

Ability modals and actuality entailments

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1 Ability and actuality

Past-tense statements of ability are ambiguous between an interpretation in which the agent simply possesses the ability to perform a particular action, and an interpretation in which she performs the action:

- (1) Rebecca was able to swim across Lake Balaton.
 - a. **‘Ability’ reading:**
[In her youth,] Rebecca had the ability to swim across Lake Balaton.
 - b. **‘Opportunity’ reading:**
[Last week,] Rebecca swam across Lake Balaton.

Thalberg (1972):

Take as a premise this report of Brown’s performance at the shooting gallery: ‘He hit three bull’s-eyes in a row.’ [...] I admit that we are entitled to conclude, ‘Brown was able to hit three bull’s-eyes in a row.’ I deny, however, that this conclusion is equivalent to asserting that Brown has a certain degree of ability at target practice.

The non-equivalence becomes noticeable if we expand our account of Brown’s display of marksmanship: ‘Before he hit the three bull’s-eyes, he fired 600 rounds, without coming close to the bull’s-eye; and his subsequent tries were equally wild.’ This amplified record of Brown’s performance in no way compels us to retract our assertion that he was able to hit three bull’s-eyes in a row. He was able to do it, but without any regularity. Therefore he does not have this sort of ability at target shooting.

The story reveals the ambiguity of expressions from the ‘being able’ family. [...] ‘Was able’ sometimes means ‘had the ability’, and sometimes means ‘did’.

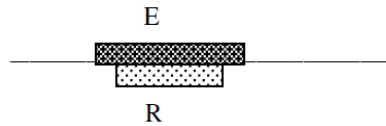
The ambiguity extends to ability uses of possibility modals, at least in languages which mark **aspect** on the verb (Bhatt, 1999):

Viewpoint aspect (Bhatt and Pancheva, 2005):

provides a temporal perspective on events, locating them relative to a reference time

- **progressive/imperfective**

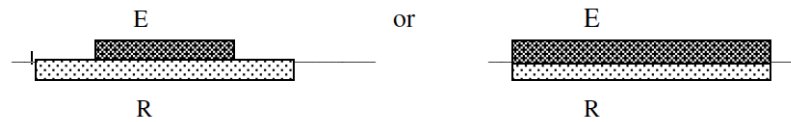
- ‘looking at the event from the inside’ (while it is ongoing)
- event time *contains* reference time:



$$(2) \quad \llbracket \text{IMPF} \rrbracket := \lambda P \lambda t. \exists e [P(e) \ \& \ \tau(e) \supset t]$$

- **perfective**

- ‘looking at the event from the outside’ (e.g., when it is completed)
- event time (E) *is contained* in the reference time (R):



$$(3) \quad \llbracket \text{PFV} \rrbracket := \lambda P \lambda t. \exists e [P(e) \ \& \ \tau(e) \subseteq t]$$

(4) **French:**

- Olga pouvait soulever un frigo, mais elle ne l'a jamais fait.*
Olga could.IMPF lift a fridge, but she NEG it-has never done.PP.
‘Olga had the ability to lift a fridge, but she never did it.’
- Olga a pu soulever un frigo, #mais elle ne l'a pas fait.*
Olga could.PFV lift a fridge, #but she NEG it-has NEG done.PP.
‘Olga was able to lift a fridge, #but she did not do it.’

(5) **Hindi:**

- a. *Yusuf havaii-jahaaz uraa sak-taa thaa, lekin vo havaii-jahaaz nahĩĩ*
 Yusuf air-ship fly could.IMPF pst, but he air-ship NEG
uraa-taa thaa.
 fly.IMPF PST
 ‘Yusuf was able to fly airplanes, but he did not fly airplanes.’
- b. *Yusuf havaii-jahaaz uraa sak-aa, #lekin vo havaii-jahaaz nahĩĩ uraa-yaa.*
 Yusuf air-ship fly could.PFV, #but he air-ship NEG flew.PFV.
 ‘Yusuf was able to fly the airplane, #but he didn’t fly the airplane.’

