Being Able to

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1. Introduction

The semi-modal *be able to* appears to have (at least) two readings. On the one reading, it basically means 'have the ability to', as illustrated in (1). I will refer to this reading as 'ability *able*'.

(1)   a.   In her early twenties, Rebecca was able to swim across Lake Balaton.
       b.   Sarah is able to count to one hundred thousand.
       c.   The 6-foot-9 White should be able to provide the Wizards with the interior muscle they lose with Thomas.   (*WP*, 26 Feb. 2003, p. D06)
       d.   "We have to have a cadre of people who are able to identify smallpox and who are properly protected from it so they can deal with it," said Richard D. Crosby III, . . .   (*WP*, 20 Feb. 2003, p. B02)

The suggested near equivalence is supported by the following paraphrases of the sentences in (1):

(2)   a.   In her early twenties, Rebecca had the ability to swim across Lake Balaton.
       b.   Sarah has the ability to count to one hundred thousand.
       c.   The 6-foot-9 White should have the ability to provide the Wizards with the interior muscle they lose with Thomas.
       d.   We have to have a cadre of people who have the ability to identify smallpox and who are properly protected from it so they can deal with it.

Although evidence for the existence of abilities typically consists of instances in which the abilities in question are actually exercised, the truth of the sentences in (1) does not strictly entail the truth of the corresponding indicative

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(i.e., 'modalless') sentences:[1]

(3)   a.   sentence in (1a) ↛ In her early twenties, Rebecca swam across
          Lake Balaton
     b.   sentence in (1b) ↛ Sarah counts to one hundred thousand
     c.   The 6-foot-9 White is able to provide the Wizards with the interior
          muscle they lose with Thomas ↛ The 6-foot-9 White provides the
          Wizards with the interior muscle they lose with Thomas
     d.   We have a cadre of people who are able to identify smallpox and
          who are properly protected from it so they can deal with it ↛
          We have a cadre of people who identify smallpox and who are
          properly protected from it so they can deal with it

For example, if Rebecca was a strong swimmer in her early twenties, she
might well have had the ability to swim across Lake Balaton even if she hap-
pened to have never actually done so. Similarly, and perhaps more strikingly,
even if Sarah is able to count to one hundred thousand, she may never in fact
do so.

On its other reading, *be able to* roughly means 'have the opportunity to',
as exemplified in (4). I will refer to this reading as 'opportunity *able*'.

(4)   a.   By detecting subtle variations in the glow's warmth, scientists
          were able to discern the primordial structure of the universe a mere
          380,000 years after its birth.   (*WP*, 12 Feb. 03, p. A01)
     b.   Iraq, according to U.S. intelligence, has been able to purchase
          from a variety of sources aluminum tubing that can be used in a
          centrifuge for producing weapons grade uranium.   (*WP*, 12 Feb.
          03, p. A01)
     c.   "During the rehearsals, I was able to sit and watch [Rodgers] work
          every day," he said.   (*WP*, 12 Feb. 03, p. B06)
     d.   Of 254 cases charged under the act last year, the state's attorney's
          office was able to obtain convictions in only 40 of them.   (*WP*,
          26 Feb. 2003, p. B05)

Again, this close equivalence is suggested by the following paraphrases of the
sentences in (4):

(5)   a.   By detecting subtle variations in the glow's warmth, scientists had
          the opportunity to discern the primordial structure of the universe
          a mere 380,000 years after its birth.
     b.   Iraq, according to U.S. intelligence, has had the opportunity to

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1.   In order to make this point for (1c) and (1d), I have suppressed the additional
modals *should* and *have to* in (3c) and (3d), respectively.

          purchase from a variety of sources aluminum tubing that can be used in a centrifuge for producing weapons grade uranium.

    c.   During the rehearsals, I had the opportunity to sit and watch Rodgers work every day.

    d.   Of 254 cases charged under the act last year, the state's attorney's office had the opportunity to obtain convictions in only 40 of them.

In contrast to the sentences in (1), those in (4) imply that the situations described actually took place. In other words, the truth of the sentences in (4) entails the truth of the corresponding indicative sentences, as seen in (6). I will call this as an 'actuality implication'.

