Actuality entailments : broadening the space of the possibilities

Alda Mari
Institut Jean Nicod, CNRS/ENS/EHESS

Abstract

The phenomenon whereby MOD p entails p has been known as an 'actuality entailment' (AE) since Bhatt (1999). We propose an account in which the modal is trivialized but bears a presupposition of non-homogeneity that allows distinguishing the modal from the non-modal assertion. When the actuality entailment arises (i.e. when the modal has present orientation) the modal asserts (after trivialization) p but bears the presupposition that $\neg p$ could have been true.

The paper offers new elements for comparison with implicative verbs, proposing that they equally presupposes that p could have not been true. We show in passing that Hacquard's account (Hacquard, 2006,2009) equally trivializes the modal and is thus not tenable as such.

Key-words: actuality entailments, modality, non homogeneity, presupposition.

Work in progress to be constantly updated, comments welcome !
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Contents

1 Introduction

Actuality Entailments (AE) are the phenomenon whereby a modal sentence implies the non-modal equivalent.

(1) MOD $p \rightarrow p$

This phenomenon was first discovered by Bhatt (1999) in Hindi, and it was immediately observed as arising when the modal is in the perfective.

(2) a. Yusuf havaii-jahaaz uraa sak-taa hai/thaa (lekin vo havaii-jahaaz nahii
Yusuf air-ship fly can-impf be.pres/be.past (but he air-ship neg
uraa-taa hai/thaaa).
fly-impf be.pres/be.past).
'Yusuf was able to fly airplanes (but he doesn't/didn't fly airplanes).'

b. Yusuf havaii-jahaaz uraa sak-aa (#lakin us-ne havaii-jahaaz nahii uraa-yaa).
Yusuf air-ship fly can-pfv (but he-erg air-ship neg fly-pfv).
'Yusuf could fly the airplane (#but he didn't fly the airplane).'

Bhatt proposed that the modal is ambiguous and that in addition to a non-implicative *can*$_1$, there is an implicative *can*$_2$ that behaves just like the implicative *manage to*. Bhatt also proposes that the imperfective conveys generic information, which prevents the actuality entailment from arising.

It has been nonetheless quickly observed that imperfectivity *cannot* cancel the implication with implicative verbs; thus, there is no such thing as an implicative modal. The following example is in French, which is the language under study in this paper.

(3) John arrivait à prendre le train, #mais il ne l'a pas pris.
John arrive.imperf to take the train, #but he not that-has taken.
'John managed to take the train, #but he did not take it.'

Since Bhatt (*ibid.*), with the aim to provide a unified theory for modals, theoreticians have built on the assumption that the modal is non-implicative to begin with. The debate has been very active

since Bhatt (*ibid.*) and, most prominently, Hacquard (2006,2009,2010), and various answers have been provided that have sought to maintain the non-implicativity of the modal.

The major challenge faced is to be able to distinguish between the modal and the nonmodal statements.

(4) a. Jean a pu prendre le train.
'John managed to take the train.'
b. John a pris le train.
'John took the train.'

It has been previously unseen that even the most sophisticated analysis, like Hacquard (2006,2009) trivialize the modality, and can work properly only under the assumption that the modal space contains only p worlds. Clearly, the existential modal statements is compatible with there being $\neg p$ worlds in the modal space and this compatibility is not borne out.

In other terms, actuality entailments pose the difficult challenge of how they can be reconciled with the so-called 'diversity condition' of the modal, that is to say, the constraint that the modal space contain both p and $\neg p$ worlds. This idea is known by the terms nonveridicality (Giannakidou, 1998;1999) and diversity (Condoravdi, 2002; Werner, 2006). Within these views, the existential modal is non-implicative (we only marginally consider universal dynamic modals, for reasons that we ill explain in section 4.1) insofar as it quantifies over a non-homogeneous space.

Our main contribution will be to provide a new answer to this question, proposing that the space of possibilities that is projected can be wider than the modal base (the set over which the modal quantifies) and that diversity is obtained in this larger space (although this is not the space of quantification of the modal). We will carefully consider how and when this larger possibility space is projected.

To get there, we divide our discussion into two parts, considering, in turn, the at-issue meaning of the modal and the constraints that the modal triggering the AE impose on the context.

Theoreticians have extensively discussed the interaction between modality and time, starting from the observation that, in all languages studied thus far, AE obligatorily arises when the modal combines with the perfective. This phenomenon is observed in Hindi (Bhatt, 1999), in French (Hacquard, 2006; Mari and Martin, 2007, Homer, 2010), Italian (Hacquard, 2006), Greek (Giannakidou and Staraki, 2012), and Gitksan (Matthewson, 2012). With the existential modal in the perfective (5), the AE arises, as the possibility of the continuation denying the truth of p reveals (6).

(5) Jean a pu prendre le train, #mais il ne l'a pas pris.
John has can.pp take the train, #but he not that-has taken.
'John managed to move the table, #but he did not do it.'

Imperfectivity seems to cancel the AE in most languages (*a contrario*, see Giannakidou and Staraki, 2012; Davis et al., 2009).

(6) John pouvait prendre le train, mais il ne l'a pas pris.
John can.imperf take the train, but he not that-has taken.
'John could have taken the train, but he did not take it.'

The obvious question is what it is about the interaction between the modal and the perfect that triggers the AE? Our answer to this question will be in line with Matthewson (2012). We will

provide French data that corroborate Matthewson's view and provide truth-conditions accordingly.

However, interpreting the truth-conditional content in a branching-time framework, we obtained just what Condoravdi (2002) bans: existential quantification over an homogeneous space that in fact contains just one world - the actual one - and we are thus far from explaining how AE copes with nonveridicality or diversity.

The non-truth conditional component of existential modality in the perfect in French sheds new light on this question.

Hacquard (2006) and Borgonovo and Cummins (2007) observe that the AE arises with dynamic modality, including abilitative (7), teleological (8) and deontic (9) modality.

(7) Jean a pu déplacer la table, #mais il ne l'a pas déplacée.
John has can.pp move the table, #but he not that-has move.pp.fem.
'John managed to move the table, #but he did not move it.'

(8) Jean a pu prendre le train, #mais il ne l'a pas pris.
John has can.pp take the train, #but he not that-has taken.
'John managed to take the train, #but he did not take it.'

(9) Jean a pu rentrer à la piscine grâce au nouveau règlement, #mais il n'est pas rentré.
John has can.pp enter to the swimming-pool thanks to-the new rules, #but he not-is enter.pp.masc.
'John could enter (and did enter) to the swimming-pool thanks to the new rules, #but he did not enter.'

In this classification, *prima facie*, the notion of ability seems to be somehow related to specific powers of the agent, whereas with teleological modality the agent pursues a goal. The deontic appeals to conditions that allow the event to take place. We will discuss at length the constraints on worlds in section 5. What matters here for now is that AE does not arise with epistemic modality, as illustrated in (10) (Hacquard, 2006,2010).

(10) Jean a pu prendre le train, comme il a pu ne pas le prendre.
John has can.pp take the train, as he has can.pp not it take.
'John might have taken the train, as he might not have taken it.'

We do not consider the epistemic interpretation in this paper (for recent discussion a.o. Laca, 2014, Mari, 2015) and instead address the following question: what is it about past *dynamic* modals that induces AE? We will argue that dynamic modality in the past conveys the following *projective content*: at a contextually determined time, it is possible that the event described in the prejacent is not realized at a time in the future of this contextually determined time. This projective content allows one to enlarge the space of possibilities backward and to calculate diversity with respect to this enlarged space.

In this setting, the modal base and what we call the 'extended modal base' are two different spaces, with the first contained within the second. The modal quantifies over the smaller space, but diversity is obtained within the larger space. This configuration has been claimed to be featured by some types of necessity modals (Werner, 2006; Knobe and Szabó, Giannakidou and Mari, 2014), and our account thus sheds new light on the relation between dynamic modals in the past triggering AE, epistemic necessity modals, and deontic-modal-like-verbs. Across these subcategories of

modalities, the modal quantifies over a homogeneous space and diversity is obtained within a larger space.

By clearly defining the constraints on these spaces and introducing *teloi*[1] and impediments, we predict that *difficulty*, *trying* and *unlikelihood* are implicatures (see discussion in Kartunnen, 1971; Coleman, 1975; Baglini and Francez, 2014). Thus, we also establish a framework for a comparison between implicative verbs and modality triggering the AE, arguing that implicative verbs convey diversity in their projective content.

The paper proceeds as follows: In section 2, we review the available accounts for AE in French; in section 3, we provide our truth conditions, bringing together Condoravdi's framework and Matthewson's semantics. In the branching time framework, as Condoradvdi precognizes, the diversity condition is not satisfied when the AE arises, within the modal base. In section 4, we study the projective component and show how diversity conditions and actuality entailments cope with each other, studying the structure of the spaces of the possibilities appealed to in the interpretations of past dynamic modals and necessity modals. We discuss the constraints on the spaces of the possibilities in section 5, in which we also reconsider the status of the notions of difficulty, trying and unlikelihood. In section 6, we compare past dynamic modals and implicative verbs. Section 7 concludes the paper.

2 A brief history of actuality entailments (in French)

Identification of events across worlds. To the best of our knowledge[2], Hacquard (2006,2009) remains the only work that provides an explanation for the implicative-epistemic ambiguity of the modal in the perfective in French. It proposes a theory according to which modal bases are parametric to events, and the interpretations of the modals depend on their being anchored to different event types. Hacquard proposes a structural account for the ambiguity according to which the epistemic modal scopes above tense and aspect, and the dynamic modal is interpreted below temporal and aspectual operators. Saliently, the 'passé composé' is analyzed as a past perfective.

Because we do not attempt to provide a theory for the ambiguity of the modal but only study actuality entailments, we focus on the theory that Hacquard offers to derive this entailment. Hacquard maintains a non-implicative reading of the modal to begin with. Let us consider (8). Modals triggering the AE are modifiers of event descriptions. The modalized event description denotes a set of events such that there is at least a world compatible with the circumstances in the actual world such that John takes the train in this world. The time of predication of the temporal property is then restricted as past, and the following interpretation is obtained: 'There is an event in the actual world that is located in a past interval, and there is a world that is compatible with the circumstances in the actual world in which the event is an event of John taking a train.' Under the scope of aspect, the modal receives a dynamic interpretation from being anchored to a wordily event that is introduced by aspect. The world that is introduced by aspect is the actual world.

[1] $\tau\epsilon\lambda o\iota$ is the plural of $\tau\epsilon\lambda o\varsigma$. The Greek term *telos* is generally translated as 'goal'. As we make clear in section 5.1 the Aristotelian notion of *telos* subsumes the one of 'goal'.

[2] The literature on AE is rapidly expanding and it would be impossible enterprise to render justice here to the variety of works on AE across languages, see, for Greek, Giannakidou and Staraki, 2012; for Spanish, Borgonovo and Cummins, 2007; Laca, 2008; for Blackfoot Davis et al., 2010; Louie, 2014. We also do not discuss syntactic approaches, Demirdarche and Uribe-Etxebarria, 2008. For a complete overview of Actuality Entailments see Hacquard, 2014.

To obtain the AE, the event located in the actual world at a past time must bear the same description as the 'possible' event. To this end, Hacquard proposes the following principle.