- (4a), (5a) are statements of ability; the modal complement need not have occurred
- **actuality entailments:** (4b), (5b) take the ‘opportunity’ reading: the modal complement must have occurred

Actuality entailments result from combining *perfective aspect* and an *ability modal*:

- from the standpoint of modality, this is mysterious:
 - modals express possibilities that go beyond the actual
 - ability modals are taken to be circumstantial possibility modals (of some kind):

$$(6) \quad A \text{ can } \phi := \Diamond_{\text{circ}}\phi(A)$$

(we can already see a problem: (6) predicts that $\phi(A)$ entails $A \text{ can } \phi$, but Brown’s single success in hitting the bull’s-eye doesn’t license Brown can hit the bull’s-eye)

- actuality entailments do not occur with all uses of the possibility modal (Hacquard, 2006, 2009):

(7) **Epistemic:**

Jean a (bien) pu partir, mais il est aussi possible qu’il soit
 Jean (well) could.PFV leave, but it is also possible that-he is.SUBJ
resté.
 stayed.’

‘Jean might well have left, but it’s also possible that he stayed.’

(8) Deontic:¹

Le doyen m'a permis d'entrer dans la bibliothèque, mais je
the dean me-has permit.PFV of-entry in the library but I
ne suis pas entrée.
NEG am NEG enter

‘The dean permitted me to enter the library, but I didn’t do it.’

- there’s no obvious reason why perfective aspect should force the modal complement’s realization:

- as states (Hackl, 1998; Homer, 2011), abilities don’t have natural boundaries
- the perfective requires a ‘bounded eventuality’ (de Swart, 1998)
- expected outcome: the ability-state is contained within the reference time

(9) *Marie a été belle.* \leadsto [Marie is no longer beautiful.]
Marie was.PFV beautiful.

‘Marie was/has been beautiful.’

- to make matters worse, this is exactly what we get with periphrastic ability constructions like *have the ability/capacity*:

(10) *Jean a eu la capacité de soulever un frigo, mais il ne l’a*
Jean had.PFV the capacity to lift a fridge, but he NEG it-has
pas soulevé. \leadsto [And he no longer has the capacity.]
NEG lifted.

‘Jean had the ability to lift a fridge, but he didn’t lift it.’

2 Two past accounts of actuality entailments

2.1 *Being able as managing*

Bhatt (1999)’s proposal: ability modals are not (possibility) modals at all

- instead of the standard modal semantics, *be able*, *pouvoir*, and *saknaa* share the semantics of the **implicative** verb *manage*, which always entails its complement (Karttunen, 1971):

(11) Olga managed to lift a fridge. \vdash *Olga lifted a fridge.*

- the lack of entailment for *pouvoir/saknaa* under imperfective marking is due to a covert **genericity** operator, which is realized as imperfective aspect in combination with the past tense:

¹Hacquard argues that actuality entailments occur with all **root** (circumstantial and deontic) modals, but this is not the prevalent view (anymore).

- (12) **Genericity:** quantifies over ‘normal worlds’
 $\llbracket \text{GEN} \rrbracket^w := \lambda Q_{st} [\forall w' \in \text{NORM}(w) Q(w')]$
- (13) a. *Olga pouvait soulever un frigo.*
 Olga can.IMPF lift a fridge.
 ‘Olga had the ability to lift a fridge.’
 b. = PST(GEN(ABLE(lift-fridge))(Olga))
 = PST($\forall w \in \text{NORM}(w^*)$ [lift-fridge(Olga)])
 \rightarrow *At some past time, all normal worlds were such that Olga lifted a fridge.*

- but the actual world does not have to be one of the normal worlds, so the ability need not have been exercised

Two problems:

- this forces us to postulate a lexical ambiguity for *can*, *pouvoir*, *saknaa* between the possibility-modal reading and the implicative reading
- more immediately: the explanation from genericity predicts that implicative verbs like *manage* won’t entail under perfective marking
 - this turns out not to be true:

- (14) *Jean réussissait à parler à Marie, #mais il n’a jamais parlé*
 Jean managed.IMPF to speak to Marie, #but he NEG-has never spoken.PP
à son.
 to her.
 ‘Jean (normally) managed to speak to Marie, #but he never spoke to her.’

