Actuality Entailments and Aspectual Coercion

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This is a preliminary version; all comments are welcome.

Contents

1 Introduction

A number of researchers, in particular Bhatt (1999) and (Hacquard 2006, 2009), have observed that in languages which distinguish the perfective and the imperfective aspects morphologically, whenever an ability or a circumstantial modal appears in the perfective in a positive matrix clause, it is possible to infer the truth of its complement in the actual world. I will only talk about one such language, namely French. Sentence (1a) features present perfect morphology; in the indicative mood, this morphology correlates with the perfective aspect. The sentence not only says that at a past interval Olga had the capacity to lift a fridge, it also entails that she did: it is infelicitous to

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contradict this inference, called an Actuality Entailment (henceforth AE), as in (1b), the continuation of the sentence:

(1)   a.   *Olga a   pu$_{abil}$ soulever un frigo.*
            Olga has can.PP lift   a fridge
            'Olga had the capacity to lift a fridge.'
    b.   #*Mais elle ne l' a pas fait.*
            but   she NEG it has NEG done
            'But she didn't do so.'

In addition to the contradiction test, I propose a new test, which consists in enforcing the actuality of the complement in order to satisfy the presupposition triggered by *aussi* 'too' in the continuation (presuppositions triggered by *aussi* are notoriously hard to accommodate):

(2)   a.   *Olga a   pu$_{abil}$ soulever un frigo, et [Marie]$_F$ aussi en a   soulevé*
            Olga has can.PP lift   a fridge and Marie   too of-it has lifted
            un.
            one
            'Olga had the capacity to lift a fridge, and [Marie]$_F$ lifted one too.'
    b.   *Presupposition:* Someone other than Marie lifted a fridge.

The fact that the presupposition of *aussi* is satisfied by the inference triggered in the first conjunct is compatible with it being an entailment. We can easily eliminate another candidate, namely a scalar implicature (SI), by placing the first conjunct in a downward-entailing environment, which blocks SIs (while an entailment triggered in the antecedent of a conditional satisfies the presupposition of *aussi* triggered in the consequent (3b)).

(3)   a.   *Si Olga a   pu$_{abil}$ soulever un frigo, [Marie]$_F$ aussi en a   soulevé*
            if Olga has can.PP lift   a fridge Marie   too of-it has lifted
            un.
            one
            Presupposition: Someone other than Marie lifted a fridge.
    b.   If Olga lives in Paris, [Marie]$_F$ lives in France too.
            Presupposition: Someone other than Marie lives in France.

Generalizing, AEs can occur with all root modals, including deontic ones (this fact is seldom acknowledged), as shown by (4):

(4)   #*Avec l' autorisation de son nutritionniste, Olga a   pu$_{deon}$ manger des*
       with the authorization of her dietician   Olga has can.PP eat   of-the
       pommes de terre, mais ne   l' a pas fait.
       potatoes   but   NEG it has NEG done
       'Authorized by her dietician, Olga was allowed to eat potatoes, but she didn't do so.'

With the imperfective aspect (which correlates with simple past morphology, aka *imparfait*), AEs are not possible, as shown by the contradiction test (5a) and the presupposition test (5b) (the # sign in the latter indicates a presupposition failure):[1]

(5) a. *Olga pouvait$_{abil}$ soulever un frigo, mais ne   l' a   pas fait.*
         Olga can.PST   lift   a fridge, but NEG it has NEG done
     b. *#Si Olga pouvait$_{abil}$ soulever un frigo, [Marie]$_F$ aussi en   a   soulevé*
         if Olga can.PST   lift   a fridge, Marie   too of-it has lifted
         un.
         one

Under what conditions are AEs triggered? Previous researchers, especially Hacquard (2006), have proposed that AEs are triggered if and only if a root modal appears in the perfective (in a positive matrix clause). The main goal of this article is to show that this criterion is not warranted, for it is both too strong (AEs occur even when the predicate is not a modal) and too weak (the perfective doesn't suffice). Focusing for the time being on its excessive weakness, the standard criterion faces an immediate problem: AEs are not always mandatory under the perfective. It is possible, under certain conditions, to deny that the complement of the modal is true in the actual world, as Mari and Martin (2009) were first to show (they propose an explanation to AEs which, like the one defended here, relies on a clash between the perfective and the stativity of root modals). Quantificational temporal modifiers, e.g. *une fois* 'once', *toujours* 'always', *souvent* 'often', *chaque fois* 'each time' (both in its restrictor and nuclear scope) are responsible for a subclass of exceptions to obligatory AEs. For example, the only difference between (6a) and (1) is the presence in the former of the modifier *à plusieurs reprises* 'on several occasions'. Locational temporal adverbials such as *cet après-midi* 'this afternoon' do not have the same effect (6b).

(6) a. À plusieurs reprises, Olga a pu$_{abil}$ soulever un frigo, mais ne l'a pas fait.
     b. #Cet après-midi, Olga a pu$_{abil}$ soulever un frigo, mais ne l'a pas fait.

AEs should be impervious to temporal modification if the presence of a root modal under the perfective were a sufficient condition for them (assuming that aspect is preserved under temporal modification). Therefore examples like (6a) are genuine counterexamples to any theory that relies on the aforementioned criterion. Now, if the perfective is not sufficient, something else must come into play: I therefore submit that AEs result from some enrichment of the meaning of modalized sentences in the perfective. In order to capture the nature of the process, I propose that we look for a meaning-enrichment mechanism that applies specifically in the perfective. Aspectual coercion just fits the bill: it enriches the meaning of sentences where the perfective, in contravention of its need for a bounded predicate, is confronted with a stative one;

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[1]It is important to emphasize the contrast between (3a) and (5b): it shows the validity of the *aussi* test. One could in principle argue that (i.) *aussi* requires the presence of an antecedent in the discourse; (ii.) this antecedent must entail the presupposition triggered by *aussi;* (iii.) global accommodation can be appealed to to ensure that the entailment goes through. Suppose indeed that one accommodates: $\Diamond$ p → p: then the presupposition of the consequent is satisfied, and the test doesn't reveal the existence of an AE (i.e. the presence of a coercion operator, see below). It is the deviance of (5b) which shows that such a pragmatic line is not promising. I owe Philippe Schlenker this important comment.

this article shows that AEs are the result of a certain kind of aspectual coercion, which I name actualistic. Section 2 explains some key notions and argues that root modals form stative predicates. Section 3 shows how coercion applies uniformly to modal and non-modal predicates alike and presents AEs as instances of a hitherto undocumented kind of aspectual coercion, the actualistic one. Section 4 compares this approach to Hacquard's (2006).