(11) Preservation of Event Descriptions Across Worlds: for all worlds w1, w2, if e occurs in w1 and w2 and e is a P-event in w1, then ceteris paribus, e is a P-event in w2

Unnoted in the literature is the fact that Hacquard's account itself trivializes the modal. Here is why. An existential modal claim is of course compatible with all worlds being P worlds, or some of the worlds being non-P worlds. The latter possibility is booked under Hacquard's view. It would have to be possible to extend the truth conditions in the following way.

(12) $[\![$Jane a pu courir$]\!]^{w,B,c,\leqslant}$ = 1 iff $\exists e[e$ in $w \wedge \tau(e) \subseteq t \wedge t \prec t_u \wedge \exists w'$ compatible with the circumstances in w such that $run(e, J, w')$ AND $\exists w''$ **compatible with the circumstances in** w **such that** $\neg run(e, J, w'')]$

In this case the AE does not follow: the actual event can either be a P event or a $\neg P$ event. The actuality entailment in Hacquard's account can only be obtained is the modal space contains only P worlds.

Action dependent abilities Mari and Martin (2007) specifically introduce the notion of 'action dependent ability' (ADA), which they define as follows.

- (i) ADAs require an action to exist - actually, an ADA *ontologically depends* on the corresponding action.
- (ii) A unique and non repeatable performance suffices to imply the corresponding ADA.
- (iii) ADAs have the same temporal boundaries than the action of which they depend and are thus bounded.

Claims (i) and (ii) are problematic. (i) is meant to explain the AE: an action has to ontologically pre-exist the attribution of the ability. However, the AE arises even when the existence of the action is not certain, as in questions, in which the speaker is not asking whether John had the possibility of taking the train but whether he actually took it.

(13) Il devait partir. Est-ce qu' il a pu prendre le train ?
He must.imperf leave. he has can.pp take the train?
'He had to leave. Did he manage to take the train?'

Claim (ii) is also problematic. It states that performing an action implies that the performer of the action had the ability to perform it. So far so good. However, why do we choose to utter an abilitative statement is some cases but not in others ? Consider the following scenario. I see a dog running. Then, I utter (14):

(14) Ce chien a pu courir.
This dog has can.pp run.
'This dog managed to run.'

Since the ability of running is implied by the running itself, I can feel titled to utter an abilitative statement. In spite of this, the most probable reaction of the hearer would be:

(15) Wait a minute: there were some impediments?

In other terms, the performance of an action does not seem to justify the attribution of an ability to act, *post facto*. Once again, the question that has not been addressed is under what circumstance we do use modals in an implicative way and what the constraints on the context are.

Mari and Martin (*ibid.*) importantly propose (iii), namely that ADA (and more generally the possibility) has the same temporal boundaries as the action. Let us for now note that Homer (2010) provides further data for this claim, which we present in (16).

(16) a. Hier il a pu rendre son devoir.
Yesterday he has can.pp return his homework.
'Yesterday, Pierre managed to turn in his homework.'
b. #Hier il a pu rendre son devoir demain.
Yesterday he has can.pp return his homework tomorrow.
'#Yesterday, Pierre managed to return his homework tomorrow.'

The contrast in (16) shows that the time of the event cannot follow the time at which the possibility holds. In the next section, we will spell out this constraint in more precise terms when we introduce Condoradvi's terminology.

Actualistic present perfect Homer (2010) also builds on the clash between the stativity of the modal and the perfective aspect and shows that the perfect on a stative leads to actuality entailment beyond modal verbs. (17) entails that the house has been sold.

(17) La maison a coûté 200000 euros.
The house has cost.pp 200000 euros.
'The house has costed 200000 euros'.

Homer's explanation resorts to an actualistic operator ACT.

The schematic LF proposed by Homer is in (19).

(18) Jean a pu prendre le train.
John has can.pp take the train.
'John managed to take the train'.

(19) [PRES [PERF [PFV [Q ACT [pouvoir [Jean prendre le train]]]]]]

The analysis for (18) is in (20).

(20) $[\![$Jean a pu prendre le train$]\!]^{c,s}(c_w)$ = 1 iff there is a past interval t s.t., there is an eventuality e of $s(Q)$ in t in c_w s.t. no proper part of e is an eventuality of $s(Q)$ and e is simultaneous with a state in c_w of John taking the train being possible.

(20) correctly predicts that the possibility and the event have the same temporal boundaries. However, with Piñón (2011), we observe that (20) does not entail the existence of an eventuality e in which John takes the train. Homer explains (Homer, *ibid.*, p.11) that a pragmatically determined

event is entailed. As a consequence, one can legitimately wonder, with Piñón (*ibid.*), how an actuality entailment is ensured given that in any realistic context, there are a number of available values for Q.

3 When do AE arise ?

3.1 Model theoretic assumption: predicting the modal/temporal configuration for actuality entailments.

Condoravdi introduces the now-standard distinction between the temporal perspective (TP) of the modal and the temporal orientation (TO) of the modal. The temporal perspective of the modal is the time at which the modal base is projected. The temporal orientation of the modal is the relationship between the temporal perspective and the time of the described event. In Condoravdi's setting, different temporal orientations of the modal correlate with different interpretations of the modal. With present TP and present (21-a) or past (21-c) TO, the modal is epistemic. With present TP and future TO, the modal is circumstantial (21-b). When the TP of the modal is past and the TO of the modal is future, a counterfactual reading arises (21-d).

(21) a. He might be sick. - Epistemic - present TP - present TO
b. He might become sick. - Circumstantial - present TP - future TO
c. He might have won the game. - Epistemic - present TP - past TO
d. He might have won the game. - Counterfactual interpretation - Past TP - future TO

To generalize, the epistemic interpretation is obtained with present and past TO; the circumstantial (and counterfactual) interpretations are obtained with future TO.

The lexical aspect is the key factor in determining whether present or future orientation is obtained. The modal has future TO when the prejacent in its scope is eventive (21-a)-(21-d).

Finally, in Condoravdi's setting, modality bears modal and temporal information, as shown in (22).

(22) $MAY/MIGHT : \lambda P \lambda w \lambda t \exists w'[w' \in MB(w,t) \wedge AT([t,\_), w', P)]$

A function AT is defined as in (23):

(23) $AT(t, w, P)$ =
a. $\exists e[P(w)(e) \wedge \tau(e,w) \subseteq t]$ if P is eventive
b. $\exists e[P(w)(e) \wedge \tau(e,w) \circ t]$ if P is stative
c. $\exists e P(w)(t)$ if P is temporal

The following truth conditions are obtained. PRES provides *now*.

(24) a. He might become sick.
b. PRES(MIGHT(he arrive)) =
$\lambda w \exists w'[w' \in MB(w, now) \wedge \exists e$[he become sick$(w', e) \wedge \tau(e, w') \subseteq [now, _)]]$
There is a world w' in the modal base projected at now such that there exist an event of 'he become sick' in w' and the temporal trace of the event in w' is included in the

right open interval starting at now.

(25) a. He might be sick.
b. PRES(MIGHT(he be sick)) =
$\lambda w \exists w'[w' \in MB(w, now) \wedge \exists e[\text{he be sick}(w', e) \wedge \tau(e; w') \circ [now, \_)]]$
There is a world w' in the modal base projected at now such that there exist an eventuality of 'he being sick' in w' and the temporal trace of the eventuality in w' overlaps with the right open interval starting at now.

These truth conditions are silent with respect to the types of modal bases. The interpretations of the modal (whether it is metaphysical/circumstantial or epistemic modality) are derived in a principled way given some properties of the model. Condoravdi follows Thomason's world-time model (Thomason, 1984), using $W \times T$ frames. A branching structure is generated. Each branching point determines an equivalence class of worlds with a unique past and present and an open future. A three-place relation $\simeq$ on $T \times W \times W$ is defined such that (i) for all $t \in T$, $\simeq_t$ is an equivalence relation; (ii) for any $w, w' \in W$ and $t, t' \in T$, if $w' \simeq_{t'} w$ and t precedes t', then $w' \simeq_t w$ (we use the symbols $\prec$ and $\succ$ for temporal precedence and succession, respectively). In words, w and w' are historical alternatives at least up to t' and thus differ only, if at all, in what is future to t'.

Figure 1 depicts two equivalence classes of worlds, determined at t_1 and t_2.

(26) a. $w_0 \simeq_{t_1} w_1 \simeq_{t_1} w_2 \simeq_{t_1} w_3 \simeq_{t_1} w_4$ (historical alternatives at t_1).
b. $w_0 \simeq_{t_2} w_2 \simeq_{t_2} w_3$ (historical alternatives at t_2).

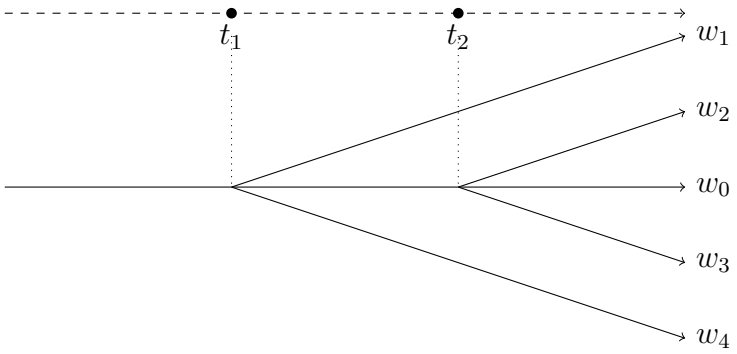

Figure 1: Equivalence classes of worlds

For any time $t \in T$, Condoravdi defines the *common ground* $cg(t)$ as the set of worlds that are identical to the actual world w_0 at least up to and including t.

(27) $cg(t) := \{w \mid w \simeq_t w_0\}$

Figure 2 depicts the common ground, determined at time t.

(28) $cg(t) = \{w_1, w_2, w_0, w_3, w_4\}$

The final piece to obtain the interpretations of the modal is the diversity condition.

(29) Diversity Condition (Condoravdi, 2002).

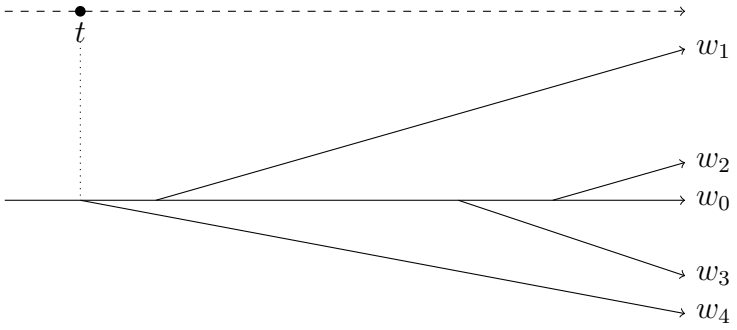

Figure 2: *cg(t)*

There is $w \in cg$ and $w', w'' \in MB(w,t)$ such that:
AT$([t,_), w', P)$ and $\neg$AT$([t,_), w', P)$

The idea is that the modal base must contain p and $\neg p$ worlds.

Note immediately, that branching time has been used for a variety of purposes. For Condoravdi, the branches represent metaphysical alternatives. For Belnap (1992), branching points represent the agent's choices. For now, we assume that the branches represent the actual world in time. We will add goals and teloi later on. Our goal is for now to spell out the temporal/modal configuration that gives rise to AE. For us, the branches represent the 'circumstances'. There is nothing deep here, it is just the actual work evolving in time.

For modals that express circumstantial modality, the modal base consists of historical alternatives, which are determined at the time at which the modal base is projected $MB(w,t) = \{w' : w' \simeq_t w\}$. These are alternatives that are identical up to and including t and differ in what is future to t. For modals that express epistemic modality, the modal base is an epistemic state. Epistemic states are unions of sets of equivalence classes of worlds with respect to a given time.