(6)   a.   sentence in (4a) → Scientists discerned the primordial structure of the universe a mere 380,000 years after its birth

    b.   sentence in (4b) → Iraq, according to U.S. intelligence, has purchased from a variety of sources aluminum tubing that can be used in a centrifuge for producing weapons grade uranium

    c.   sentence in (4c) → During the rehearsals, I sat and watched Rodgers work every day

    d.   sentence in (4d) → Of 254 cases charged under the act last year, the state's attorney's office obtained convictions in only 40 of them

    One might imagine that the actuality implication illustrated in (6) is merely an artifact of the use of *be able to* in the past tense, but this is not quite right. On the contrary, ability *able* may appear in the past tense without an actuality implication, as we saw in (1a) and as the following minimal pairs demonstrate:

(7)   a.   In her early twenties, Rebecca was able to swim across Lake Balaton.   (= (1a); ability *able*)

    b.   Yesterday afternoon, Rebecca was able to swim across Lake Balaton.   (opportunity *able*)

(8)   a.   In her teens, Sarah was able to stand on her head.   (ability *able*)

    b.   Yesterday evening, Sarah was able to stand on her head.   (opportunity *able*)

The most natural way of understanding the sentence in (7b), in contrast to the one in (7a), is that Rebecca did in fact swim across Lake Balaton yesterday afternoon. Similarly, the natural reading of the sentence in (8b), as opposed to the one in (8a), is that Sarah did actually stand on her head yesterday evening. Such minimal pairs show that the actuality implication of opportunity *able* in the past tense is not merely an artifact of the use of *be able to* in the past tense, given that ability *able* does not exhibit an actuality implication in the

past tense.

Even so, the past tense is apparently a crucial factor for the actuality implication, because opportunity *able* lacks an actuality implication in the other tenses. For example, the present tense version of the sentence in (4c) with opportunity *able* does not strictly entail that I actually do sit and watch Rodgers work every day:

(9)   During the rehearsals, I am able to sit and watch Rodgers work every day $\nrightarrow$ During the rehearsals, I sit and watch Rodgers work every day

More surprisingly, the use of opportunity *able* in the future tense also does not give rise to an actuality implication:

(10) a.   Tomorrow afternoon, Rebecca will be able to swim across Lake Balaton.
      b.   Bertarelli reckons it will be good for the event since he will be able to choose the next venue for the best wind and facilities.   (*WP*, 12 Feb. 03, p. D01)
      c.   [For the first time, AOL will offer an \$8.95-per-month subscription to MusicNet, the e-music service partly owned by AOL Time Warner's Warner Music unit.] Users will initially be able to tap into a catalog of 250,000 songs.   (*WP*, 26 Feb. 03, 9:38 AM)
      d.   "Hopefully, the things I learn here, I'll be able to pass on to my own 2-year-old grandson."   (*WP*, 20 Feb. 03, p. VA03)

The lack of an actuality implication for the sentences in (10) means that they express something weaker than their corresponding indicative variants with *will*:

(11) a.   sentence in (10a) $\nrightarrow$ Tomorrow afternoon, Rebecca will swim across Lake Balaton
      b.   sentence in (10b) $\nrightarrow$ Bertarelli reckons it will be good for the event since he will choose the next venue for the best wind and facilities
      c.   sentence in (10c) $\nrightarrow$ Users will initially tap into a catalog of 250,000 songs
      d.   I'll be able to pass the things I learn here on to my own 2-year-old grandson $\nrightarrow$ I'll pass the things I learn here on to my own 2-year-old grandson

For example, to say that Rebecca will able to swim across Lake Balaton tomorrow afternoon is not to say that she will actually do so, though it is to say that she will at least have the opportunity to do so. Similarly, even if users will be able to tap into a catalog of 250,000 songs, it does not follow that they will in fact do so, but they will at least have the opportunity to do so.

In sum, *be able to* has two readings, ability *able* and opportunity *able*. With ability *able*, there is no actuality implication. With opportunity *able*, in contrast, there is an actuality implication in the past tense but not in the present or future tense.