2.2 A scope-based treatment

For **Hacquard (2006)**, the ability modal is a real possibility modal:

- she argues that the ‘Bhatt effect’ extends to all root possibility and necessity modals (including deontic modals), but not to epistemic modals (see 7):

- (15) a. *Lydia pouvait/devait aller chez sa tante (selon les ordres de*
 Lydia could.IMPF/must.IMPF go place her aunt (after the orders of
son père), mais n’y est pas allée.
 her father), but NEG-there is NEG go.
 ‘Lydia could/had to go to her aunt’s (according to her father’s orders), but she did not go.’

- b. *Lydia a pu/a dû aller chez sa tante (selon les ordres de son père), #mais n’y est pas allée.*
 Lydia could.PFV/must.PFV go place her aunt (after the orders of her father), but NEG-there is NEG go.
 ‘Lydia could/had to go to her aunt’s (according to her father’s orders), #but she did not go.’

- the argument is that root modals merge lower than epistemic modals: root modals scope below aspect, and epistemic modals scope above
- to make this work, the aspectual operator must not only locate events with respect to time, but also be keyed to a world of evaluation

(16) Hacquard’s perfective operator:

$$\llbracket \text{PFV} \rrbracket^w = \lambda P \lambda t \exists e [e \text{ in } w \ \& \ \tau(e) \subseteq t \ \& \ P(e)]$$

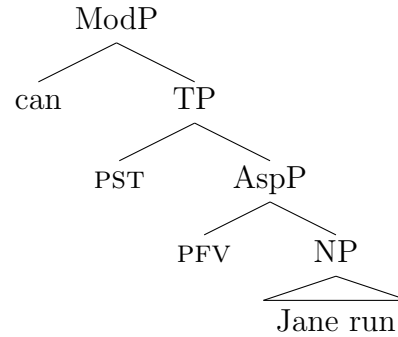
- if there is no modal higher than aspect, this evaluation world is the real world (see 18)

(17) a. *Jane a pu_{epis} courir.*

Jane has can.PFV run

‘Jane may have run.’

b. (17a) \equiv



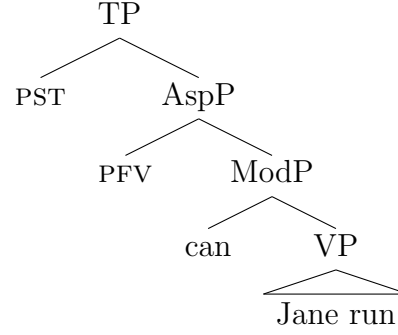
- c. (17b) is true iff there is a world w' compatible with what is known in w^* such that $\exists e [e \text{ in } w' \ \& \ \tau(e) \subseteq t\{t < t^*\} \ \& \ \text{run}(e, J, w')]$
 \leadsto *there is a world compatible with what is known in the actual world such that there is an event located within a past interval which is a running event by Jane*

(18) a. *Jane a pu_{root} courir.*

Jane has can.PFV run

‘Jane was able to run.’