If the presupposition of diversity is satisfied within a metaphysical modal base, the modal is circumstantial. To achieve diversity in the circumstantial modal base, multiple branches must be available at the time of evaluation of the prejacent p, with p not being settled as either true or false across the available alternatives. If there is no circumstantial diversity in the modal base, then the modal is epistemic.

The temporal orientation of the modal determines which of these interpretations of the modality is available. If TO is future (w.r.t. TP), metaphysical/circumstantial diversity is obtained, and the interpretation of the modal is circumstantial. If TO is present or past (w.r.t. TP), there is circumstantial settledness, and the modal can only receive an epistemic interpretation.

Dynamic modality requires circumstantial diversity, and thus dynamic modality can only have future TO. Because at the time of the modal perspective there is just one world (the actual one), if the temporal orientation is present, circumstantial diversity cannot be obtained within the modal base.

Now, what we want to propose, is that, rather than seeing this as a ban, we should see this as a major prediction of branching time, which, based on model theoretic assumptions, together with the diversity condition, predicts the exact temporal/modal configuration in which actuality entailments arise. The prediction that AE arise with present oriented circumstantial modality is borne out as

data across languages confirm.

3.2 Confirming the prediction: Actuality entailments and present oriented circumstantial modality

Kratzer (2011) has recently proposed that future orientation takes away AE, but future orientation is not coded in the modal, as Condoravdi proposes. According to Kratzer, every modal is followed either by a perfective or prospective aspect, and the AE does not arise with the latter.

(30) Kratzer (2011)

a. [Present [Mary can$_{\lambda n}$ [Perf [x$_n$ climb Everest]]]]
b. [Past$_n$ [Mary can$_{\lambda n}$ [Perf [x$_n$ climb Everest]]]]
c. [Present [Mary can$_{\lambda n}$ [Prosp [x$_n$ climb Everest]]]]
d. [Past$_n$ [Mary can$_{\lambda n}$ [Prosp [x$_n$ climb Everest]]]]

Here, the modal is interpreted between tense and aspect. This system is supported with typological evidence by Matthewson (2012), who establishes a cross-linguistic correlation between the presence and/or absence of prospective aspects and actuality entailments. Gitksan provides evidence for Kratzer's view, offering an overt prospective aspect marker *dim*, which suppresses the actuality entailments.

In Gitksan, modals are lexically restricted with respect to the modal bases they allow: *ima* is the epistemic modal and *da'akxw* is the circumstantial modal. Matthewson argues that in Gitksan, the modal does not bear temporal information. (31) provides a piece of evidence. It is not acceptable in a context in which the speaker has evidence that it is going to rain after the time of the utterance; it can only be used in contexts in which the speaker has evidence for past or present rain. The examples and the glosses are from Matthewson, 2012:436-437.

(31) yugw=ima'=hl wis
impf=epist=CN rain
'It might have rained' / 'It might be raining' / not: 'It might be raining in the future'.

Matthewson also shows that dim, the prospective aspect is *obligatory* with circumstantial modality.

(32) da'akxw[-i]-'y dim ayee=hl bax-'y
circ.poss[-tra]-1sg.II PROSP go.fast=CN run-1sg.II
'I can run fast'.
Rejected in context: 'You were a fast runner, but you've become permanently paralyzed.'

In French, we can observe that the actuality entailment does not arise when there is some prospective component. This seems to be present with present and imperfective (see Bhatt, 1999; Hacquard, 2006,2009).

With the verb in the present, we obtain future orientation with eventives.

(33) Jean arrive.
John arrive.3sg.pres.
'John is about to arrive (he is not here yet).'

When the modal is in the present, the AE does not arise.

(34) John peut prendre le train, il a le temps.
John can take this train, the has the time.
'John can take the train, he still has time.'

Extending the Kratzerian picture to French, we would obtain the following:

(35) PRES(MOD(PROSP(p))

A sentence such as (36), with the imperfective, along the lines of Hacquard (2006,2009), is analyzed as in (37).

(36) Jean pouvait prendre le train (mais il ne l'a pas pris).
John can.3sg.impf take the train (but he that-has not taken).
'John could take the train, but he did not take it.'

(37) PAST(MOD(PROSP(p))

Kratzer's system thus extends to French.

Let us now return to the modal in the perfect and reconsider Homer's data (Homer, 2010).

(38) a. **Hier** il a pu rendre son devoir.
Yesterday he has can.pp return his homework.
Yesterday, Pierre managed to turn in his homework.
b. #**Hier** il a pu rendre son devoir **demain**.
Yesterday he has can.pp return his homework tomorrow.
'Yesterday, Pierre managed to return his homework tomorrow'.

As we see, AE arises with present TO, just as we predict based on model theoretic assumptions.

3.3 Actuality entailments in the present

Historically AE have been studied in connection with PAST. The model we are using here, however, allows us to see that AE can also arise in the present if the modal has present TO. Imagine a scenario in which Benjamin does not know David's password, but really needs to get connected. He tries a series of passwords and by chance he can use David' computer. *While he is using it* I can utter:

(39) Benjamin peut se connecter (Mari, 2011/2015)
Benjamin can get connected.

In this case, the modal has present orientation and the AE arise. The story that we are going to develop, later on in the paper, namely that it is presupposed at a time prior to the time of the event that the event could have not taken place equally holds for AE in the present.

A more general note. We are working under the the hypothesis that what distinguishes the modal from the non-modal assertion is that there must be some $\neg p$ world involved at some level of the interpretation. What this amounts to, for instance, for abilitative modality ? When I utter (40), I am not simply describing a functioning of Maria. This sentence conveys that it was not possible

for Maria to breathe before, or that someone else cannot breathe, or that I thought that she could not breathe.

(40) Maria can breathe

In this paper we focus on the presupposition of the modal in the specific case where the AE arise. Future research will reveal the types of contexts that enable ability attributive statements.

This being said, let's continue with AE in the past to prepare the way to investigate the role of projective content.

3.4 Truth conditions

The coincidence of TP and TO is derived by having PAST binding all temporal variables in its scope.

(41) PAST [MOD [ASP [VP]]]

In our analysis, the 'passé composé' is analyzed as a PAST,[3] in line with Squartini and Bertinetto (2000), who argue for the aoristic drift of the present perfect in French, which has replaced the simple past in spoken French (see also Shaden, 2009). Note also that the AE also arises when the modal is in the simple past, and thus there is nothing inherent in the presence of an alleged result state that would account for the AE.[4]

(42) Jean put prendre le train, #mais il ne l'a pas pris.
John can.sp take the train, #but he not that-has taken.
'Jean managed to take the train, #but he did not take it.'

The lexical entries are the following, for (8).

(43) a. MOD = $\lambda p \lambda w \lambda t. \exists w' [w' \in MB(w,t) \wedge p(t)(w') = 1]$
b. PAST = $\lambda p \lambda w \exists t' [t' \prec t_u \wedge p(t')(w) = 1]$
c. ASP = $\lambda w \lambda t. \exists e$[he take the train$(e)(w) \wedge \tau(e) = t$]
d. VP = λe[he take the train(e)]

The composition proceeds as follows.

(44) a. ASP(VP) =
$\lambda w \lambda t. \exists e$[he take the train$(e)(w) \wedge \tau(e) = t$]
b. MOD(ASP(VP))) =
$\lambda w \lambda t. \exists w' [w' \in MB(w,t) \wedge \exists e$[he take the train$(e)(w') \wedge \tau(e) = t$]]

[3] To account for the pluperfect in French, one could argue that the 'passé composé' is to be analyzed as a relative past, with a PRES head. This would not change the truth conditions, however, with PRES providing the contextual now, which is to say the utterance time.

[4] Mari and Martin (2007) note that, with the 'passé composé,' when a temporal adverb is added, the AE is not obligatory, see footnote 1. See also Homer (2010). The same pattern arises with the simple past. 'Il put s'échapper à ce moment là, mais il ne s'est pas échappé.' *He could escape at that moment, but he did not escape.* As Homer argues, the optionality of the AE is an effect of the adverb. We thus do not consider that in this case, as, in the default case, without the adverbs, that the AE is obligatory (see Hacquard, 2006,2009; Mari and Martin, 2007; Homer, 2010; Thomas, 2013).

c. PAST(MOD(ASP(VP))) =
$\lambda w \exists t'[t' \prec t_u \wedge \exists w'[w' \in MB(w, t') \wedge \exists e[$he take the train$(e)(w') \wedge \tau(e) = t']]]$

The truth conditions are in (45).

(45) Truth conditions.
$[\![$PAST(MOD(ASP(VP)))$]\!]$ = 1 iff
$\exists t'[t' \prec t_u \wedge \exists w'[w' \in MB(w_0, t') \wedge \exists e[P(e)(w') \wedge \tau(e) = t']]]$
There exist a time t' preceding the time of the utterance and there is a world w' accessible from w_0 at t' and there is an event that is a P event in w' and the temporal trace of e is equal to t'.

Here, the temporal perspective is past, and the temporal orientation of the modal is present (i.e., the time at which the modal base is projected and the time at which the eventuality is located are both t'). Again, this is expected under our model theoretic assumptions.

3.5 Trivial quantification: open questions

What we are arguing for, is that AE arise in the temporal-modal configuration depicted here.

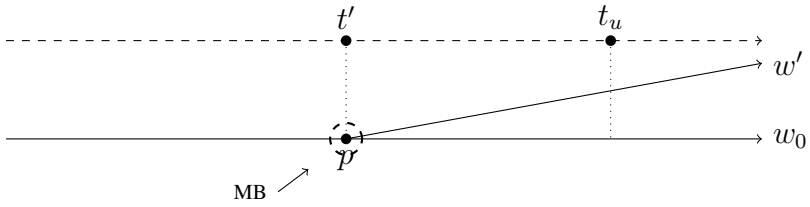

Figure 3: The circumstantial modal base associated with past dynamic modals in French.

We are for now assuming, loosely, that the modal has a circumstantial interpretation. We will color the branches later in the paper when we ail turn to the notion of $telos$. The circumstantial modal base at t' contains just one world, the actual one. Because the modal quantifies over this set, the AE is obtained.

The quantification is trivial (this is also in line with Borgonovo and Cummins, 2007, although these authors derive trivial quantification in a different setting), and, at this point, the modal statement seems to convey the same content as a non-modal statement.

Because the time of evaluation of the prejacent is not forward-shifted, metaphysical/circumstantial diversity cannot be obtained. The modal base on which the modal quantifies in Figure 3 is a homogeneous space that contains just one world, and the condition of diversity hinging on modal bases is not satisfied.

We have nonetheless argued that banning present oriented circumstantial modality is not a suitable strategy (see Condoravdi, 2002): actuality entailments arise with present-oriented circumstantial modality (Matthewson, 2012) and this is the case in French.

One has to acknowledge that actuality entailments arise precisely with present-oriented circumstantial modality and that, in this modal-temporal configuration, the modal base does not satisfy

metaphysical/circumstantial diversity. The question of the semantic difference between the modal and non-modal statement is open and requires investigation.

Consideration of the constraints that past dynamic modals triggering the AE impose on the utterance context allows us to shed new light on the phenomenon, considering a previously understudied dimension.

Let us first add a note about universal past dynamic modals giving rise to the AE.

3.6 A note on universal modals and AE

Hacquard (2006) also notes that AE arise with the universal modal *devoir* (*must*).

