Another look at the actuality entailment of certain modal verbs

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1   From the past

Here is a (probably unintended) provocation by Austin (1970, p. 175): "[O]f course it follows merely from the premise that he does it [i.e., that a person does something], that he has the ability to do it, according to ordinary English."

And here is a reaction by Thalberg (1972, p. 121):

> 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 markmanship: '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'.

Though not cited by Thalberg, von Wright (1963, p. 50–51) appears to hold a similar view:

> On the view of ability which we are here adopting, a criterion for judging truly that a man can do a certain act is that normally, on most occasions for doing it, he should succeed. But is this not like saying that he *can do* something only if, on most occasions, he *can do* this? Are we not moving in a circle here?
>
> I do not think that we have a circle here but a noteworthy shift in the meaning of certain words. That I 'can do' something has a different

meaning when it refers to an act-individual and when it refers to an act-category. That on some occasion a certain state of affairs, say that a door is open, comes (came) into being as a *consequence* of some *activity* on my part, say some movements of my hands and fingers, is a necessary and sufficient condition for saying that I can (could) do this thing or produce this state *on that occasion*. The sole criterion of the 'can do' is here the success of certain efforts. Of this 'can do' no 'know how' and no reasonable assurance of success before the attempt is required. [...]

I shall call the 'can do' which refers to individual acts the *can do of success*, and that which refers to generic acts the *can do of ability*. The first 'can do' is always relative to an occasion for acting. The second is *independent* of occasions for acting. By this I mean that it makes no sense to say that we can do—in this sense of 'can do'—the thing on one occasion, but not on another—unless that other occasion belongs to a stage in out life-history which is either before we have learnt to do this thing or after we have forgotten how to do it.

[...] the meaning of the 'can do' of ability [is] different from the meaning of the 'can do' of success.

Kenny (1976), although less explicitly concerned with semantic issues, argues that the 'can do' of ability isn't a modality. As part of his argument, he points out that the principle $p \rightarrow \Diamond p$ (a theorem of the system T of modal logic) fails to be valid if the '$\Diamond$' is construed as an ability operator. It fails to be valid because, according to him, an occasional success does not establish an ability. He writes (p. 214): "A hopeless darts player may, once in a lifetime, hit the bull, but be unable to repeat the performance because he does not have the ability to hit the bull." In this respect, Kenny's view about ability is in line with Thalberg's and von Wright's.

Just to be clear: the consensus at this point is not there are two kinds of ability—there is only one—but rather that *be able* and *can do* have more than one meaning, denoting not only ability but also meaning "do" or "manage to".

2   Fast-forward

2.1   Bhatt (1999)

Bhatt writes (p. 74): "I show that the English ability modal *was able to* is ambiguous between two readings which can be paraphrased as 'managed to' and 'had the ability to'." Note that this claim of ambiguity is essentially due to Thalberg and von Wright. Bhatt points out that a number of languages distinguish the two readings aspectually. Consider, for example, Hindi:

(1)   a.   Yusuf havaii-jahaaz uṛaa sak-taa   hai/thaa   (lekin vo
           Yusuf air-ship   fly   can-impfv be.pres/be.pst but   he
           havaii-jahaaz nahĩĩ uṛaa-taa hai/thaa).   (= Bhatt's (8))
           air-ship   neg   fly-impfv be.pres/be.pst
           'Yusuf is/was able to fly airplanes (but he doesn't/didn't fly airplanes).'

b.   Yusuf havaii–jahaaz uṛaa sak–aa (#lekin us–ne   havaii–jahaaz nahĩĩ
     Yusuf air–ship   fly   can–pfv but   he–erg air–ship   neg
     uṛaa–yaa).   (Hindi)
     fly–pfv
     'Yusuf is/was able to fly the airplane (#but he didn't fly the airplane).'

The main novelty of Bhatt's analysis is that he tries to relate the two meanings with the help of a generic operator *Gen*:

(2)   a.   ABLE means "manage to" (realized as perfective)
      b.   *Gen*(ABLE) means "have the ability to" (realized as imperfective)

The main worry (from the present perspective) is that it isn't feasible to derive the meaning "have the ability to" from a generalization over instances of managing to, contrary to what is stated in (2b). (See also Hacquard 2006, chap. 3.1 for other, though more framework-dependent, critical points.)