2 Background

2.1 Aspectual Classes

This article deals with the interaction between Viewpoint aspect and aspectual class, specifically between the perfective and stative predicates of eventualities. Predicates of eventualities (denoted by vPs) can be either bounded, stative or neither. I assume that the domain of eventualities D_v has a semi-lattice structure that is partially ordered by the part relation '$\sqsubseteq$': '$\sqsubseteq$': $\forall e,e' \in D_v$ $[e \sqsubseteq e' \leftrightarrow e \oplus e' = e']$. The proper part relation is defined as follows: $\forall e,e' \in Dv$ $[e \sqsubset e' \leftrightarrow [e \sqsubseteq e' \wedge e \neq e']]$. Bounded predicates, e.g. *John bake the cake,* apply to eventualities that have no proper parts homogeneous to the whole (i.e. no proper part of an eventuality of John baking the cake is itself an eventuality of John baking the cake). Stative predicates, e.g. *John be in the pub,* apply to eventualities that have proper parts, each of which is homogenous to the whole. Let P be a predicate of eventualities:

(7)   P is bounded iff $\forall e,e'$ if $P(e) \wedge e' \sqsubset e$ then $\neg P(e')$;
        P is stative iff $\forall e$ if $P(e)$ then (i) $\exists e'[e' \sqsubset e]$ and (ii) $\forall e''$ if $e'' \sqsubset e$ then $P(e'')$.

2.2 Viewpoint Aspect

I assume that Viewpoint aspect (either perfective, PFV, or imperfective, IMPFV) is a head located below T (and perfect, PERF, when it is projected as in the present perfect) and above vP. It takes a predicate of eventualities of type $<vt>$ and a time interval (the topic time) of type $<i>$ as arguments, and locates the temporal trace of some eventuality in the denotation of the predicate w.r.t. the topic interval. PFV includes the runtime of an eventuality within the topic interval (the τ function maps eventualities onto their runtimes); the topic interval is introduced either by PERF (in perfect 'tenses') or directly by T (elsewhere).[2]

(8)   a.   Il a plu. (it has rained)

b.
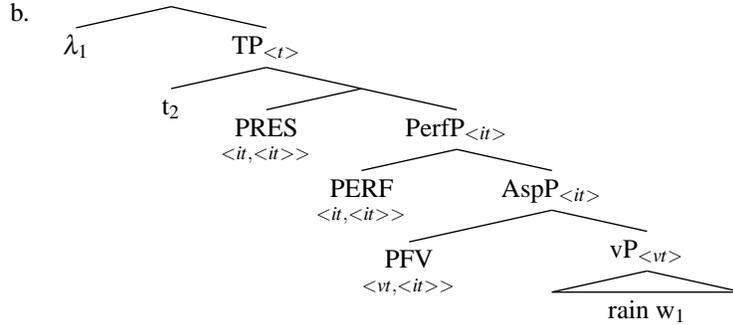
(9) a. $[\![\text{PFV}]\!]^{c,s} = \lambda P_{vt}.\lambda t_i. \exists e_v[\tau(e){\subseteq}t \wedge P(e)]$
     b. $[\![\text{IMPFV}]\!]^{c,s} = \lambda P_{vt}.\lambda t_i. \exists e_v[t{\subseteq}\tau(e) \wedge P(e)]$
     c. $[\![\text{PERF}]\!]^{c,s} = \lambda p_{it}.\lambda t_i. \exists t'_i[t'{\leq}t \wedge p(t')]$ (t'$\leq$t iff there is no t''$\subset$t' s.t.
         t''>t)
     d. $[\![\text{PRES}]\!]^{c,s} = \lambda p_{it}.\lambda t_i. t{=}c_t \wedge p(t)$
     e. LF: [λw_1 [$_{TP}$ t_2 PRES [$_{PERFP}$ PERF [$_{VAspP}$ PFV [$_{vP}$ w_1 pleuvoir]]]]]
     f. $[\![(9e)]\!]^{c,s}(c_w) = \exists t_i[t{\leq}c_t \wedge \exists e_v[\tau(e){\subseteq}t \wedge$ e in $c_w \wedge$ rain(e)]]

After de Swart (1998) and Bary (2009), I assume that a selectional restriction bears on the complement of PFV: it must be a bounded predicate of eventualities. The incompatibility of PFV with stative predicates is visible in the following:

(10) a. #*Tout à l'heure, il a été assis/ en colère.*
          earlier   he has been sitting/ angry

      b. *Tout à l'heure, il était assis/ en colère.*
          earlier   he was sitting/ angry

This is not to say that stative predicates can never co-occur with the perfective. In fact they can, but as we will now see, this co-occurrence is always accompanied by a certain semantic enrichment, called aspectual coercion (de Swart 1998, Bary 2009). In and of themselves, stative predicates are, by definition, unable to meet the selectional requirement of the perfective; but they can still occur under the perfective if they contribute to forming a bounded predicate.[3] Operative in the process are coercion operators inserted between PFV and vP, whose function is to return bounded predicates. Section 3 is devoted to the exploration of the properties of three coercion operators; my strategy is to show for each of them that it applies in a fully parallel fashion to non-modal and to modal predicates. Of central importance in the discussion is the third operator, the one which gives rise to the entailment that an event related to the core stative predicate took place in the actual world.