(46) Jean a dû aller voir sa tente, #mais il n'est pas allé la voir.
Jean has must.pp go see his aunt, #but he not-has go.pp her see.
'John had to go to see is aunt, #but he did not go to see her.'

The truth conditions are as follows:

(47) Truth conditions.
$[\![$PAST(MOD(ASP(VP)))$]\!]$ = 1 iff
$\exists t'[t' \prec t_u \wedge \forall w'[w' \in MB(w_0, t') \wedge \exists e[P(e)(w') \wedge \tau(e) = t']]]$
There exist a time t' preceding the time of the utterance and for all w' accessible from w_0 at t' and there is an event that is a 'take the train' event in w' and the temporal trace of e is equal to t'.

Interpreting these truth conditions in a branching time framework, the AE is also predicted. As we are now going to argue, existential past dynamic modals impose diversity on a space of possibilities that is projected at a time prior to the time of the event. As we note later on (see end of section 4.1), universal modals do not seem to impose this constraint. As a consequence, the main focus of the paper are existential past dynamic modals.

4 The extended modal base and the diversity condition

As Hacquard noted, actuality entailments arise not only with abilitative (48) but also with teleological (49) and deontic modalities (50). Note that, in all these cases the agent has the goal of carrying about p. For this reason we subsume these cases under the general label goal-oriented modality.

(48) Jane a pu déplacer la table, #mais il ne l'a pas déplacée. (= (7))
Jane has can.pp move the table, #but he not that-has move.pp.fem.
'Jane managed to move the table, #but he did not move it.'

(49) Jane a pu prendre le train, #mais il ne l'a pas pris. (= (8))
Jane has can.pp take the train, #but he not that-has take.pp.
'Jane managed to take the train, #but he did not do it.'

(50) Jean a pu rentrer à la piscine grâce au nouveau règlement, #mais il
John has can.pp enter to the swimming-pool thanks to-the new rules, #but he
n'est pas rentré. (= (9))
not-is enter.pp.masc.
'John could enter (and did enter) to the swimming-pool, thanks to the new rules, #but he did not enter.'

To answer the questions of how to reconcile diversity conditions and AE, we need to understand why AEs arise with these types of modality.

Anticipating what is to come, what we are going to argue is that, at some level of the interpretation, the sentence conveys that $\neg p$ was a possibility. As for (49), we would use this sentence in a context in which John has taken the train, but he also could have missed it. Something could have occurred before the time at which he took the train, such as being kept in a late meeting, or the metro was on strike, etc. More generally, $\neg p$ is a possibility in the modal space (given some restrictions on worlds) projected at a time that preceded the time of the event, and which is contextually determined.

In the sequel of this section we argue that the past dynamic modal triggering the AE conveys the following projective content:

(51) Projective content c (informal): $\neg p$ was a possibility in the common ground (given some restrictions on the relevant worlds, cf. *infra*) fixed at a contextually determined time. The time of the event follows this contextually determined time.

We now show that this is indeed projective content and will try to understand, along the lines of Tonhauser, et al. (2013), what type of projective content is triggered by the past dynamic modal, and whether it is a case of presupposition (see, for the most recent and elaborate discussion, Schlenker, 2009).

4.1 Strong Felicity Constraint, projective content

We now diagnose that the trigger imposes a strong felicity constraint (SFC) on the context with respect to content c and that this content projects.

c-positive and c-neutral contexts are defined (Tonhauser et al., 2013).

(52) c-positive and c-neutral contexts
A c-positive context is an utterance context that entails or implies c. A c-neutral context is an utterance context that entails or implies neither c nor $\neg c$.

In our case, the c-positive context is the one that entails that there is a contextually determined time in the past, at which alternatives are projected, including p and $\neg p$ worlds.

(53) Strong Contextual Felicity constraint.
If utterance of trigger t of content c is acceptable only in a c-positive context, then t imposes a Strong Contextual Felicity constraint with respect to c.

Consider the following scenario. As well-known, Usain Bolt is the fastest runner in the world, who can run 100 meters in 9.58 seconds.

(54) Usain Bolt a pu battre le record du monde des 100 mètres grâce à son
Usain Bolt has can.pp beaten the record of-the world of-the 100 meters thanks to his
entraînement.
training.
'Usain bolt managed to win the 100 meters world record thanks to his training.'

Beating the world record is never granted, and the possibility that even Usain Bolt does not beat it is open at a time prior to the race. The sentence is felicitous. Sentence (56), instead, is infelicitous in Context 1 and felicitous in Context 2 described in (55).

(55) a. *Context 1* : Usain Bolt is in his best shape and at the climax of his career.
b. *Context 2*: Usain Bolt is recovering from a long cold and is far from his highest standards.

(56) (#)Usain Bolt a pu courir 100 mètres en 15 secondes aujourd'hui.
Usain Bolt has can.pp run 100 meters in 15 seconds today.
'Usain Bolt managed to run 100 meters in 15 seconds today.'

Consider context (55-a), in which sentence (56) is infelicitous. Since Usain Bolt can run 100 meters in 9.58 seconds, it is taken for granted that, in his best shape, he can run 100 meters in fifteen seconds, and the possibility that he does not run 100 meters in fifteen seconds is not available in the modal space projected at a contextually determined past time such that the time of the event is in the future with respect to it.

Sentence (56) is instead felicitous in context 2 (55-b), where Usain Bolt is recovering from a very bad cold. In this context, running 100 meters in fifteen seconds is not granted; the possibility of $\neg p$ is open in the modal space projected at a contextually determined time such that the time of the event is in the future of that time, and so the sentence is felicitous in this context.

The un-modalized sentence (57) is felicitous in both contexts (55-a) and (55-b), instead. It does not require that $\neg p$ was a possibility projected at a time that was prior to the time of the event but it is compatible with it.

(57) Usain Bolt a couru 100 mètres en 15 secondes.
Usain Bolt has run.pp 100 meters in 15 seconds.
'Usain Bolt has run 100 meters in 15 seconds.'

Importantly, the content c triggered by past dynamic modals must be part of the utterance context prior to utterance, and encodes what the participants take for granted (Schlenker, 2009; Tonhauser et al. 2013 relate this property to SFC), as 'wait a minute' test (designed to detect presuppositions – von Fintel, 2004) shows. Consider the following scenario. My mother has to take the train to her home in the south of the country. She generally goes there every weekend, and she phones my husband or me to tell us that she has arrived. She generally phones me on Saturday. My husband comes home and asks whether she has arrived (see (58)).

(58) Est-ce que ta mère est arrivée ?
your mother is arrive.pp.fem ?
'Did your mother arrive?'

If I reply (59), and my husband is not aware that it was not granted that my mother would take the

train, he would be entitled to ask (60).

(59) Oui, elle a pu prendre le train.
Yes, she has can.pp take the train.
'Yes, she managed to take the train.'

(60) Attends, il y avait un problème ?
Wait, it there have.3sg.imp a problem ?
'Wait a minute, there was a problem?'

Similarly, consider again the sentence (14), repeated here in (61). As we mentioned, for the sentence to be felicitous, the context of utterance must entail that it was possible that the dog would not run.

(61) Ce chien a pu courir.
This dog has can.pp run.
'This dog managed to run.'

We thus conclude that the trigger (the past dynamic modal) imposes SFC with respect to c and that c must be part of the utterance context prior to the utterance.

For triggers imposing SFC with respect to c, projectivity of c is defined as in (62) (Tonhauser et al. 2013).

(62) Trigger t imposes a Strong Contextual Felicity constraint with respect to c.
If utterances of $FOS(S)$ [Family of sentences(S)] are judged unacceptable in a c-neutral context and acceptable in a c-positive context, the implication c is projective.

The content c triggered by the dynamic modal in the past projects, as the following family of sentences reveal. Again, (63)-(64)-(65) are felicitous only in c-positive contexts, implying that not running 100 meters in fifteen seconds is an open possibility in the modal space projected at a contextually determined time such that the time of the event is in the future with respect to it (Usain Bolt is recovering from a cold – see Context 2 in (55-b)).

(63) (#)Est-ce qu' il a pu courir 100 mètres en 15 secondes, aujourd'hui ?
He has can.pp run 100 meters in 15 seconds, today ?
'Did he manage to run 100 meters in 15 seconds?'

(64) (#)Il est possible qu'il ait pu courir 100 mètres en 15 secondes.
It is possible that-he has.3sg.subj can.pp run 100 meters in 15 seconds.
'It is possible that he managed to run 100 meters in 15 seconds'.

(65) (#)S'il a pu courir 100 mètres en 15 secondes, alors il va bientôt se
If-he has can.pp run 100 meters in 15 seconds, then he go.3sg.pres soon refl
remettre.
be-fine.
'If he managed to run 100 meters in 15 seconds, then he is going to be fine soon.'

Similarly, the following family of sentences are felicitous only in c-positive contexts implying that my mother not taking the train is an available option in the modal space projected at time

preceding the time of the event (e.g. the metro was on strike, she did not feel well, she was kept in a late meeting ...).

(66) a. Est-ce que ta mère a pu prendre le train ?
Your mother has can.pp take the train.
'Did your mother manage to take the train?'
b. Si ma mère a pu prendre le train, alors elle est arrivée.
If my mother has can.pp take the train, then she is arrived.
'If my mother managed to take the train, then, she has arrived.'

In addition to SFC and Projectivity Tonhauser et al. (2013) use a third diagnostic to disentangle different types of projective content: the obligatory local effect (OLE), (67).

(67) Obligatory Local Effect.
A projective content c with trigger t has an Obligatory Local Effect if and only if, and when it is syntactically embedded in the complement of a belief-predicate B, and c is necessarily part of the content that is targeted by, and within the scope of B.

The following minimal pair illustrates (67).

(68) a. #Jane believes that Bill has stopped smoking and that he has never been a smoker.
b. Jane believes that Bill, who is Sue's cousin, is Sue's brother

Sentence (68-a) attributes inconsistent beliefs to Jane. (68-b) does not. The projective content c triggered in (68-a) has thus OLE.

Tonhauser et al. (*ibid.*) design a sub-diagnostic for projective content c having OLE for triggers imposing a SFC on c. This sub-diagnostic is in (69).

(69) Trigger t imposes a Strong Contextual Felicity constraint with respect to c: Let S be a sentence where $S1$ is embedded under a belief-predicate. If utterance of S is acceptable when the utterance context entails c but the bearer of the attitude is explicitly ignorant of c, then the content c with trigger t need not have its effect locally, i.e. does not have Obligatory Local Effect.

To test whether the content c triggered by past dynamic modal sentence has OLE we built the following scenario (modifying Baglini and Francez, 2014). It is never the case that everyone gets an automatic A in class, but the bearer of the attitude is explicitly ignorant of c (Philippe believes that A is automatic).

(70) Tout le monde sait qu'il est impossible d'avoir A automatiquement. Philippe ne le sait pas et croit que tout le monde a un A automatique. Philippe croit que Anne **a pu** avoir A.
'Everyone knows that it is impossible to get an automatic A. Philippe does not know this and believes that everyone has an automatic A. Philippe believes that Anne managed to get an A.'

The modal sentence seems felicitous in this context.

Assessing the felicity of this type of sentences, as Tonhauser et al. (2013) note, is a very difficult task. They discuss the case of *too* in (71), and build up a scenario in which Jane is not aware that

Mary is having dinner in New York.