2.2 Piñón (2003)

In an earlier paper, my strategy was "to keep the 'descriptive content' of both readings constant but to postulate a difference between them in terms of the relative scope of operators" (p. 392). More specifically, "[w]ith ability *able*, tense takes scope over modality, but with opportunity [i.e., implicative] *able*, modality takes scope over tense" (p. 392). I cast the analysis in a branching times framework and showed how the actuality entailment could be derived if modality took scope over tense.

The main difficulty (again, from the present perspective) is that this strategy was a bit too good to be true: more specifically, if the descriptive content of these two readings of *be able* turns out to be different (however this difference is to be characterized), playing around with scope in a nice branching times framework won't help, unfortunately. (See Hacquard 2006, chap. 3.2 for an additional critical point or two, but note that she also ends up proposing a scope-based solution, though of a more intricate sort.)

2.3 Hacquard (2006)

Here's an example from French, contrasting the *passé composé* with the *imparfait*:

(3)   a.   Jane a pu soulever cette table, #mais elle ne l'a pas soulevée.   (=
           Hacquard's (37a))
           Jane could–pfv lift this table, #but she didn't lift it
      b.   Jane pouvait soulever cette table, mais elle ne l'a pas soulevée.   (=
           Hacquard's (37b))
           Jane could–ipfv lift this table, but she didn't lift it

Hacquard proposes an intricate analysis that makes use of *Gen* for the 'can do' of ability (in this respect like Bhatt) and the raising of aspect above the ability modal to account for the actuality entailment (also a scopal strategy). Thus, in (3a) but not in (3b), aspect raises above the ability modal.

Her account has come under critical scrutiny recently, both by Mari and Martin (2007, 2009) and Portner (2009). In particular, Portner argues (pp. 210–211) that her analysis predicts an actuality entailment for the imperfective as well (e.g., in (3b)). If he's right about this (and it seems to me that he is), then this is a show-stopper for Hacquard.

2.4 Mari and Martin (2007, 2009)

Here's another example from French:

(4)   a.   Marie a pu s'enfuir, #mais elle ne s'est pas enfuie. (= Mari and Martin's (2009) (9a))
           Marie could.perf escape, #but she didn't do it
    b.   Marie pouvait s'enfuir, mais elle ne s'enfuyait pas (= Mari and Martin's (2009) (9c))
           Marie could.imperf escape, but she didn't do it

Mari and Martin propose a new (non-structural) semantic account; their (2009) catchy slogan is "Simplify the structures, enrich the ontology" (p. 7). The ontological enrichment they propose is that there are two types of abilities, *generic abilities* (GAs) and *action-dependent abilities* (ADAs). GAs are akin to the abilities of Thalberg, von Wright, and Kenny. ADAs are said to be ontologically dependent on corresponding actions. What this means (I suppose, given the usual understanding of ontological dependence) is that in order for an ADA to exist, its corresponding action must exist.

Mari and Martin discuss a nice set of examples and offer a number of ideas about how to analyse them. Of special interest is their observation that the use of *pouvoir* on an ability reading in the *passé composé* doesn't always give rise to an actuality entailment:

(5)   Notre nouveau robot a même pu repasser les chemises à un stade bien précis de son développement. Mais on a supprimé cette fonction qui n'a jamais été testée) pour des raisons de rentabilité. (= Mari and Martin's (2009) (14))
    'Our new robot could.perf even iron shirts at a particular stage of its development. But we suppressed this function (which was never tested) for reasons of cost.'

A practical difficulty in evaluating their proposal is that a number of important details still need to be worked out, so I'll simply ask three questions:

- What is really the difference between an ADA and its corresponding action? ADAs look suspiciously like actions.

- How are ADAs and GAs ontologically related?