b. (18a) \equiv

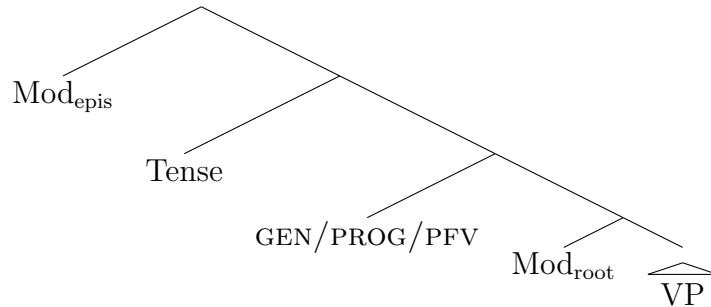


- c. (18b) is true iff $\exists e[e \text{ in } w^* \ \& \ \tau(e) \subseteq t\{t < t^*\} \ \& \ \exists w' \text{ compatible with the circumstances in } w^* \text{ such that } \text{run}(e, J, w')]$
 \leadsto *there is an event in the actual world located within a past interval, and there is a world compatible with the circumstances of the actual world where that event is a running event by Jane*

- NOTE: (18) doesn't get us quite where we want to be: the event in the real world has a circumstantially accessible counterpart event in which the modal complement is realized
- Hacquard invokes a homogeneity principle to identify the descriptions of the two events, and give us a real-world event in which the modal complement is actualized:

(19) **Preservation of Event Description (PED).**² For all worlds w_1, w_2 , if e_1 occurs in w_1 and in w_2 , and e_1 is a P -event in w_1 , then *ceteris paribus*, e_1 is a P -event in w_2 as well.

- What happens with the imperfective?
 - roughly, Hacquard adopts Bhatt's story
 - imperfective aspect brings in a generic operator, which quantifies over normal worlds
- Skeleton:



²Hacquard calls this principle a 'pragmatic' one, noting that there are cases – e.g. counterfactual conditionals – where it obviously fails. The idea is that it operates as a default, and abrogating it requires morphological indication from the speaker, such as the use of *conditionnel* for counterfactuals in French. The status of such a principle is unclear: it seems to suggest that there ought to be a way for speakers to actively cancel actuality entailments.

Problems:

- Mari and Martin (2009): Hacquard, like Bhatt, predicts that implicatives should not entail their complements (due to the merge height of GEN)
 - **preservation of event description** does work that we might not want it to do:
 - modal force (possibility vs. necessity) is preserved, even in the actuality-entailing cases: (20a) is fine in a situation where there were multiple options for going to London, but (20b) should be false in this context
- (20) a. *Jane a pu prendre le train pour aller à Londres, #mais elle a pris l'avion.*
 Jane has can.PFV take the train for go to London but she has
 take.PFV the.plane
 ‘Jane was able to take the train to go to London, #but she took the plane.’
- b. *Jane a dû prendre le train pour aller à Londres, #mais elle a pris l'avion.*
 Jane has must.PFV take the train for go to London but she
 has take.PFV the.plane
 ‘Jane had to take the train to go to London, #but she took the plane.’
- forcing a coherent event description flattens the difference between possibility and necessity:
 - the universal quantifier of *must/devoir* forces all of the teleologically-best (going-to-London) worlds to contain a train-taking,
 - the existential quantifier gives us that one of the best worlds contains a train-taking; PED then guarantees that all others must also contain a counterpart train-taking

3 The ability modal

From the philosophical literature: an ability (modal) is not just a possibility (Austin, 1961; Kenny, 1976):

- *be able* and *can* don’t behave like possibility modals
 - if S can $\phi \sim \Diamond_{\text{circ}}\phi(S)$, we expect: $\phi(S) \vdash S$ can ϕ [T: $p \rightarrow \Diamond p$]
- (21) (Maier, 2018): Tara is a beginning golfer. She misses most of her shots. On this occasion, however, she strikes the ball from the tee and it happens to go

into the hole, so on this occasion she’s made a hole in one.