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[2]The lexical entries in (9a-d) are partially borrowed from Pancheva and von Stechow 2004; I use an extensional system with indexed abstractors over world variables which are syntactically represented, *à la* Percus 2000.

[3]Activities e.g. *John run,* are neither bounded nor stative; they can appear under the perfective through some coercion (interestingly, their coercion doesn't seem to ever need any temporal adverbials).

2.3 Modals Form Stative Predicates of Eventualities

Before proceeding, it is important to show that root modals form (i.) predicates of eventualities (ii.) which are stative (the ultimate goal is to show that the enrichment process that targets statives in the perfective applies to them too). First, Viewpoint aspect selects for a predicate of eventualities P of type $<v,t>$ (cf. (9a)). It seems safe to assume that in the sentences that interest us, the root modal is the head of the complement of VAsp and as such it forms a predicate of eventualities. Second, what kind of eventuality gets ordered w.r.t. the topic interval in the presence of a root modal? My claim is that root modals apply to states (the evaluation points of their accessibility relations), which are the input to the temporal ordering carried out by Viewpoint aspect. This claim is somewhat unusual, so we need to look at the facts with great care. If it is true that root modals apply to eventualities, these should have time and space coordinates, like any other eventuality. As for a time coordinate, in sentence (11) the adjunct *hier* 'yesterday' sets the time of Pierre's obligation to turn in his homework, while *la semaine prochaine* 'next week' sets the time of the turning-in itself.

(11)   *Context:* The rules have just changed: Pierre now has to turn in his homework tomorrow.
       Hier   encore, il devait$_{deon}$ rendre son devoir   la semaine
       yesterday still   he must.PST turn-in his homework the week
       prochaine.
       next
       'Yesterday, he still had to turn in his homework next week.'

Therefore what Viewpoint aspect (IMPFV in the case at hand) orders w.r.t. the topic interval is the runtime of a legal situation (now over and superseded by a new one); it is not the runtime of an event of Pierre turning in his homework. Generalizing, eventualities in the denotation of the complement of a root modal are never quantified over by Viewpoint aspect.

The next sentence exemplifies a mismatch between the space coordinate of the legal situation fixed by the matrix adverbial, and the one of the eventuality of graduating.

(12)   *Context:* Where he lives now, is Jean allowed to practice as a surgeon with his French degree?
       Non, dans ce pays   Jean ne peut$_{deon}$ pas avoir obtenu son diplôme de
       no   in   this country Jean NEG can.PRS NEG have gotten his degree   of
       chirurgien à l'étranger.
       surgeon   abroad
       'No, in this country, Jean is not allowed to have gotten his surgeon degree abroad.'

Predicates formed by root modals thus apply to eventualities. I propose that root modals take as arguments a proposition (they create biclausal structures), a world and an eventuality (the same lexical entry holds, mutatis mutandis, for *devoir$_{root}$* 'must'). The accessibility relation Acc takes as input an eventuality, e.g. the existence of certain conditions, rules or circumstances (I draw on situation semantics when I say that ac-

cessibility is not relative to a world but to an eventuality).

(13)   a. $[\![\text{pouvoir}_{root}]\!]^{c,s} = \lambda \Phi_{st}.\lambda w_s.\lambda e_v.$ e in w $\wedge \exists w'_s \in \text{Acc}(e)[\Phi(w')]$

       b.   Jean peut$_{deon}$ travailler.

       c. $[\![(13b)]\!]^{c,s} = 1$ iff at c_t there is an eventuality e in c_w such that for some world w' compatible with e, Jean works in w'.

If root modals are predicates of eventualities, they are stative, since our definition of stative predicates applies to them: any P eventuality described as the existence of certain conditions, rules or circumstances, has proper parts, each of which is itself a P eventuality. There is empirical evidence that root modals do form stative predicates: I use the incompatibility of the periphrastic progressive *être en train de* 'be in the process of' with stative predicates illustrated in (14b) as a test. As expected, the modal predicate *x pouvoir gagner l'élection* 'x can win the election' is infelicitous under the progressive:

(14)   a.   *être en train   de gagner l' élection/ courir*

            be   in process of win.INF the election run.INF

       b.   *#être en train   d' être   en colère/ pouvoir gagner l'   élection*

            be   in process of be.INF angry   can.INF win   the election

Furthermore, in counterfactuals, root modals behave like well-established statives and unlike well-established eventives.

(15)   a.   *S' il était plus grand, il jouerait   en ce moment au*

            if he be.PST more tall   he play.COND in this moment at-the

            basket   au   niveau professionnel.

            basketball at-the level   professional

            'If he were taller, he would be playing as a professional basketball player.'

       b.   *S' il pouvait marquer des   paniers comme M. Jordan, il jouerait*

            if he can.PST score   of-the baskets like   M. Jordan he play.COND

            en ce moment au   basket   au   niveau professionnel.

            in this moment at-the basketball at-the level   professional

            'If he could score points like M. Jordan, he would be playing as a professional basketball player.'

       c.   *#S' il rencontrait M. Jordan, il jouerait   en ce moment au*

            if he met   M. Jordan he play.COND in this moment at-the

            basket   au   niveau professionnel.

            basketball at-the level   professional

            'If he met M. Jordan, he would be playing as a professional basketball player.'