(71) Mary's having dinner in New York tonight, and, Jane thinks Sam is having dinner in New York tonight, **too**. Coincidence? I don't think so! But don't let Jane know that I told you about Mary or Sam's dinner plans, or she'll say IÕm being a gossip.

They explain that 'the implication targeted seems not to be about the external world which the interlocutors seek to describe, but facts about the discourse situation itself ... Clearly there is no implication that Jane thinks that a certain proposition, e.g. the proposition that Mary is having dinner in New York, is salient in the utterance context, since Jane doesn't know anything about the utterance context, and need not have any particular beliefs about what is salient in the minds of the interlocutors.' (Tonhauser et al. *ibid.*:100-101). It follows that the salience implication does not have Obligatory Local Effect.

Our case (70) seems parallel. Philippe does not have any particular belief about what is salient in the minds of the interlocutors. Consequently, c does not have OLE. In this respect, the content triggered by past dynamic modals giving rise to the AE cannot be classified in the same class as the content triggered by, e.g., 'to stop'.

We do not pursue the discussion about local context any further here, as the relevant criterion important for us is that the trigger imposes a SFC on the context (no matter whether c has OLE or not). Tonhauser et al. (*ibid.*) identify different classes of projective content, based on the Strong Felicity Constraint (SFC) an Obligatory Local Effect (OLE).

For triggers imposing SFC, presence/absence of OLE disentangles two different classes, both of which comprise anaphoric expressions like *too*. As they argue, it is the Strong Contextual Felicity constraint that can be taken to reflect an anaphoric requirement imposed by a trigger on the context. This suffices for us, and this conclusion allows us to explain that past dynamic modals are typically odd in discourse initial contexts. To announce Anne's arrival at a party, (72) is a weird thing to say.

(72) Anne a pu arriver.
Anne has can.pp arrive.
'Anne managed to arrive.'

The sentence can only be felicitously uttered if it is a possibility prior to the time of the event that Anne cannot arrive and that this possibility is familiar.

In a recent work, Klecha (2011) establishes a clear connection between modal bases, domain restriction and anaphora. He focuses on modals that are odd in initial discourse contexts, and his explanation resorts to a consideration of the presuppositions that modals place on the context of utterance. Klecha considers the following contrast – Binnick (1971).

(73) a. Don't go near that bomb! It'll explode!
b. Don't go near that bomb! It's going to explode!

As Binnick noted, the second sentence in (73-a) must be understood as meaning 'If you go near it, it'll explode.' In Binnik's view, there is an implicit conditional. According to Klecha (but not to Binnik), the sentence (73-b), *can* have this interpretation. This implicit conditional reading for (73-a) is labeled 'modal subordination' by Roberts (1989). Klecha treats it as a case of implicit domain restriction on modal expression (in the spirit of Kratzer, 1981/1991). The if-clause introduces the conversational background, the set of worlds on which the modal quantifies. Klecha adds that,

for some (but not all) modals, the conversational background is familiar (Heim, 1982). Klecha calls *definite modals* those modals that impose an implicit domain restriction, which is also familiar.

In our case, the modal also imposes a domain restriction. However, differently from the case discussed in Klecha (*ibid.*), the restricted domain is not the modal base on which the modal quantifies, as we now make clear. Recall that the modal base is the set of alternatives projected at the time of evaluation of the modal. As we have shown, past dynamic modals impose that a past time – such that the time of the event is in the future of that time – is identified, at which a set of alternatives is projected, that satisfy diversity.

Before we formally define c and provide our final analysis for past dynamic modal sentences with present TO, let us note that universal past dynamic modals do not seem to trigger the projective content triggered by existential past dynamic modals.

Assume a context in which we are waiting for Anne. The possibility that $\neg p$ is not familiar. In this context, unlike (74-b), (74-a) is felicitous.

(74) a. Elle va arriver plus tard, elle a dû passer à la boulangerie.
She goes arrive more later, she has must.pp pass-by to the bakery.
'She is going to arrive later, she had to pass by the bakery.'

b. Elle va arriver plus tard, elle a pu passer à la boulangerie.
She goes arrive more later, she has can.pp pass-by to the bakery.
'She is going to arrive later, she managed to pass by the bakery.'

That $\neg p$ (in (74-b), not to pass by the bakery) is a possibility determined at a time prior to the event is thus a peculiarity of existential past dynamic modals, on which we now exclusively focus.

4.2 Broadening the space of the possibilities

Our starting assumption is that dynamic modality requires that the time of evaluation of the prejacent follow the time at which alternatives - including p and $\neg p$ worlds - are projected.

When the modal is in the present, the time at which alternatives are projected is the utterance time and the set of projected alternatives is the modal base. As we have already mentioned, when the modal is in the present, there a prospective component that is introduced by the present itself. The sentence in (75) can be decomposed as in (76) (à la Kratzer, 2011)[5]. The interpretation of (75) is along the lines of (77).

(75) Il peut arriver bientôt.
He can arrive soon.
'He might arrive soon.'

(76) PRES(MOD(PROSP(p))) à la Kratzer (2011)

(77) $\exists w' \in MB(w_0, t_u) \exists t' \in [t_u, \infty) \big(p(w', t')\big)$

Here, the modal has future TO w.r.t. the TP, which is the time of the utterance. As a consequence, in the specific case in which the modal is in the present, the set of projected alternatives is the **modal base**. The modal base has three properties, namely, it

[5]We are not committed to this particular analysis for the modal in the present. For an alternative view, see Giannakidou, (2009).

1. is projected at a contextually determined time such that the time of the event is in the future with respect to it,

2. is the domain of quantification of the modal,

3. satisfies diversity.

Picturing the modal base for the modal in the present, we obtain the following configuration (see Figure 4):

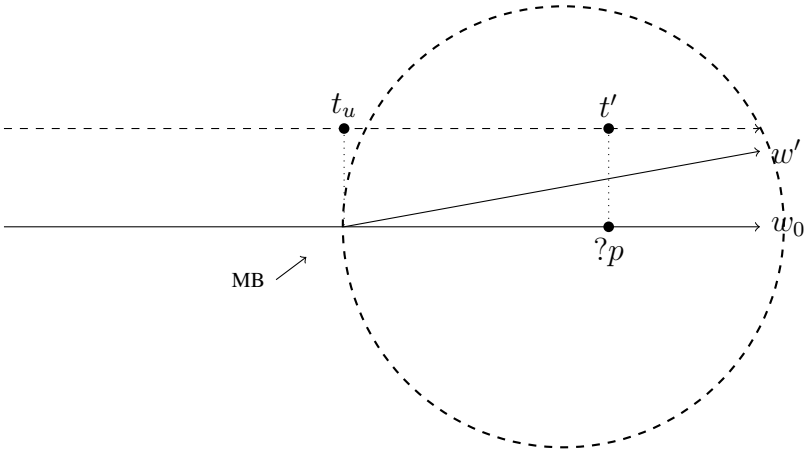

Figure 4: Modal base with the modal in the present

For comparison, recall what we had obtained with the past dynamic modal (see Figure 3, repeated here in Figure 5):

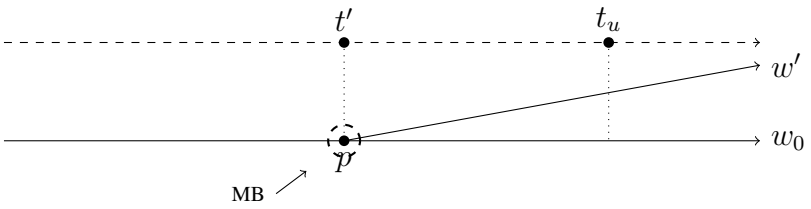

Figure 5: The circumstantial modal base associated with past dynamic modals in French (bis).

In this case, the modal base

1. is NOT projected at a time that precedes the time of the event,

2. is the domain of quantification of the modal,

3. does NOT satisfy diversity.

Let t'' be a contextually determined time. We define an **extended modal base** as follows:

(78) $EMB(w_0, t'')$ =
$\{w \in cg(w_0, t''); \text{a relevant agent has a certain } \textit{telos}\ p \text{ in } w\}$

$cg(w_0, t'')$ is the equivalence class of worlds determined at t'' and the worlds in the $EMB(w_0, t'')$ are a subset of $cg(w_0, t'')$. In section 5, we return to the restrictions on the relevant worlds in the common ground.

As with modal bases, we impose a felicity condition on this space, namely a condition of diversity.

(79) Diversity condition on the extended modal base:
$\exists t' \succ t''\Big(\exists w' \in EMB(w_0, t'')\big(p(w', t') = 1\big)\Big) \wedge \Big(\exists w'' \in EMB(w_0, t'')\big(p(w'', t') = 0\big)\Big)$

Here, the time of the event (t') follows the time at which the alternatives - including p and $\neg p$ worlds - are projected (t''), as is expected with dynamic modals. Unlike with the modal in the present, the set of alternatives is not the modal base; it is the extended modal base, which constitutes a larger space in which diversity is obtained.

Adding now the projective content, we obtain Figure 6.

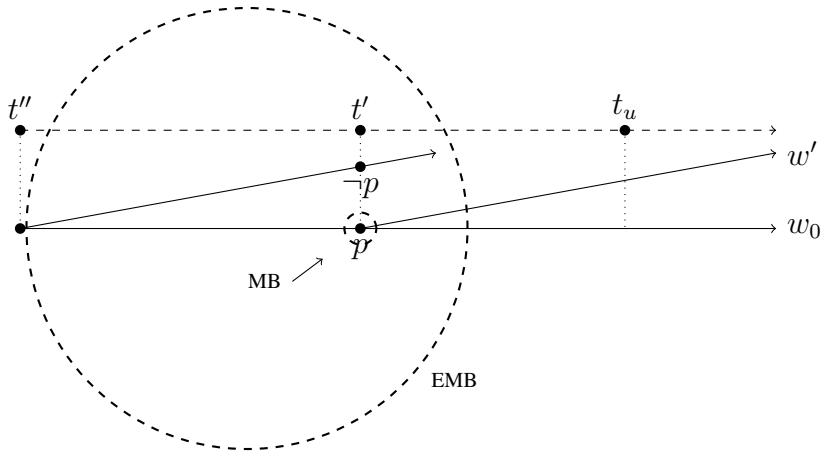

Figure 6: Extended modal base

Let us again first consider the dynamic modal in the present. We have started from the assumption that with dynamic modals, there is a contextually determined t'' time at which alternatives are projected. As per (79), the time of the event follows t''.[6] At the time t'' prior to the time of the event, which is by default the time of the utterance ($t'' = t_u$), a set of alternatives is projected that contains both p and $\neg p$ worlds. In this case, the modal base and the extended modal base are the same space, as pictured in Figure 7.

With the dynamic modal in the past, the modal base (which is reduced to a singleton) is a subset of the 'extended modal base.' (See Figure 6)

One question that is worth addressing is whether this articulation between two spaces, the one that satisfies diversity (the extended modal base) and a smaller one that is the quantificational

[6]This is in fact Belnap's (1991) method of setting the question for the abilitative modal in the present (although Belnap does not consider the modal in interaction with tense and, in fact, only considers the modal in the present).