Claim: It’s difficult to decide whether or not “Tara can make a hole in one” is true (this is the problem of Brown and the bull’s-eye)

- we expect that $S \text{ can } (\phi \vee \psi) \vdash (S \text{ can } \phi) \vee (S \text{ can } \psi)$ [K: $\Diamond(p \vee q) \rightarrow \Diamond p \vee \Diamond q$]

(22) (Kenny, 1976): given a randomly shuffled deck of cards, with equal distribution of black and red cards.

Claim: Karl can draw a red card or a black card, but we can’t assert either “Karl can draw a red card” or “Karl can draw a black card” (with a circumstantial/agentive reading).

- Hindi past perfective (if the card-drawing happened last week, and if the card was either red or black):

- (23) a. *Karl laal patthaa ya kaalii patthaa le sak-aa.*
 Karl red leaf or black leaf take.INF can-PFV.MASC.
 ‘Karl was able to take a red or black card.’
 b. *Karl laal patthaa le sak-aa.* (*Karl could-pfv take a red card*)
 c. *Karl kaalii patthaa le sak-aa.* (*Karl could-pfv take a black card*)

* (24)a is weird for two reasons. First, the context doesn’t suggest that it was in any way “difficult” to draw a card from the deck (and since drawing a card results in drawing either a red or black card, the ability modal doesn’t seem licensed). Second, it’s hard to read this circumstantially, because the speaker is behaving as if she doesn’t know what colour the card was.

* (24b) and (24c) are much better – the uncertainty pre-draw over the card colour makes the ability modal better. Of course, to utter either one, we have to know what colour the card was.

- present imperfective:

- (24) a. *Karl laal patthaa ya kaalii patthaa le sak-taa hai.*
 Karl red leaf or black leaf take.INF can-hab.masc pres.
 ‘Karl can draw a red card or a black card.’
 b. *Karl laal patthaa le sak-taa hai.* (*Karl can-impf take a red card*)
 c. *Karl kaalii patthaa le sak-taa hai.* (*Karl can-impf take a red card*)

* it’s almost impossible to avoid an epistemic interpretation (to the extent possible, only (25a) is okay)

- past imperfective: only (25a), with past tense marker. But there have to have been multiple situations in which he was in a card-drawing situation, and then, again, the ability modal is weird.

- K and T are good in the perfective; what explains the asymmetry?

Question: If the ability modal isn't just a circumstantial possibility modal, what is it?

One solution: a complex view of ability/agentive modals

- abilitative/agentive *can* is stronger than \Diamond , but weaker than \Box
- *stit* operators (Belnap and Perloff, 1988; Horty and Belnap, 1995): *S can ϕ* is really something like 'S can_{circ} see to it that ϕ '

- the *stit* operator: *S stit ϕ* at some moment *m* just in case *S* does something that ensures that ϕ is the case at every history that includes *m*
- operates in a branching time framework (Thomason, 1984; Belnap, 1991)
- $S \text{ can}_{\text{agentive}} \phi := \Diamond_{\text{circ}}(S \text{ stit } \phi)$
- solves the T and K problems, but:

(25) (Cross, 1986): Gina is an excellent runner. In the 50-yard dash at her school, she almost always – but not quite always – wins.

Claim: Facing a particular race, it is plausible that Gina has the ability to win, but she cannot guarantee that she will win.

- * past perfective uses *do* talk about situations where Gina's win was guaranteed (i.e. nothing intervened between her "try" and her win)
- * if we want to talk about an ability that isn't a guarantee, we use imperfective (but, what is the reason for the failure of the guarantee?)
- abilitative 'can' is a **hypothetical guarantee**: Mandelkern et al. (2017); Maier (2018)
 - the proposals are quite similar to the *stit* view
 - Mandelkern et al. (2017): the agent has some 'practically available' action such that if *S* tries to take this action, she performs the modal's prejacent. The action can, but need not be the prejacent itself.
 - * this deals with the case of Gina by (I think) saying that in the cases where she "tries" but doesn't win, the relevant action was unavailable (she was low on energy, etc)
 - Maier (2018) defines *options* as actions that are open at a given moment – this seems to be the same as practically available actions.
 - * "What is it, then, to have an ability? I propose: *S has the ability to A just in case A is generally an option for S.*"
 - * this sounds like an imperfective

3.1 Actuality entailments again

Assumption: Ability modals have the structure of a ‘hypothetical guarantee’ – S can/able $\phi \sim S$ has a possible action/option A s.t. if S does A , S realizes ϕ .