3 Aspectual Coercion

3.1 Ingressive Interpretation

Uttered out of the blue, (16a) is deviant for want of a bounded predicate satisfying the requirement of the perfective. The adjunction of the adverb *soudain* 'suddenly' in (16c) salvages the sentence:

(16)   a.   #*Jean a   été   en colère cet après-midi.*
            Jean has be.PP angry   this afternoon

       b.   *Jean était   en colère cet après-midi.*
            Jean be.PST angry   this afternoon

       c.   *Jean a   soudain été en colère cet après-midi. ll n'   a   pas*
            Jean has suddenly been angry   this afternoon   he NEG has NEG
            cessé   de l' être depuis.
            stopped of it be since-then
            *'Suddenly, Jean became angry this afternoon. He has been angry nonstop
            ever since.'*

Given the background assumptions adopted here, this means that a bounded predicate is made available in (16c) and is fed to PFV. A coercion operator generated between PFV and vP must be responsible for the transformation, and the adverb plays a role in licensing the operator.[4] We can infer the workings of this operator from the particular reading that obtains: the sentence says that Jean started being angry at a time included within the topic interval denoted by this afternoon (and leaves open the possibility that Jean is still in this state at the time of utterance). To achieve this reading, Bary (2009) postulates an INGR operator, which outputs, in the case at hand, a bounded predicate of eventualities (the input to PFV) that applies to instantaneous—hence devoid of proper parts—eventualities, the initial bounds of open-ended eventualities of Jean being angry. I refer the reader to Bary 2009 for details. Now, the very same kind of reading comes about with modal predicates:

(17)   a.   Olga a soudain pu$_{abil}$ soulever un frigo, mais ne l'a pas fait.
       b.   Si Olga a soudain pu$_{abil}$ soulever un frigo, [Marie]$_F$ aussi en a soulevé
            un.

Olga a soudain pu soulever un frigo can mean, as the continuation in (17a) shows, that a state of Olga being able to lift a fridge came into existence at some point: under this reading brought about by INGR (and made available e.g. in a context where a magician played a trick on Olga that made her strong instantly), the AE is not triggered. But under another reading, the AE comes about (17b). As will become clearer in section 3.4, the optionality of the AE in (17) is a case of ambiguity between two kinds of coercion, the ingressive one (17a) and the actualistic one (which yields AEs) (17b). A

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[4]The exact role of adverbials in supporting certain readings is not explored in this article. They don't seem to be necessary to carry out the ingressive and the complexive coercions, because certain predicates can be coerced in the perfective without temporal modification, e.g. *Pierre être prof d'anglais* 'Pierre be an English teacher', which can easily be understood as a locally maximal state (i.e. complexive interpretation).

point needs to be emphasized: a modal predicate can be coerced, in the same way that a non-modal stative predicate can. From this it follows that modal predicates do not meet the selectional requirement of the perfective and that they in fact must be coerced to fit under this particular Viewpoint aspect.

3.2   Complexive Interpretation

The second kind of special interpretation that arises when the perfective is confronted with a stative predicate is what Bary (2009) calls a complexive interpretation, whereby the existence of a locally maximal state is asserted. Quantificational adverbials e.g. *à plusieurs reprises* 'on several occasions', *une fois* 'once', *chaque fois* 'each time', *à un moment* 'at some point'. . . , as well as durational ones e.g. *pendant n heures* 'for n hours'. . . (as opposed to locational ones e.g. cet après-midi 'this afternoon') support this reading.

(18)   *Il y a un moment de l' après-midi où   Jean a   été assis.*
         there is a   moment of the afternoon   where Jean has been sitting

For (18) to be true, this afternoon must contain a maximal state of Jean sitting (i.e. a state not contained within some larger state of the same nature). After Bary (2009), I assume that an operator labeled MAX (generated between PFV and vP) performs the operation of turning a stative predicate into a maximal one. In the case at hand, boundedness is achieved through maximality: no proper part of a maximal P eventuality is itself a maximal P eventuality (see Bary 2009 for details). Here again, it is important to observe that modal predicates pattern with non-modal ones in being subject to the same kind of coercion. (19a) merely says that at some point in the past, there was a temporally maximal capacity:

(19)   a.   Il y a un moment où/À plusieurs reprises Olga a pu$_{abil}$ soulever un frigo, mais ne l'a pas fait.
         b.   S'il y a un moment où/Si à plusieurs reprises Olga a pu$_{abil}$ soulever un frigo, [Marie]$_F$ aussi en a soulevé un.

The two continuations show again an ambiguity, this time between a complexive reading (19a) and an actualistic one (aka AE) (19b). The fact that modal predicates are amenable to at least two kinds of aspectual coercion in the perfective suffices to show that they are not suitable under the perfective, and that they need to be coerced. It is now time (i.) to show that there exists a kind of coercion which gives rise to AEs with non-modal stative predicates and (ii.) to propose that canonical AEs (with modals) are nothing but the result of this coercion.

3.3   Actualistic Interpretation

Besides the ingressive and the complexive interpretations, French has a third kind of aspectual coercion of stative predicates, which has gone unnoticed so far. I propose that it is the culprit in the triggering of canonical AEs. When placed in the scope of PFV, a number of stative predicates (importantly, not all predicates are eligible) give rise to

a reading whereby the existence of some pragmatically determined event is entailed. This is true e.g. of predicates formed with the verb *coûter* 'cost': (20a) not only says what the price of the house was, it also entails that the house was bought for that price. No such entailment occurs if we substitute the *imparfait* (hence imperfective aspect) for the present perfect (which correlates with the perfective aspect), as in (20b):

(20) a. *La maison a   coûté 100 000 €.*
          the house   has cost.PP €100,000
          → The house was bought.
      b. *La maison coûtait 100 000 €.*
          the house   cost.PST €100,000
          ↛ The house was bought.

Similarly with the following stative predicates; the entailment only obtains in the perfective:

(21) a. *L' obstacle a   été   facile/ difficile/ presque impossible à franchir.*
          the obstacle has be.PP easy/ difficult/ almost   impossible to overcome
          → The obstacle was overcome.
      b. *L' obstacle était   facile/ difficile/ presque impossible à franchir.*
          the obstacle be.PST easy/ difficult/ almost   impossible to overcome
          ↛ The obstacle was overcome.

(22) a. *Jean a eu   du   tact.*
          Jean has have.PP of-the tact
          → Jean acted tactfully.
      b. *Jean avait   du   tact.*
          Jean have.PST of-the tact
          ↛ Jean acted tactfully.

(23) a. *Jean a été   intelligent.*
          Jean has be.PP intelligent
          → Jean did something intelligent.
      b. *Jean était   intelligent.*
          Jean be.PST intelligent
          ↛ Jean did something intelligent.