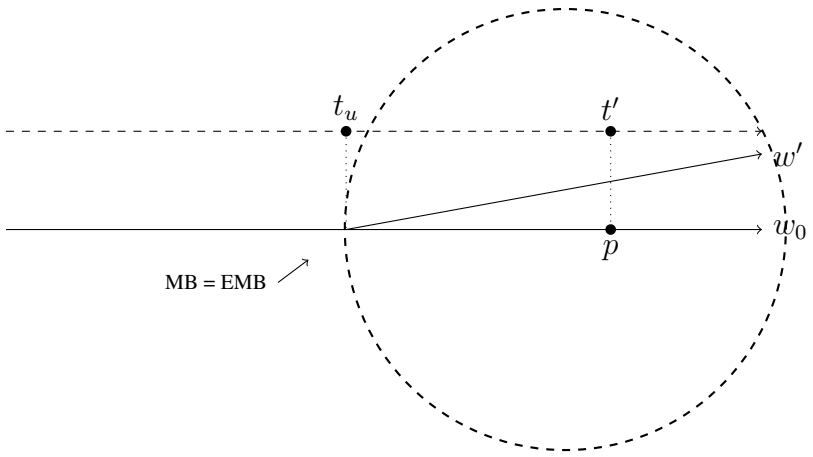

Figure 7: Dynamic modals in the present: MB = EMB

domain of the modal (which is homogeneous) is a specificity of past dynamic modals. Our answer is that it is not. In the section that follows, we briefly speculate as to whether we are entitled to identify a specific class of modals to which past dynamic modals that trigger the AE would belong. This speculation does not in any way affect our analysis which is provided in (80), where the projective content is given as a definiteness condition.

(80) a. $[\![$PAST(MOD(ASP(VP)))$]\!]$ is defined if and only if
there is a contextually determined past time t'' s.t.
(i) $EMB(w_0, t'')$ =
$\{w \in cg(w_0, t''); $a relevant agent has a certain *telos* p in $w\}$
(ii) $\exists t' \succ t''$;
$\Big(\exists w' \in EMB(w_0, t'')\big(p(w', t') = 1\big)\Big) \wedge \Big(\exists w'' \in EMB(w_0, t'')\big(p(w'', t') = 0\big)\Big)$

b. If defined, $[\![$PAST(MOD(ASP(VP)))$]\!]$ = 1 iff
t' defined in (a.-ii.) is such that: $t' \prec t_u \wedge \exists w'[w' \in MB(w_0, t') \wedge \exists e[P(e)(w') \wedge \tau(e) = t']]$
Paraphrase. t' defined in (a.-ii.) is such that: it precedes the time of the utterance and there is a world w' accessible from w_0 at t' and there is an event that is a P event in w' and the temporal trace of e is equal to t'.

4.3 A speculation: a natural subclass of modals?

Indeed, the question of the articulation of multiple modal spaces has been raised connection with a variety of phenomena. In particular, it has been raised in connection with the interpretation of *will* (Copley, 2002; Kaufmann, 2005; Klecha, 2011), universal epistemic modal *must* (Werner, 2006; Giannakidou and Mari, 2014), and deontic-modal-like-verbs by Knobe and Szabó (2013). To maintain a uniform terminology, we will borrow from Knobe and Szabó (2013) the labels *inner* and *outer* domains for the remainder of this section.

Let us for now abstract over the temporal considerations and focus on the modal spaces: the inner domain (our MB) and the outer domain (our EMB). As we see, the inner domain is a

p-domain, and the outer domain is not. This is not a peculiarity of past dynamic modals.

$Will$ shows a parallel behavior. If-clause in (73-a) determines a subset of this domain on which $will$ universally quantifies. In this picture, the *inner* domain is also a set of worlds in which p is true. The outer domain is merely an unrestricted set of possibilities. As for $will$, this is also a picture that obtains according to Copley (2002), Kaufman (2005), Ginnakidou and Mari (2014), although there is no consensus about the nature of the inner space (whether it is a set that contains bouletic, epistemic, or inertial alternatives or a combination of these).

The universal epistemic modal *must* has been argued to pattern similarly by number of authors (see e.g., Werner, 2006; von Fintel and Gillies, 2010; see also Matthewson et al. 2007 for evidentials behaving like universal epistemic modals). *Must* has been argued to universally quantify over a homogeneous set of p worlds, while presupposing diversity (as *per* Werner, 2006) or nonveridicality (as *per* Giannakidou and Mari, 2014) within an outer domain (for a demonstration, see the references cited here).

Ultimately, these views go back to Kratzer (1981/1991 – see also Portner, 2009): ordering sources allow to partition the modal base, and some modals universally quantify over a subset of it. A parallel, Kratzerian, proposal has also been put forward by Knobe and Szaboó (2013) in relation to deontic-like verbs.

All of this is parallel with what we have proposed for past modals triggering an AE. The modal operates over the inner domain in all these cases, and the inner domain is the one that contains only p worlds.

When the actual world is part of the inner domain, the AE arises (as with past dynamic modals). If the ordering source does not guarantee that the actual world is in the inner set, the AE does not arise (as it has been argued to be the case for e.g. *must* - Werner, 2006; Giannakidou and Mari, 2014; see *a contrario*, von Fintel and Gillies, 2010).

The important point is that issue and non-at-issue content work together to satisfy these two conditions. With past dynamic modals, the inner domain has been restricted by time, rather than by the context. The outer set, instead, must be familiar. Despite the diversity of means by which these two domains (inner homogeneous and outer non-homogeneous) are identified, one could suggest that these modals share features that are important enough to constitute a modal subclass. In all these cases, the inner homogeneous domain contains only p worlds. As we argue in section 6, this behavior, to an extent that we will make clear, seems to extend to implicative verbs as well.

Future research will determine whether these expressions form a natural class of modals as well as the definitional properties of this class and what expressions belong to it. With this picture in mind, after presenting the conclusions of the discussion thus far, we turn to the identification of the constraints on the worlds of the outer domain.

4.4 Interim conclusions

Along our discussion, three questions have emerged: (i) how can we reconcile AE and diversity conditions? (ii) How can one distinguish the modal from the non-modal statement when the circumstantial modality has past perspective and present orientation? (iii) Why is it that dynamic modals in the past allow AE? Our answers to these questions are as follows.

(i) With Condoravdi (2002), we endorse the view that the diversity condition must be satisfied no matter what the orientation of the modal is (see also Thomas, 2013). When the circumstantial modality has past TP and present TO, the modal base is a homogeneous space that contains only

p worlds (and is in fact reduced to a singleton, the actual world). Diversity is satisfied within the 'extended modal base.'

(ii) The modal statement with the modality with past TP and present TO triggering the AE and the corresponding non-modal statement pose different constraints on previous contexts, and, specifically, past dynamic modals with present TO require that $\neg p$ be a possibility in the common ground, determined at a time such that the time of the event is in the future with respect to it.

(iii) We have claimed that the 'extended modal base' is triggered by dynamic modality (with past TP and present TO). Because past dynamic modals bear projective content that $\neg p$ was a possibility at a contextually determined time such that the time of the event follows that time, they allow the AE.

5 Constraints on branches

We have stated that the extended modal base is a subset of the common ground that is fixed at a time t''. The time of the event follows t''. Now, we characterize the relevant branches that constitute the extended modal base.

As we have twice noted, the interpretation of the modals that are compatible with AE are the abilitative (48), the teleological (49) and the deontic (50). We must then determine the constraints that are common to these uses and that allow us to characterize the subset of worlds that constitute the extended modal base.

5.1 Teloi

We propose that the common feature of these three uses is that an agent (as we shall see, not necessarily the referent of the subject) has a *telos* (this is what we proposed without commentary in section 4.2 – we clarify that *teloi* and goals are different notions).

As for abilitative modality, it has been argued that, in addition to involving intentionality (Davidson, 1980), it also appeals to agent-choices (Belnap, 1991) and goal orientedness (Elgesem, 1997), together with a restriction on inertial or normal worlds (Peacocke, 1999).

As for the cases that concern us here, we are certainly not dealing with abilitative modality *per se*. Typically, abilitative modality requires repeatability of an action (Kenny, 1975), which is a feature that our cases do not satisfy (see Mari and Martin, 2007).

However, at the first approximation, goal-orientedness is a feature that is shared by all of the cases that concern us (see also Hacquard, 2006,2014). In (48), John has the goal of moving the table; in (49) John has the goal of taking the train; in (50), John has the goal to go to the swimming pool.

The agent need not be the entity that is denoted by the subject, however. As for (81), the relevant agent is the captain of the sheep or some other relevant individual.

(81) Le navire a pu rentrer au port.
The ship has can.pp enter to-the harbor.
'The ship managed to enter in the harbor.'

A more delicate question concerns the intentionality feature, which is inherent in goal-orientedness (see, e.g., Elgesem, 1997). The data seem to point to different directions.

In some cases, it seems that there is no intentional agent needed:

(82) Le vent a pu abattre cet arbre.
The wind has can.pp break this tree.
'The wind managed to break this tree.'

However, when we contrast past dynamic modals that trigger AE with the implicative verb *arriver à* ('manage to'), intentionality emerges. The English sentence 'He managed to be dumped' can be translated in two different ways (83-a) and (83-b).

(83) a. John est arrivé à se faire quitter. (no goal)
John is arrive.pp to refl make dump.
b. John a pu se faire quitter (goal)
John has can.pp refl make dump.
'He managed to be dumped'.

In (83-a), John has the role of the victim who has been dumped by his girlfriend. In (83-b), his girlfriend is the victim, as the sentence conveys that John had the goal of dumping her.

The question then arises of how we can accommodate cases such as (82).

The Aristotelian notion of *telos* is the one that we need. Natural entities have *teloi*: the *telos* that the wind is to breathe, the *telos* that water is to expand, the *telos* that fire is to burn, ...

We can thus provide a first characterization of the worlds in the extended modal base. These are worlds in which a relevant entity has a *telos*. However, that is not all.

5.2 Teloi worlds and impediments

All worlds in the extended modal base are worlds in which a contextually relevant entity has a *telos*. They are also worlds in which impediments of the *telos* might arise.

Returning to example (49), we have suggested that one would use this sentence in a context in which John has taken the train, but he could have missed it. Something could have occurred before the time at which he took the train, such as being kept in a late meeting or in the metro on strike.

Both p and $\neg p$ worlds are such that these impediments are present. In $\neg p$, world impediments prevent the realization of the action, in p worlds, the action takes place in spite of the impediments.

None of these options is 'more inertial' than the other. Consider (49). In $\neg p$ worlds, the metro is on strike, and John is on the metro to the train station. The metro is slow, and John does not make it to the station. In p worlds, John gets off the metro and takes a taxi. In terms of inertia properties of worlds, there is no difference. The taxi is also there in $\neg p$ worlds. Only John does not take it. The course of events is inertial and 'normal' (à la Dowty, 1979) in both cases.

The p world is also not 'reasonable' à la Landman (1992), Portner (1998), Mari, (2013). The discussion about the differences between inertia and reasonability goes back to Landman (*ibid.*), with regard to the famous example (84).

(84) Mary was crossing the street when the truck hit her.

On Dowty's view of inertia, the event of Mary crossing the street continues in worlds that are most compatible with the actual world 'now.' In those worlds, we find both Mary and the truck approaching. As Landman notes, Mary being hit by the truck is already part of the normal course of

events. Only a miracle could save Mary even in an *inertia* world. Landman (*ibid.*) uses this example to justify a theory for the progressive that considers what is internal to an event for determining reasonable continuations. The progressive considers those non-actual worlds in which a given event (e.g., Mary crossing the street) continues (by virtue of what the event is, i.e., in this case, an event of crossing the street such that the person crossing the street reaches the other side) if interrupted in the actual world.