- Concerning an eventual semantic derivation: How is *pouvoir* represented? Is it ambiguous? It seems so, but if not, how can the postulation of a single meaning account for the facts? How does aspect come into play? When Mari and Martin write (p. 9) that "the AE [i.e., actuality entailment] is triggered when the eventuality described by the infinitive is the only one which can

satisfy the "Boundedness Constraint" associated to the perfect", what is the status of this claim/principle?

- Finally, what is the status of the "Boundedness Constraint"?

2.5 Portner (2009)

Portner (p. 212) suggests that the actuality entailment should be treated as a kind of performativity, where the extra speech act performed is one of assertion:

(6)   Update potential of *pouvoir*: For any sentence ϕ of the form *pouvoir* ψ, the update potential of ϕ used in context c with modal base f and ordering source g, $[\![\phi]\!]^{c,f,g}$, is defined as follows:
$$cg[\![\phi]\!]^{c,f,g} = cg \cup \{[\![\psi]\!]^{c,f,g}\} \cup \{[\![\phi]\!]^{c,f,g}\} \quad \text{(Portner 2009, p. 212)}$$

According to Portner (p. 212), an utterance of (1b) asserts two two things: "first, that Yusuf has the ability to fly airplanes, and, second, that he did fly them."
    I find this somewhat puzzling. The semantics in (6) doesn't really do what Portner claims it does (since '$\cup$' is commutative, the right side of the formula in (6) is equivalent to $cg \cup \{[\![\phi]\!]^{c,f,g}\} \cup \{[\![\psi]\!]^{c,f,g}\}$), but putting this technicality aside, should we conclude that *pouvoir* is ambiguous? If not, where does the extra sppech act (that of assertion) come from? If so, how does the ambiguity relate to aspect? Furthermore, it sounds like this update potential of *pouvoir* could be used with any modal base and ordering source, but that is evidently much too permissive.

3   A new direction

The new slogan might be "Simplify the structures, simplify the ontology, simplify the semantics, enrich the pragmatics." The leading idea is to make use of *abduction* for getting the "actuality entailment." However, if abduction is involved, then the "actuality entailment" is strictly speaking no longer an entailment. The first idea is that *be able* and *can do* are ambiguous, having two readings—in this respect, the present approach differs from the analyses of Piñón and Hacquard, where a single reading is postulated. The second idea is that neither reading entails actuality—in this respect, the present view differs (as far as I can determine) from the analyses of Bhatt, Mari and Martin, and Portner (but Mari and Martin and Portner need to be much clearer about the question of ambiguity). In what follows, I want to point in the new direction.

Another try   A central primitive notion is one of *trying*: **try**(e, x, E) 'e is a trying by x to do E', where e is a variable for individual events, x is a variable for ordinary individuals, and E is a variable for event types. The notion of trying intended here is very weak, following O'Shaughnessy (1997) in this respect, because every action may involve a trying. Accordingly, **try** does not serve as an accurate representation of English *try*.
    If e is a trying by x to do E, then x is the agent of e:

(7) $\forall e \forall x \forall E(\mathbf{try}(e, x, E) \rightarrow \mathbf{agent}(x, e'))$ $\triangleright$ Axiom

The next axiom states that if e is a trying by x to do E, then it is (historically) possible for there to be an event e' such that e' is of type E, e is a causal part of e', and x is the agent of e'.

(8) $\forall e \forall x \forall E(\mathbf{try}(e, x, E) \rightarrow$ ▷ Axiom
        $\diamond \exists e'(E(e') \wedge \mathbf{causal\text{-}part}(e, e') \wedge \mathbf{agent}(x, e')))$

If e is of type E, x is the agent of e, and e is *not* a trying by x to do E, then it is (historically) possible for there to be an event e' such that e' is a trying by x to do E and e' overlaps with e:

(9) $\forall e \forall x \forall E(E(e) \wedge \mathbf{agent}(x, e) \wedge \neg\mathbf{try}(e, x, E) \rightarrow$ ▷ Axiom
        $\diamond \exists e'(\mathbf{try}(e', x, E) \wedge e' \circ e))$

Simple ability is defined as follows: at t, x is *simply able* to do E just in case t is an instant and it is (historically) possible for there to be an event e that immediately follows t which is a trying by x to do E.