The fact that these entailments only occur in the perfective strongly suggests that they result from aspectual coercion. I call the operator at play ACT.

(24) a. $[\![$ ACT $]\!]^{c,s}=\lambda P_{vt}.\lambda Q_{vt}.\lambda w_s.\lambda e_v.$ Q(e) $\wedge$ e in w $\wedge$ $\forall e'_v[e'\sqsubseteq e\rightarrow\neg Q(e')] \wedge$ $\exists e''_v[P(e'') \wedge \tau(e)=\tau(e'')]$
      b. Jane a pu$_{circ}$ prendre le train.
      c. LF of (24b): $[\lambda w_1$ [$_{TP}$ t_4 PRES [$_{PERFP}$ PERF [$_{VAspP}$ PFV [w_1 Q_2 ACT [$_{vP}$ w_1 pouvoir [$_{CP}$ λw_3 [w_3 J. prendre-le-train]]]]]]]]
      d. $[\![(24c)]\!]^{c,s}(c_w) = 1$ iff there is a past interval t s.t. there is an eventuality e of s(Q_2) in t in c_w s.t. no proper part of e is an eventuality of s(Q_2), and e is simultaneous with a state in c_w of J. taking the train being possible.

The bounded predicate of eventualities ACT returns is pragmatically determined; for example in (20a), the output predicate applies to events of someone buying the house and in (24b) to events of Jane taking the train (the value of $s(Q_2)$ above). This means that the second predicate argument of ACT is, in the object language, a free variable, whose value is set by the context. The third conjunct in the meaning of ACT says that it is bounded. The fourth conjunct ensures that the runtime of the event is simultaneous with the runtime of some eventuality in the denotation of the core stative predicate. That the latter simultaneity condition exists is evidenced by the infelicity of (25b) and (26b):

(25)　　*Context:* A yachtsman talks about a round-the-world non-stop race in which he took part several times, and in which he is currently engaged...

　　a.　*La dernière fois, la ligne d'arrivée a été difficile à atteindre.*
　　　　the last　　time the finish line　　has be.PP difficult to reach
　　　　Intended: '*Last time, the finish line was hard to reach.*'
　　　　→ The finish line was reached.

　　b.　#*Hier　　la ligne d'arrivée a été difficile à atteindre demain.*
　　　　yesterday the finish line　　has be.PP difficult to reach　　tomorrow
　　　　Intended: '*Yesterday, the finish line was hard to reach tomorrow.*'

(26)　　a.　*Hier　　Pierre a pu　rendre son devoir.*
　　　　yesterday Pierre has can.PP turn-in his homework
　　　　'*Yesterday, Pierre was able to turn in his homework.*'
　　　　→ Pierre turned in his homework yesterday.

　　b.　#*Hier　　Pierre a pu　rendre son devoir　demain.*
　　　　yesterday Pierre has can.PP turn-in his homework tomorrow
　　　　Intended: '*Yesterday, Pierre was able to turn in his homework tomorrow.*'

Lastly, I would like to add to this discussion a fact that illuminates the workings of ACT. We have shown that *x coûter y* 'x cost y' can easily give rise to an actualistic interpretation ((20a) repeated below). Its near synonym *x valoir y* 'x be worth y' cannot:

(27)　　a.　*La maison a　coûté　100 000 €.*
　　　　the house　has cost.PP €100,000
　　　　→ The house was bought.

　　b.　#*La maison a　valu　　100 000 €.*
　　　　the house　has be-worth.PP €100,000

There is a crucial difference in the lexical semantics of *cost* and *be worth*. The *value* of an object is independent of a monetary transaction: even without being for sale, or after being sold, an object can retain its value, but not its price. Only objects that are up for sale have a price, and lose it once they have been purchased. This difference rooted in the lexical entry of the two verbs suffices, I hypothesize, to fix the value of the predicate variable argument of ACT (namely an event of buying the house in (27a)): besides commonplace assumptions and encyclopedic knowledge (in the case e.g. of *be intelligent*), the very meaning of words that make up the complement of PFV is exploited to give a plausible value to the free variable (namely the meaning of *cost* in (27a)).

In brief, the effect of ACT matches the description of AEs. Given that modal predicates are in fact always coerced in the perfective, I propose that AEs with root modals in (1), (3a), (6b), (17b) and (19b) are mere instances of the actualistic coercion.

3.4 Ambiguity

All stative predicates need to be coerced in the perfective. Temporal adverbials support certain types of coercion (as summarized in Table 1). For the predicates that are amenable to the actualistic one, temporal modifiers are not necessary to get the interpretation: therefore in the presence of temporal modifiers, ambiguity ensues, and in their absence, only the actualistic interpretation is available. As for predicates that are not amenable to the actualistic interpretation, the only way they can be made acceptable in the perfective is through the ingressive and the complexive interpretations, supported by the appropriate modifiers (they are otherwise generally excluded cf. (10a) on page 5).

Modification→ Predicates↓	No modifier	'Soudain'	Quantificational Modifiers
John be angry, *John be sitting*	No Coercion	Ingr^{ve} (no AE)	Compl^{ve} (no AE)
John can p, John must p, *the house cost n,* *m be difficult to p*	Act^{ic} (AE)	Ingr^{ve} (no AE) or Act^{ic} (AE)	Compl^{ve} (no AE) or Act^{ic} (AE)

Table 1: Stative Predicates and their Coercion Potentials

We have seen a case (19) (repeated here for convenience) where two types of coercion (complexive and actualistic) are possible in the presence of a quantificational modifier.