The world in which John makes it to the station is thus not a 'reasonable' world à la Landman, in which there is no strike. In our example (49), the worlds in which the *telos* is being pursued are both inertial (and not 'reasonable', in the technical sense of Landman *ibid.*). The metro is on strike in both p and $\neg p$ worlds. The metro is on strike, but the inertial continuations in the p and in $\neg p$ worlds are different. In the world in which John takes the taxi to get to the station, it is not a 'miracle' happening, it is not a disruption of inertia.

It is important to emphasize that the worlds in which the entity has a *telos* and in which impediments occur are projected at a contextually determined time, such that the time of the event is in the future with respect to it. From the perspective of that time (the time prior to the event) all worlds satisfy the same constraints; there are no ordering sources that privilege one world over another. From the past time, given some impediments, the event can be realized or it cannot be realized.

Abilitative and teleological modality select *teloi* and impediment worlds. Deontic modality does not (50). The deontic is a case that requires richer at-issue content. As for projective content, the extended modal base contains those worlds in which the agent has a telos, and this *telos* is realized in some but not all of the worlds. In worlds in which *telos* is realized, some enabling conditions are present. However, the existence of enabling conditions is part of the assertion. In (see (50)), from the perspective of the time such that the time of the event is in the future w.r.t. it, John aims to go to the swimming-pool. When the assertion is made, the speaker conveys that John could enter, and he did enter, thanks to the new rules. This is the at-issue meaning part and not the projective one. In fact, note that, without the addition, 'thanks to the new rules,' the sentence would be interpreted teleologically.

Let us now focus on the abilitative and teleological cases.

5.3 Implicatures

The notional categories of *teloi* and impediments allow us to calculate some implicatures, which, as implicatures, can be cancelled.

We can calculate, that, if the relevant agent has a goal, s/he also has a preference for p worlds (49). This implicature is indeed cancelable, (85).

(85) Jean a pu prendre le train, mais il n'avait vraiment pas envie de
John has can.pp take tha train, but he not-have.imp.3sg really not will of
partir.
leave.inf.
'John managed to take the train, but he did not want to leave.'

Moreover, given that $\neg p$ is a possibility that is available at a time prior to the time of the event that might have been actualized by virtue of impediments, the implicature of difficulty arises. This is also cancelable.

(86) Le voleur a pu rentrer facilement.
The thief has can.pp enter easily.
'The thief managed to enter easily.'

6 Perspectives: comparison with implicative verbs

The study of implicative verbs has a very long history that we do not retrace here, as implicative verbs are not the main focus of our paper. However, our analysis of past dynamic modals has given us new elements to add to the debate.

In a very recent study of implicative verbs in English, Baglini and Francez (2014) discuss the empirical facts surrounding the interpretation of *manage to* and explain that these have not been adequately understood. Specifically, they challenge the current view that has overall proposed that *manage to* is associated with presuppositions of *difficulty*, *trying* and *unlikelihood* (See Karttunen, 1971; Coleman 1975; Giannakidou, 2011).[7]

They provide examples of *manage to*-sentences with an explicit denial of trying.

(87) Archer couldn't help but think about all of the trouble they managed to get into, without even trying (Baglini and Francez, example number (10)).

They also provide examples in which difficulty is overtly denied and so is unlikelihood (examples (14) and (17) in Baglini and Francez, *ibid.*).

(88) Clad in civilian clothes and having passports, they easily managed to get back over the Volga.
(Beevor, Antony. Stalingrad: The Fateful Siege: 1942-1943.)

(89) Now it's becoming obvious that Fork will manage to kill someone important.
http://lowermidtable.wordpress.com/2010/06/26/blogging-legend-of-the-galactic-heroes-episode-78/

The data can be replicated for French, for the implicative verb *arriver à*. There is no presupposition of trying (90), nor of difficulty (91), nor of unlikelihood (92).

(90) Jean est arrivé à se faire quitter, sans même essayer de se faire quitter.
John is arrive.pp to refl do dump, without even try.inf of refl do dump.
'He managed to be dumped, without even trying of being dumped'.

(91) Le voleur est arrivé à rentrer très facilement. (= (86))
The thief is arrive.pp to enter very easily.
'The thief manage to enter very easily'.

(92) Il était évident que le voleur arriverait à rentrer dans cette banque.
It was obvious that the thief arrive.3sg.cond to enter into this bank.
'It was obvious that the thief would enter into this bank.'

We propose that implicative verbs convey projective content that $\neg p$ was a possibility at a time

[7] Coleman (1975) also proposes that the presuppositions are hierarchically ordered. See Baglini and Francez for a discussion of why this order is not tenable.

prior to the time of the utterance. Before the time of the event, a set of alternatives is projected that contain p and $\neg p$ worlds.

We can replicate the tests we have proposed for past dynamic modals to show that the trigger imposes SFC with respect to c, and that c is projected content. Usain Bolt is the fastest runner in the world, who can run 100 meters in 9.58 seconds.

(93) Usain Bolt est arrivé à battre le record du monde des 100 mètres grâce à
Usain Bolt is arrive.pp to beaten the record of-the world of-the 100 meters thanks to
son entraînement.
his training.
'Usain bolt managed to win the 100 meters world record thanks to his training.'

Beating the world record is never granted, and the possibility that even Usain Bolt does not beat it is open at a time prior to the race. The sentence is felicitous. Sentence (56), instead, is infelicitous in Context 1 and felicitous in Context 2 described in (55-a)-(55-b), repeated in (94).

(94) a. *Context 1* : Usain Bolt is in his best shape and at the climax of his career.
b. *Context 2*: Usain Bolt is recovering from a long cold and is far from his highest standards.

(95) #Usain Bolt est arrivé à courir 100 mètres en 15 secondes aujourd'hui.
Usain Bolt is arrive.pp to run 100 meters in 15 seconds today.
'Usain Bolt managed to run 100 meters in 15 seconds today.'

Consider context (94-a), with respect to which sentence (95) is infelicitous. Since Usain Bolt can run 100 meters in 9.58 seconds, it is taken for granted that, in his best shape, he can run 100 meters in fifteen seconds, and the possibility that he does not run 100 meters in fifteen seconds is not available in the modal space projected at a past time contextually determined, such that the time of the event is in the future with respect to it.

Sentence (95) is instead felicitous in context 2 (94-b), where Usain Bolt is recovering from a very bad cold. In this context running 100 meters in fifteen seconds is not granted; the possibility of $\neg p$ is open in the modal space projected at a contextually determined time such that the time of the event is in the future of that time and so the sentence is felicitous in this context. This shows that trigger imposes a strong felicity constraint with respect to c.

The 'wait a minute' test also shows that the content c must be part of the relevant context prior to the utterance (Schlenker, 2009; Tonhauser et al. 2013). Recall the scenario in which my mother has to take the train for her home in the south of the country and she phones my husband or me to tell us that she has arrived. On a Saturday, she phones me. My husband comes back home and asks whether my mother has arrived (see (96)).

(96) Est-ce que ta mère est arrivée ?
your mother is arrive.pp.
'Did your mother arrive?'

If I reply (97), in the a context in which my husband is aware of no reasons which could prevent my mother from taking the train, he would be entitled to ask (98).

(97) Oui, elle est arrivée à prendre le train.
Yes, she is arrive.pp to take the train.
'Yes, she managed to take the train.'

(98) Attends, il y avait un problème ?
Wait, it there have.3sg.imp a problem ?
Wait a minute, there was a problem?

The non-at-issue content, triggered by the dynamic modal in the past, projects, as the following family of sentences reveal. Again, (99)-(100)-(101) are felicitous only in c-positive contexts, implying that not running 100 meters in fifteen seconds is an open possibility in the modal space projected at a time such that the time of the event is in the future with respect to it – see Context 2 in (94-b).

(99) (#)Est-ce qu' il est arrivé à courir 100 mètres en 15 secondes, aujourd'hui ?
He is arrive.pp to run 100 meters in 15 seconds, today ?
'Did he manage to run 100 meters in 15 seconds ?'

(100) (#)Il est possible qu'il soit arrivé à courir 100 mètres en 15 secondes.
It is possible that-he has.3sg.subj arrive.pp to run 100 meters in 15 seconds.
'It is possible that he managed to run 100 meters in 15 seconds'.

(101) (#)S'il est arrivé à courir 100 mètres en 15 secondes, alors il va bientôt
If-he is arrive.pp to run 100 meters in 15 seconds, then he go.3sg.pres soon
se remettre.
refl be-fine.
'If he managed to run 100 meters in 15 seconds, then he is going to be fine soon.'

As the projective content triggered by past dynamic modal, the projective content triggered by the implicative verb belongs to either class A or D of Tonhauser et al. (2013) and implicative verbs also pattern with anaphoric expressions belonging to both of these classes.

We propose that unlike the past dynamic modal triggering the AE, the implicative verb *arriver à* asserts p and projectively conveys that alternatives are projected at a time such that the time of the event is in the future with respect to it, with this set satisfying diversity.

Our analysis for *manage to p* is as follows.

(102) a. $[\![$manage to $p]\!]$ is defined if and only if
there is a contextually determined past time t'' s.t.
(i) $EMB(w_0, t'')$ =
$\{w \in cg(w_0, t''); $ a relevant agent has a certain *telos* p in $w\}$
(ii) $\exists t' \succ t''$;
$\Big(\exists w' \in EMB(w_0, t'')\big(p(w', t') = 1\big)\Big) \wedge \Big(\exists w'' \in EMB(w_0, t'')\big(p(w'', t') = 0\big)\Big)$

b. If defined, $[\![$manage to $p]\!]$ = 1 iff p

Importantly, with the past dynamic modals, p is not asserted. The truth of p is calculated given modal-temporal interaction, see 3.2. There is nonetheless quantification (a trivial one, in this particular modal-temporal configuration), and the modal is a quantifier. When prospective aspect is added, as with the imperfective, the AE is canceled see (6) (Hacquard, 2006; Kratzer, 2011; Matthewson, 2012). The modal thus has a uniform semantics regardless of what the modal-temporal-aspectual combinations are. As we have noted – see (3), repeated in (103)– the prospective aspect cannot cancel the implication of *arriver à* ('manage to'), and it is to be concluded that p is asserted.

(103) John arrivait à prendre le train, #mais il ne l'a pas pris.
John arrive.imperf to take the train, but she not that-has taken.
'John managed to take the train, but he did not take it.'

To conclude, we propose that past dynamic modals and implicative verbs share the same projective content that there is a set of alternatives projected at a contextually determined time preceding the time of the event, which contains both p and $\neg p$ worlds.

What the precise constraints on the branches for implicative verbs are is an open question that future research might want to investigate in depth. We would like to suggest that *telos* is the common ingredient to both past dynamic modals and implicative verbs and that the alternatives that are projected at the time such that the time of the event is in the future with respect to it, are *teloi* worlds. $\neg p$ worlds are those in which the *telos* is not achieved. Recall that the notion of *telos* does not require intentionality or trying and thus extends to a case like (90), where John has a natural propensity for being dumped by girls (and this natural propensity had been countered by the will of John of not being dumped, in worlds which have not been finally actualized).

As with past dynamic modals, difficulty, trying and unlikelihood are cancelable implicatures (see (90), (91), (92)) that one can calculate by considering that (i) p was a telos at a contextually determined time, (ii) $\neg p$ was a possibility since p could have failed in virtue of impediments.