(10) $\mathbf{simply\text{-}able}(t, x, E) \stackrel{\text{def}}{=} \mathbf{instant}(t) \wedge \diamond \exists e(t \prec e \wedge \mathbf{try}(e, x, E))$

More succinctly, simple ability is the (historical) possibility of trying.

A straightforward fact is that if e is of type E, x is the agent of e, e is not a trying by x to do E and instant t immediately precedes e, then at t, x is simply able to do E.

(11) $\forall e \forall x \forall E(E(e) \wedge \mathbf{agent}(x, e) \wedge \neg\mathbf{try}(e, x, E) \wedge \mathbf{instant}(t) \wedge t \prec e \rightarrow$ ▷ Fact
        $\mathbf{simply\text{-}able}(t, x, E))$

General ability is defined as follows:[1] at t, x is *generally able* to do E just in case for every part t' of t at which x is simply able to do E, it is (historically) possible that for every event e that immediately follows t' which is a trying by x to do E, e is a causal part of an event e' that is of type E and of which x is the agent (in other words, if x tries, x succeeds). The final two lines in (13) force t to be an interval and prevent x from being simply able to do E throughout t:

(12) $\mathbf{generally\text{-}able}(t, x, E) \stackrel{\text{def}}{=}$
        $\forall t'(t' \sqsubseteq t \wedge \mathbf{simply\text{-}able}(t', x, E) \rightarrow$
            $\diamond \forall e(t' \prec e \wedge \mathbf{try}(e, x, E) \rightarrow$
                $\exists e'(E(e') \wedge \mathbf{causal\text{-}part}(e, e') \wedge \mathbf{agent}(x, e')))) \wedge$
        $\exists t' \exists t'' \exists t'''(t' \sqsubseteq t \wedge t'' \sqsubseteq t \wedge t''' \sqsubseteq t \wedge t' < t'' \wedge t'' < t''' \wedge$
        $\mathbf{simply\text{-}able}(t', x, E) \wedge \neg\mathbf{simply\text{-}able}(t'', x, E) \wedge \mathbf{simply\text{-}able}(t''', x, E))$

Here are a couple of analyses (ignoring tense and grammatical aspect):

(13)   Sarah is (generally) able[g] to swim $\rightsquigarrow$
        $\lambda t.\mathbf{generally\text{-}able}(t, \mathbf{sarah}, \lambda e.\mathbf{swim}(e))$

(14)   Sarah is able[s] to swim (right now) $\rightsquigarrow$
        $\lambda t.\mathbf{simply\text{-}able}(t, \mathbf{sarah}, \lambda e.\mathbf{swim}(e)) \wedge t = \mathbf{now}$

It is also predicted that (15a) is acceptable but that (15a) is unacceptable.

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[1] This definition is probably too extensional as it stands.

(15)   a.   Sarah is generally able^g to swim but she isn't able^s to swim right now.
          b. ??Sarah is generally able^g to swim right now.

In sum, a general ability at an interval t for x to do E entails a simple ability at at least two instants t', t'' in t for x to do E, but a simple ability at an instant t for x to do E does not entail a general ability at an interval t' which t is included in for x to do E.

    The morphemes perfective and imperfective are defined as follows and apply to predicates T of times:

(16)   a.   *perf* $\rightsquigarrow \lambda T \lambda t . \exists t' (T(t') \wedge t' \sqsubseteq t)$
          b.   *imperf* $\rightsquigarrow \lambda T \lambda t . \exists t' (T(t') \wedge t \sqsubseteq t')$

Essentially, the perfective morpheme creates a predicate of 'reference times' that contain a 'situation time' t' of type T, whereas the imperfective morpheme creates a predicate of 'reference times' that are included in a 'situation time' t' of type T.