(28)   a.   Il y a un moment où/À plusieurs reprises Olga a pu$_{abil}$ soulever un frigo, mais ne l'a pas fait.   *(Compl^{ve})*
       b.   S'il y a un moment où/Si à plusieurs reprises Olga a pu$_{abil}$ soulever un frigo, [Marie]$_F$ aussi en a soulevé un.   *(Act^{ic})*

A hallmark of the actualistic coercion is the simultaneity between the pragmatically salient event and a state in the denotation of the core stative predicate. We can now provide further evidence that (28b) is an instance of the actualistic interpretation: by violating the simultaneity condition, we make the continuation which contains the anaphoric presupposition trigger *aussi* 'too' infelicitous in (29) (in the absence of a temporal mismatch, the continuation is impeccable (28b)). This confirms that our analysis of AEs as stemming from the actualistic coercion is on the right track, and that quantificational temporal modifiers do not block AEs, they simply make them optional.

(29) *Il y a un moment où   Olga a pu   soulever un frigo lors de la*
there is a moment where Olga has can.PP lift   a fridge during the
foire qui a   lieu demain. #[Marie]_F aussi a   soulevé un frigo.
fair that takes place tomorrow Marie   also has lifted a fridge
Intended: *'At some point, Olga was able to lift a fridge during tomorrow's*
fair. [Marie]_F also lifted a fridge.'

I would like to close this section by showing that the coercion operators that I posited are indeed present in the syntax (the demonstration is about MAX and ACT). To do so, I use a gapping test. First of all, I show that MAX is syntactically represented when a complexive interpretation obtains.

(30) *Context:* A group of ten French people are being held hostage by rebels in the Amazon rainforest. Some of them have developed Stockholm syndrome, i.e. they prefer to stay with their captors; every hostage that ever managed to escape and got caught was immediately killed...

 a. *Jean a pu   s'   évader chaque fois qu' il était seul avec son*
 Jean has can.PP REFL escape each   time that he was alone with his
 gardien et Marie, mardi   matin. #[Pierre]_F aussi s'   est
 guard and Marie Tuesday morning Pierre   also REFL is
 évadé mardi.
 escaped Tuesday
 Intended: *'Jean had an opportunity to escape each time he was alone with his guard, and Marie, on Tuesday morning. [Pierre]_F also escaped on Tuesday.'*

 b. *Jean a pu   s'   évader chaque fois qu' il était seul avec son*
 Jean has can.PP REFL escape each   time that he was alone with his
 gardien et Marie a pu   s'   évader mardi   matin. [Pierre]_F
 guard and Marie has can.PP REFL escape Tuesday morning Pierre
 aussi s'   est évadé mardi.
 also REFL is escaped Tuesday
 'Jean had an opportunity to escape each time he was alone with his guard, and Marie had an opportunity to escape on Tuesday morning. [Pierre]_F also escaped on Tuesday.'

The first conjunct of the first sentence of (30a) favors a complexive interpretation (since no prisoner escaped more than once) which the temporal modifier makes possible; the constituent that is gapped in the second conjunct is identical with some constituent of the first conjunct which is at least as large as VAspP. Importantly, there is no quantificational temporal modifier in the second conjunct, but a complexive interpretation obtains nonetheless: it is forced by syntactic means (i.e. copying). The continuation with *aussi* 'too' yields a presupposition failure: the AE is unavailable. The gapped constituent contains MAX—instead of ACT—because its antecedent does too. We have evidence that the complexive interpretation—i.e. MAX insertion—obtains through at least two routes: either MAX is licensed by certain quantificational temporal modifiers, or it is copied from another clause. In (30b), which is a control and where no copying takes

place, the AE in the second conjunct is possible (the *aussi*-test is successful) and in fact necessary (in the absence of modification or copying).

We can apply the same strategy to show that ACT is syntactically represented when an actualistic interpretation obtains.

(31) *Context:* Same as in (30)...

   a. #*Jean a enfin pu s' évader mardi matin, et Marie,*
       Jean has finally can.PP REFL escape Tuesday morning and Marie
       chaque fois qu' elle était seule avec son gardien.
       each time that she was alone with her guard
       'Jean was finally able to escape on Tuesday morning, and Marie, each time she was alone with her guard.'

   b. *Jean a enfin pu s' évader mardi matin et Marie a*
       Jean has finally can.PP REFL escape Tuesday morning and Marie has
       pu s' évader chaque fois qu' elle était seule avec son gardien.
       can.PP REFL escape each time that she was alone with her guard
       'Jean was finally able to escape on Tuesday morning, and Marie was able to escape each time she was alone with her guard.'

The first conjunct of (31a) has an actualistic interpretation (i.e. an AE) because it lacks a quantificational temporal modifier. Copying of VAspP—including the ACT operator it contains—into the second conjunct ruins the coherence of the discourse (in the context, no prisoner ever escaped more than once) but it is syntactically forced, hence the incoherence marked with the # sign. In the control sentence (31b), the first conjunct receives an actualistic interpretation and the second conjunct a complexive interpretation, and no incoherence ensues (the asymmetry is possible because no copying is involved).

To sum up, we have shown that AEs are instances of a kind of aspectual coercion which targets modal and non-modal predicates alike (the actualistic coercion). We have shown that syntactically represented coercion operators are operative in satisfying the need of the perfective to combine with a bounded predicate of eventualities.

4   Comparison with Hacquard 2006

Hacquard (2006) focuses on examples with ability and circumstantial modals (primarily existential), without any adverbial modifiers. She thus doesn't discuss any exceptions to AEs, such as (6a), (17a) and (19a). But these exceptions are genuine counterexamples to her analysis. The thrust of the proposal lies in what Hacquard takes to be a syntactic peculiarity of modal verbs: *pouvoir* and *devoir,* unlike other modal expressions e.g. *avoir la possibilité de,* are, according to this proposal, auxiliaries. When it comes to AEs, this purported difference is prima facie illuminating: in the absence of temporal modifiers, negating the actuality of the complement of the former leads to a contradiction, as we already know, cf. (1) on p. 2; but the same test applies to the latter without a hitch:

(32)   Olga a eu la possibilité$_{circ}$ de prendre le train de 7 heures, mais ne l'a pas fait.

'Olga had the possibility to take the 7 o'clock train but she didn't do so.'