Finally, let us note that, in some languages, implicative verbs select subjunctive complements, as in Greek. The subjunctive has been argued to be triggered by nonveridicality or diversity (Giannakidou, 2011). This puzzling behavior can be explained under our proposal that implicative verbs convey that there is a space of possibilities projected at a time such that the time of the event is in the future with respect to it, which satisfies diversity. Our proposal echoes the one elaborated by Giannakidou (2011), proposing that, prior to the time of the event, at the time of the trying, an epistemic state is projected, that contains $\neg p$ worlds. 'Trying' is lexically triggered by 'manage to', according to Giannakidou (*ibid.*). In our account we do not use the 'trying' component, nor epistemic states.

It is not our aim here to provide a full-fledged theory of implicative verbs. Our more humble

goal is rather to reduce the distance between past dynamic modals and implicative verbs once again. Rather than making modals implicative verbs as Bhatt proposed (Bhatt, 1999), our new proposal is that implicative verb convey diversity at the non-at-issue dimension, just like modal verbs.

7 Conclusion

This paper acknowledged that AE arises when circumstantial modality is present oriented and seriously considered the question of how the diversity condition or nonveridicality condition on modals can be satisfied. It considered the non-at-issue dimension of past modals that trigger AE and showed that diversity or nonveridicality is obtained within a domain that is larger than the modal base. The bottom line of this paper is that diversity is an inherent feature of modality, which needs to be part of the interpretation of modal statements, regardless of the dimension of meaning.

The non-at-issue content is that $\neg p$ is a possibility in the common ground at a time prior to the time of the event. We have shown, as predicted by Condoravdi, that AE arises when there is quantification over a homogeneous space that contains just one world, the actual one. Diversity, we have argued, is satisfied within the larger domain.

We have established that the larger domain is a subset of the common ground that is projected at a contextually projected time such that the time of the event is in the future with respect to it and contains those worlds in which an entity has a *telos* and the *telos* can be impeded.

With these elements in place, our account sheds new light on a variety of phenomena.

First, it establishes a correlation between actuality entailments and some necessity modals and verbs behaving like necessity modals. Both are now argued to mobilize two domains: an inner homogeneous domain and an outer non-homogeneous one. When the AE arises, the actual world is contained within the inner domain.

Second, it establishes a new correlation between past dynamic modals triggering AE and implicative verbs, as conveying projective content that there is a set of alternatives that satisfy diversity, projected at a contextually determined time such that the event is in the future of that time. This promises new extensions to languages in which implicative verbs trigger the subjunctive mood, such as Greek. We have argued that, with the modal in the perfect in French, the main difference with implicative verbs lies in that the truth of p is calculated given modal-temporal interaction with the modal, while p is asserted with implicative verbs.

Third, we have established the status of the notions of difficulty, trying and unlikelihood both in connection with past dynamic modals and implicative verbs *arriver à*, which we have argued to be implicatures.

To conclude, our account considers different dimensions of modal meaning and reconciles AE and diversity conditions. It paves the way for understanding previously unseen correlations within the realm of modality and between modality and neighboring notions and for new explorations on how different levels of meaning interact in the interpretation of modals and modals in interaction with time.

References

Baglini, R. and Francez, I. (2014). The implications of managing. Ms. University of Chicago.

Belnap, N.D. (1991). Backwards and forwards in the modal logic of agency. *Philosophy and Phenomenological Research, vol. 51*: 777-807.

Binnick, R. (1971). Will and be going to. *Proceedings of CLS 7*: 40Ð52.

Bhatt, R. (1999). *Covert Modality in Non-Finite Contexts*. PhD thesis, Philadelphia: University of Pennsylvania.

Borgonovo, C. and Cummins, S. (2007). Tensed modals. In L. Eguren and O. Fernandez Soriano (eds.). *Coreference, modality, and focus*. pp. 1-18. John Benjamins Publishing Company, Amsterdam/Philadelphia.

Coleman, L. 1975. The case of the vanishing presupposition. In *Proceedings of the first Annual Meeting of the Berkeley Linguistics Society*.

Condoravdi, C. (2002). Temporal interpretation of modals: Modals for the present and for the past. In Beaver, D., Kaufmann, S., Clark, B., et Casillas, L. (eds), *The Construction of Meaning*. Stanford, CA: CSLI, pp. 59-88.

Copley, B. (2002). The semantics of the future: MIT dissertation.

Davidson, D. (1963). Actions, Reasons, Causes. In Davidson 1980, pp. 3-19.

Davis, H., Louie, M., Matthewson, L., Paul, I., Reis Silva, A. and Peterson, T. 2010. Perfective Aspect and Actuality Entailments: A Cross-Linguistic Approach. *The Proceedings of SULA 5: The Semantics of Under-Represented Languages in the Americas*. Amherst, MA: GLSA.

Demirdache, H. et Uribe-Etxebarria, M. (2008). Scope and anaphora with time arguments: The case of 'perfect modals'. *Lingua 118*: 1790-1815.

Elgesem, D. (1997). The modal logic of agency. *Nordic Journal of Philosophical Logic 2*, 1-46.

Dowty, D. (1979). *Word Meaning and Montague Grammar*. Dordrecht: Reidel.

von Fintel, K. (2004). Would you believe it? The king of France is back! Presuppositions and truth-value intuitions. In Marga Reimer and Anne Bezuidenhout, editors, Descriptions and Beyond. Oxford University Press, Oxford.

von Fintel, K. and Gillies, A. 2010. Must...stay... strong ! *Nat. Language Semantics 18*: 351-383.

Frankfurt, H. (1969). Alternate Possibilities and Moral Responsibility. *The Journal of Philosophy 66*: 829-839.

Giannakidou, A. (1998). Polarity Sensitivity as (Non)veridical Dependency. John Benjamins. Amsterdam.

Giannakidou, A. (1999). Affective dependencies. *Linguistics and Philosophy 22*: 367-421.

Giannakidou, A. (2009). The dependency of the subjunctive revisited: temporal semantics and polarity. *Lingua 120:* 1883-1908.

Giannakidou, A. (2011). Nonveridicality and mood choice: subjunctive, polarity, and time. In R. Musan and M. Rathert (eds.). *Tense across Languages*. Berlin: Mouton de Gruyter. pp. 59-90.

Giannakidou and Mari (2014). The future in Greek and Italian: epistemic and metaphysical dimensions. Ms. University of Chicago and IJN.

Giannakidou, A. and Staraki, E. (2012). Ability, Action and Causation: From Pure Ability to Force. In A. Mari, C. Beyssade and F. Del Prete (eds.). *Genericity*. Oxford, OUP, pp. 250-275.

Hacquard, V. (2006). Aspects of Modality. PhD thesis, Cambridge, MA: MIT.

Hacquard, V. (2009). On the interaction of aspect and modal auxiliaries. *Linguistics and Philosophy 32*: 279-315.

Hacquard, V. (2010). On the event relativity of modal auxiliaries. *Natural language semantics, 18(1)*, 79-114.

Hacquard, V. (2014). Actuality entailments. Under review for L. Matthewson, C. Meier, H. Rull-

mann, T. E. Zimmermann (eds.) Companion to Semantics. Wiley.
Heim, I. (1982). The semantics of definite and indefinite nps: MIT dissertation.
Homer, V. (2010). French modals and perfective: a case of aspectual coercion. In *Proceedings of WCCFL 28*, pp. 106-114.
Karttunen, L. (1971). Implicative verbs. *Language 47*:340-358.
Kaufmann, S. (2005). Conditional truth and future reference. *Journal of Semantics 22*: 119-128.
Kaufmann, S. 2005. Conditional Truth and Future Reference. *Journal of Semantics*. doi: 10.1093/jos/ffh025
Kaufmann, S., Condoravdi, C., et Harizanov, V. (2006). Formal approaches to modality. In Frawley, W. (ed.), *The Expression of Modality*, pp. 71-106. Berlin and New York: Mouton de Gruyter.
Kenny, A. (1975). *Will, Freedom, and Power*. Dordrecht: D. Reidel.
Klecha, P. (2012). Positive and conditional semantics for gradable modals. In A. Aguilar Guevara et al. (eds.), *Proceedings of Sinn und Bedeutung 16*: 363-376.
Knobe, J. and Szaboó, Z. (2013). Modals with a taste of the deontic. Semantics and Pragmatics 6: 1-42.
Kratzer, A. (1981). The Notional Category of Modality. In *Words, Worlds, and Contexts. New Approaches in Word Semantics*, ed. By H. J. Eikmeyer & H. Rieser, 38? 74. Berlin: de Gruyter.
Kratzer, A. (1991). Modality. In Semantics: *An International Handbook of Contemporary Research*, ed. By A. von Stechow & D. Wunderlich, 639-650. Berlin: de Gruyter.
Kratzer, A. (2011). What 'can' can mean. Lecture notes, University of Massachusetts, Amherst.
Laca, B. (2008). On modal tenses and tensed modals. *Invited Talk at Going Romance 2008*, Groningen.
Laca, B. (2014). Epistemic modality and temporal anchoring. ReVEL, special issue 8.
Landman, F. (1992). The progressive. *Natural Language Semantics* 1: 1-32.
Louie, M. (2014). Actuality Entailments in Blackfoot (Sleepers and Imposters). *WSCLA 2014*, Ms. Memorial University. .
Mari, A. (2013). Each other, asymmetry and reasonable futures. *Journal of Semantics*, doi: 10.1093/jos/fft0030.
Mari, A. (2015). *Modalités et Temps. Des modèles aux données*. Peter Lang AG. (Based on 2011 Habilitation).
Mari, A. et Martin, F. (2007). Tense, abilities and actuality entailment. In Aloni, M., Dekker, P., et Roelofsen, F., (eds.), *Proceedings of the XVI Amsterdam Colloquium*, ITLI, University of Amsterdam, Amsterdam, pp.151-156.
Matthewson, L. (2012). On the (non)-future orientation of modals. In Proceedings of Sinn und Bedeutung 16, pp. 431-446.
Matthewson, L. Rullmann, H., and Davis, H. 2007. Evidentials as Epistemic Modals: Evidence from St'at'imcets. *The linguistic Variation Yearbook 7*.
Peacocke, C. (1999). *Being Known*. Oxford: Oxford University Press.
Piñón, C. (2011). The pragmatics of actuality entailments. Workshop Aspect and Modality in Lexical Semantics, Stuttgart, 30 Sept. 2011.
Portner, P. (1998). The Progressive in Modal Semantics. *Language 74(4)*: 760-87.
Portner, P. (2009). *Modality*. Oxford: OUP.
Roberts, C. (1989). Modal subordination and pronominal anaphora in dis- course. *Linguistics and Philosophy 12(6)*: 683-721.
Schaden, G. (2009). Present perfect compete. *Linguistics and Philosophy 32(2)*: 115-141.
Schlenker, P. (2009). Local contexts. *Semantics and Pragmatics 2*: 1-78.

Squartini, M. and Bertinetto, P-M (2000). The simple and compound past in Romance languages. Empirical Approaches to Language Typology 6: 403-440.

Thomas, G. (2013). Circumstantial modality and the diversity condition. To appear. *Proceedings of Sinn und Bedeutung 18*.

Thomason, R. (1984). Combinations of tense and modality, in D. M. Gabbay et F. Guenthner (eds.), *Handbook of Philosophical Logic: Extensions of Classical Logic, vol. II*, pp. 136-165. Dordrecht: Reidel.

Tonhauser, J., Beaver, D., Roberts, C. and Simons, M. (2013). Toward a taxonomy of projective content. Language 89(1): 66-109.

Werner, T. (2006). Future and non-future modal sentences. *Natural Language Semantics 14*: 235-255.