Appealing to abduction   The schema for an abductive inference is as follows:

(17) $$\frac{\alpha \rightarrow \beta \quad \beta}{\alpha}$$

Intuitively, abductive reasoning is a search for an explanation of β, and if $\alpha \rightarrow \beta$ holds, *alpha* is such an explanation. Naturally, insofar as there are other propositions γ such that $\gamma \rightarrow \beta$ holds, α is not the only explanation of β. Even so, in a given context, α may be considered a more likely explanation of β than γ.

    The leading idea is to reconstruct the "actuality entailment" as an inductive inference based on a simple ability attribution. Take the following sentence:

(18)   Sarah was able to stand on her head yesterday at noon.

If this sentence is true, it seems natural to infer that Sarah actually stood on her head yesterday at noon (and not merely that she was able to but didn't). But why is this? Let's adopt the hearer's perspective. In the present approach, the more temporally specific an ability attribution that the speaker makes is, the more likely it will be construed as a simple ability attribution. In (18), the temporal adverbial *yesterday at noon* serves to temporally restrict the ability attribution. The use of this adverbial implicates that the ability in question didn't hold before yesterday at noon or thereafter. For this reason, it would be odd to construe this sentence as a general ability attribution.

    Granting, then, that the sentence in (18) is a simple ability attribution, what would explain such a (short-lived) simple ability? Recall that a simple ability at an instant t for x to do E doesn't entail that there actually is an event e in which x does E. Nevertheless, if there is an event e in which x does E, then at the instant immediately before e, x was simply able to do E (recall (11)). So x's doing E is an explanation for x's simple ability to do E just before. More formally, we have basically the following instantiation of the schema in (17):

(19)   a. $\beta :=$ **sarah–is–simply–able–to–stand–on–her–head**(t)
            $\alpha :=$ **sarah–stands–on–her–head**$(e) \wedge t \prec e$

b. **sarah–stands–on–her–head**$(e) \wedge t \prec e \rightarrow$
   sarah–is–simply–able–to–stand–on–her–head(t)
   $\underline{\text{\textbf{sarah–is–simply–able–to–stand–on–her–head}}(t)}$
   sarah–stands–on–her–head$(e) \wedge t \prec e$

If the abductive inference is drawn here, then the inference is that Sarah stood on her head, i.e., her standing on her head is an explanation for the simple ability attribution that she was able to stand on her head, which in the present approach is the essence of the "actuality entailment."

At the same time, this particular abductive inference doesn't strictly have to be drawn by the hearer, because there is also another explanation for the simple ability attribution that Sarah was able to stand on her head, namely, that she was generally able to stand on her head. If she was generally able to stand on her head over a period of time which includes yesterday at noon, then she may well have been simply able to stand on her head yesterday at noon.[2] In this case, the hearer does not make the abductive inference that she actually stood on her head but only that she was generally able to do so. However, the latter is arguably a less likely inference than the former for the hearer to make, because the hearer may wonder why the speaker didn't make a general ability attribution in the first place: if the speaker intended to express that Sarah was generally able to stand on her head over a longer period of time, then why temporally restrict the ability attribution to yesterday at noon? It was precisely this temporal restriction that led the hearer to assume that the speaker had made a simple ability attribution, hence (given this assumption) it would be less likely for the hearer now to abductively infer a general ability attribution which would explain the simple ability attribution. Nevertheless, even if less favored, this abductive inference isn't strictly ruled out.

A third possibility is for the hearer simply to accept the simple attribution at face value or "on faith" with no attempt to explain it. After all, it may be that Sarah just mysteriously had the (short-lived) simple ability yesterday at noon to stand on her head—it just came and went. In this case, the hearer may be regarded as (overly) generous with respect to the speaker in not "asking" about what justifies this (short-lived) simple ability attribution in the first place. Under normal circumstances, I take this third possibility to be the least likely strategy for the hearer to follow.

To do Make the role of aspect more explicit, but in light of the definitions in (16), it is (pragmatically) natural to pair general ability attributions with the imperfective and simple ability attributions with the perfective. Extend the abductive reasoning account to other modals that exhibit the "actuality entailment."

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[2]Note, crucially, that there is no deductive inference here that she was able to stand on her head yesterday at noon, precisely because a general ability over an interval doesn't entail a simple ability at any given instant in that interval.

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