Hacquard concludes that modal verbs are special among modal expressions, and among verbs tout court: they are auxiliaries (in ModP), and as such lack an argument that, in her account, all lexical verbs have, namely Viewpoint Aspect. Here the proposal departs from the orthodox view (held here and in many studies on tense and aspect) that Viewpoint Aspect is a projection intermediate between Tense and vP: Viewpoint Aspect in Hacquard's view is generated as an argument (of type $<<s,i,vt>,t>$) of lexical verbs, but a type mismatch forces it to raise right below Tense, leaving behind a trace $<v>$. When a root modal verb (a quantifier over accessible worlds) is present, the raised Viewpoint Aspect argument ends up taking scope over it. Next, Viewpoint Aspect is a generalized quantifier over eventualities; as a result of moving out of its base position, it binds its trace of type $<v>$ in the nuclear scope of the modal (this amounts to quantifying in); it also takes a world argument bound by the matrix default world binder λw_1.[5]

(33) a. $[\![\text{PFV}]\!]^{c,s} = \lambda w_s.\lambda t_i.\lambda P_{vt}. \exists e_v[e \text{ in } w \wedge \tau(e) \subseteq t \wedge P(e)]$
      b. $[\![\text{pouvoir}_{root}]\!]^{c,s} = \lambda w_s.\lambda \Phi_{st}. \exists w'_s \in \text{Acc}(w)[\Phi(w')]$
      c. Jane a pu$_{circ}$ prendre le train.

(34)
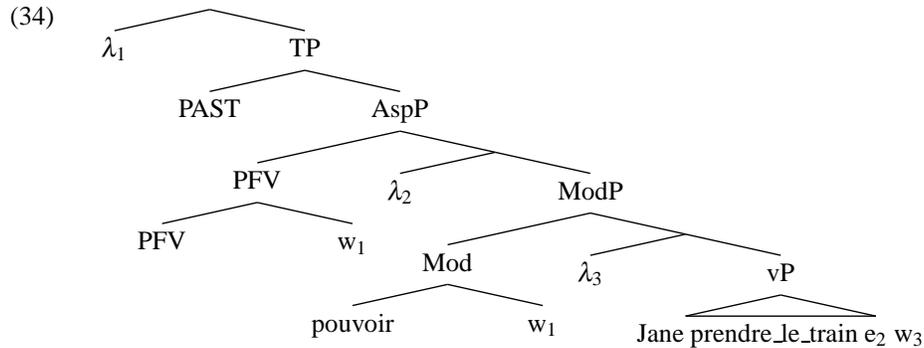
(35) a. LF of (33c): $[\lambda w_1 [_{TP} \text{PAST} [\text{PFV } w_1] [2 [_{ModP} [\text{pouvoir } w_1] \lambda w_3 [_{vP} w_3$
          Jane prendre-le-train $t_{2v}]]]]]$
      b. $[\![(35a)]\!]^{c,s}(c_w) = \exists e_v[e \text{ in } c_w \wedge \tau(e) \subseteq t \{t<c_t\} \wedge$
          $\exists w'_s \in \text{Acc}(c_w)[\text{take-the-train}(w', e) \wedge \text{Ag}(e, J)]]$
          'There is an event in c_w located in a past interval, and there is a world compatible with Jane's abilities in c_w where that event is a taking-the-train event by Jane.'

In this configuration, Viewpoint Aspect asserts the existence of some eventuality in the actual world, and with an existential quantification over possible worlds mediating between Viewpoint Aspect and vP (i.e. the modal), this eventuality is said to be, in some accessible world, in the denotation of the predicate denoted by vP.[6] Hacquard

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[5] Another difference with my proposal lies in the treatment of tense: Hacquard assimilates *passé composé* with past, which, in her view, is a pronoun which presupposes anteriority w.r.t. the time of the context (curly brackets in (35b) indicate a presupposition.)

[6] As it stands, the proposal doesn't predict that AEs do not arise when the morphology on the modal

claims that the properties of an eventuality e in an accessible world are the same as the properties of e in the actual world, which derives that in (33c) an eventuality of Jane taking the train took place in actuality.

(36)   **Principle of Event Identification across Worlds (Hacquard 2006):**[7] For any w_1, w_2: If an eventuality e occurs in w_1 and w_2, and e is described as a P eventuality in w_1, then e is a P eventuality in w_2.

I now point out three shortcomings of this account. First, there is no compelling reason to treat French root modal verbs as auxiliaries. As a matter of fact, Hacquard does not define the notion of auxiliary, and after all it is not even clear that it corresponds to any natural class. It is commonly thought that English so-called true modals (e.g. *must* and *can*) are auxiliaries by virtue of their participation to V-to-T movement (evidenced by the linearization of *not* after them). In French tensed clauses, this property is shared by all verbs, and cannot be used as a criterion; in infinitive clauses, where Pollock (1989) shows that V-to-T discriminates among verbs, head movement of root modals is very marginal (37a), unlike that of the auxiliaries *être* 'be' and *avoir* 'have' (37b), suggesting that the former are not auxiliaries.

(37)   a.   *??ne pouvoir pas parler/ ne devoir pas parler*
          NEG can.INF NEG speak/ NEG must.INF NEG speak

       b.   *n' avoir pas parlé*
           NEG have.INF NEG spoken

       c.   **ne parler pas*
           NEG speak.INF NEG

Second, we have seen that root modals are unlikely to be mere quantifiers over possible worlds without an eventuality argument, pace Hacquard (compare (13a) on p. 7 and (33b) on p. 15). In subsection 2.3, I proposed that root modals, as predicates of eventualities, apply to states located in space and time (the evaluation points of root accessibility relations). Now if this claim is correct, the quantifying-in approach loses its bite: in sentences with a root modal, Viewpoint Aspect really quantifies over eventualities that the modal or the output of a coercion operator (in the perfective), applies to; it doesn't quantify over eventualities in the set denoted by the vP in the scope of the modal. In other words, Viewpoint Aspect always selects for a complement of type <vt> and quantifies over eventualities in its denotation, which it locates w.r.t. the topic interval. If quantifying-in were taking place, Viewpoint Aspect would locate w.r.t. the

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verb is imperfective: Hacquard needs to stipulate that the imperfective has no semantics of its own, and that it is a mere morphological spell-out that occurs when Tense and Viewpoint Aspect are not adjacent: this morphology is realized when there is a silent intensional operator above the landing site of the Aspect argument and below Tense: according to her, the effect of this intensional operator, e.g. GEN, is that the entailment holds of some accessible world rather than of the actual world. See Portner 2009 for a discussion of this point.