(26) Rebecca can_{ability} hit the target. = 1 iff $\exists A(R) : A(R) \rightarrow \text{hit-targ}(R) \ \& \ \Diamond_{\text{circ}} A(R)$

- $A(S)$ is sufficient for $\phi(S)$
- the idea: the modalities that participate in actuality entailments have this structure, where a “necessity” (by way of the sufficiency conditional) is embedded under a circumstantial possibility.
- this accounts for the present/past asymmetry:
 - present tense *can* relies on knowing what A and its result are
 - past tense *can* has the benefit of hindsight: it’s enough to see that a particular action A did result in ϕ
 - past tense *can* can therefore be used in situations where, at the reference time, the speaker would not have asserted *can*

Insights from *enough* constructions:

- Karttunen (1971) points out that *too* and *enough* constructions are optionally implicative:

- (27) a. Bertha was fast enough to win the race. \leadsto *Bertha won the race.*
 b. Bertha wasn’t fast enough to win the race. \leadsto *Bertha didn’t win the race.*

Hacquard (2005): T&E constructions pattern with ability modals

- (28) a. *Bertha a été assez rapide pour gagner la course, #mais elle n’a pas gagné.*
 ‘Bertha was-PFV fast enough to win the race, #but she didn’t win.’
 b. *Bertha était assez rapide pour gagner la course, mais elle n’a pas gagné.*
 ‘Bertha was-IMPF fast enough to win the race, but she didn’t win.’

As with *be able*, *pouvoir*, an at-base implicative story (cf. Hacquard, 2005) won’t work, because *manage* still entails under imperfective

- Proposal:
 - (circumstantial) *enough* constructions have the structure proposed for ability modals, but are specific about the type of action involved

- *be fast enough to X/être assez rapide pour X* presuppose the existence of a certain degree of fastness d , the deployment of which will cause X (cf. also Schwarzschild, 2008)
- (29) Bertha was fast enough to win the race \sim Bertha was able to win the race (because she was d -fast)
- *enough* constructions presuppose the necessity of d -adj for complement actualization, and assert a sufficiency relationship between a demonstration of the relevant property and actualization of the complement.
 - * *be fast enough to win the race* presupposes: there is a certain degree d of speed necessary for winning the race
 - * *S be fast enough to win the race* asserts: S is such that her demonstration of d -fastness (at the appropriate time, see below) will cause her to win the race
- **Observation:** typically, the perfective ‘coerces’ an instance of the predicate it attaches to:
 - S run.pfv \leadsto a past event of S running.
 - perfective ‘instantiates’ stative predicates (de Swart, 1998):
 - (30) *Gina a été rapide.*
Gina has.pfv be fast
‘Gina ran/walked/moved quickly.’
 - (31) *Gina a eu de l’argent.*
Gina has.pfv have of the.money
‘Gina had (in that situation) money.’
 - in the context of an *enough* construction, instantiation of the property ‘unlocks’ the guarantee
- if S can/able ϕ says that S has an option A with the relevant properties, then putting the perfective on this instantiates the option
 - **Upshot:** A perfective ability modal says “It was the case that S had an available action A s.t. A guaranteed ϕ , and $S(A)$.”
- we still need to say something about the imperfective: it does not require instantiation (the genericity operator will work, but we’ll need to deal with the semantics of *manage* differently; Nadathur, 2017)

This looks promising, but leaves us with a big open question: why are ability modals structured so differently from epistemic and deontic modals?

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