   [7]For our current purposes, it is sufficient to quote, as I do, a provisional version of the principle, glossing over the final version. In either version, the principle rests on the questionable assumption that an event necessarily keeps the same properties across worlds, which seems implausible in view of the existence of counterfactuals, as noted by Hacquard herself (Hacquard 2009). Since the facts that I'm presenting here are by and large foreign to this aspect of Hacquard's theory, I will leave this discussion here.

topic interval eventualities occurring in the worlds quantified-over by the modal; yet this cannot be true, for the temporal location of those eventualities is set independently of matrix Viewpoint Aspect, cf. (11) on 6.

Third, the claim that AEs only occur with root modal verbs (the so-called auxiliaries) is falsified twice.

1. It is not the case that periphrastic modal expressions are unable to trigger AEs in the perfective. Granted, (32) shows that a contradicting continuation can be used with *avoir la possibilité de,* without creating any semantic deviance. Yet it is imprudent to conclude from this that no sentence pronounced *Olga a eu la possibilité de prendre le train de 7 heures* triggers an AE. Such a string is in fact ambiguous: under one reading, it does not yield an AE (32), but under another one, it does, as illustrated in (38), where the perfectly felicitous use of the presupposition trigger *aussi* 'too' reveals that it is part of the common ground when the continuation is uttered that Olga did take the 7 o'clock train.

(38)   Si Olga a eu/#avait la possibilité$_{circ}$ de prendre le train de 7 heures, [Marie]$_F$ aussi l'a pris.
'If Olga had the possibility to take the 7 o'clock train, [Marie]$_F$ took it too.'

In light of the principles I advocate in this article, the reason no AE is triggered in (32) is either that no aspectual coercion occurs, or that a kind of coercion other than the actualistic one is available (without adverbial modification). The first option is certainly viable, since the verb *avoir* 'have', which is part of the modal expression, has some eventive usages, e.g. in (39), where it means *get* in the absence of any aspectual coercion (the sentence is in the simple indicative present).

(39)   *On a   son bac   à 18 ans.*
one have.PRS his A-levels at 18 years
'One gets their A-levels at the age of 18.'

2. AEs are not in fact restricted to modal expressions *sensu lato,* as became apparent in section 3.3. Hacquard acknowledges the existence of an actuality inference in (20a) p. 10, cf. her example (9a); but she claims that this inference is the result of a pragmatic reasoning which goes as follows: the sentence says that there was a past interval at which the cost of the house was €100,000. The hearer reasons that if this state is now over, it is because some event put an end to it, and the most plausible event capable of terminating such a state is a monetary transaction. Notice that this account makes no reference to the perfective, only to the fact that the state is at the time of utterance (i.) past and (ii.) completed. But these two characteristics do not suffice to yield the transaction inference: we can very well concoct an imperfective sentence and ensure that the denoted state features the two characteristics, yet the inference does not obtain:

(40)   *La maison coûtait   100 000€ jusqu'en 1980 mais pas au delà.*
the house   cost.PST €100,000 until   1980 but   not beyond
$\nrightarrow$ The house was bought.

In closing, I would like to emphasize the importance of the 'exceptions' (6a), (17a) and (19a). One cannot rescue Hacquard's theory by claiming that temporal modifiers

change Viewpoint Aspect from perfective into imperfective (this attempt is made in Hacquard 2006, fn. 73 on p. 164 about *sempre* 'always' in Italian). There is no evidence that temporal modifiers have this effect. In fact there is ample evidence to the contrary: in all those sentences, there is a temporal inclusion *within* a topic interval, in accordance with the semantics of PFV. By themselves, temporal modifiers never change Viewpoint Aspect: this is evident in non-modalized perfective sentences, which have none of the characteristic aspectual properties of their imperfective counterpart. For example it is well known that accomplishments in the imperfective give rise to the so-called imperfective paradox (i.e. the lack of entailment illustrated in (41a)):

(41) *Context:* At that moment...

    a.   *Jean traversait la route.*
        Jean cross.PST the road
        'Jean was crossing the road.'
        $\not\to$ Jean crossed the road.

    b.   Possible continuation:
        Il n'est jamais arrivé de l'autre côté.
        'He never made it to the other side.'

The entailment that Jean crossed the road does hold in the perfective, even with a quantificational modifier:

(42)   a.   *À un moment donné, Jean a traversé la route.*
        at a moment given Jean has cross.PP the road
        'At some point, Jean crossed the road.'
        $\to$ Jean crossed the road.

    b.   Impossible continuation:
        #Il n'est jamais arrivé de l'autre côté.
        'He never made it to the other side.'

Furthermore, we know that AEs are in fact available in (6a), (17a) and (19a) and the like (the sentences are ambiguous). If temporal modifiers shifted the Viewpoint Aspect of the clause they appear in, it is not clear why this shift would not always occur (making the AE outright impossible, contrary to fact).

5 Conclusion

This article argues that AEs, traditionally described as caused by the presence of a root modal under the perfective, are instances of a kind of aspectual coercion, which I label actualistic. Stative predicates of eventualities are not per se suitable complements of the perfective, and their meaning needs to be enriched by means of a syntactically represented operator. I show that root modal predicates are stative, therefore whenever they appear under the perfective, they are coerced. The observation that some non-modal stative predicates in the perfective give rise to the inference that an event took place provides evidence that AEs with root modals are indeed the outcomes of aspectual coercion.

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