In principle, any occurrence of *be able to* should make both readings available, but contextual and pragmatic knowledge will usually render one of the readings implausible or unnatural. Abilities are usually taken to be reasonably enduring, whereas opportunities may just come and go. Accordingly, the presence of *yesterday afternoon* in (7b) renders the interpretation with ability *able* implausible, precisely because the ability to swim across a big lake does not just come and go, and yet the use of *yesterday afternoon* implicates that the relevant time frame was relatively short. However, even if pragmatically implausible, the interpretation of the sentence in (7b) with ability *able* is not grammatically impossible. One could imagine a somewhat far-fetched scenario in which Rebecca suddenly and for only a short time acquired the ability to swim across Lake Balaton (perhaps as the result of some wonder drug). In this case, the sentence in (7b) would also lose its actuality implication.

Much the same holds for sentences in which the reading with ability *able* is more natural. For example, the use of *in her early twenties* in (7a) implicates a fairly long time frame, which makes it more plausible that the sentence is about Rebecca's ability to swim across Lake Balaton. Even so, it would be difficult to categorically exclude the possibility of opportunity *able* here. If construed to mean that Rebecca had the opportunity to swim across Lake Balaton in her early twenties, then the sentence in (7a) would have an actuality implication.

In this paper, I will present a new analysis of ability *able* and opportunity *able*. The leading idea of the analysis is that the difference between ability *able* and opportunity *able* is a scopal one in the following sense: with ability *able*, tense takes scope over modality, whereas with opportunity *able*, modality takes scope over tense. I will show how this scopal difference as modeled in a framework of branching time accounts for the actuality implication of opportunity *able* in the past tense and for its absence in the present and future tense. However, in order to pave the way for this analysis in Section 3, I will first consider of a couple of previous attempts at this problem in the next section.

2. Two previous analyses: Thalberg (1972) and Bhatt (1999)

The distinction between ability *able* and opportunity *able* is rarely discussed. Perhaps the first to explicitly mention it is Thalberg (1972, p. 121), who writes that " '[w]as able' sometimes means 'had the ability', and some-

times means 'did'." Thalberg's main concern is to argue that 'was able' does not always entail 'had the ability'. For example, he claims that the sentence in (12a) does not necessarily entail the one in (12b).

(12) a. Brown was able to hit three bull's-eyes in a row.
      b. Brown had the ability to hit three bull's-eyes in a row.

Suppose that Brown is a mediocre marksman who after firing 600 rounds managed to hit three bull's-eyes in a row. In this case, it is true that Brown was able to hit three bull's-eyes in a row. However, Thalberg claims that Brown's luck in this respect does not demonstrate that he had the requisite ability to hit three bull's-eyes in a row. In other words, the truth of the sentence in (12b) does not necessarily follow. Although Brown was able to hit three bull's-eyes in a row, he was unable to do it with any regularity and so he lacked the ability to do it, according to Thalberg.

I point out that Thalberg is committed to a fairly *intensional* notion of ability that requires abilities to be reasonably enduring and reliable. Abilities for him are not momentary, and they do not just come and go. His semantic claim that 'was able' is ambiguous, sometimes meaning 'had the ability', sometimes 'did' or 'managed', allows him to set aside a fact about the usage of 'was able' that initially seems to speak against his view on abilities. For present purposes, note that if Thalberg is right, then it will be hard to relate these two meanings of 'was able' in an enlightening way, precisely because the readings 'had the ability' and 'did' are assumed to be independent of each other. (It is hard to relate two things that have next to nothing in common.) Indeed, Thalberg has nothing more to add about the ambiguity of 'was able'.

While I have no dispute with Thalberg's intensional notion of ability (which is doubtlessly useful for certain applications), arguably there is also room for a more *extensional* notion of ability. The main difference is that the extensional notion should allow for momentary abilities: certain abilities may be very short-lived.[2] Accordingly, if Brown manages to hit three bull's-eyes in a row, then he has the (extensional) ability to do so at that time, even if he cannot reliably replicate this success at other times. Notice that for the purpose of making records in sports, the extensional notion seems to be the pertinent one. If you want to make the world record in the 100 meter sprint, then all you really have to do is to officially break the previous world record in the 100 meter sprint on a single occasion. Here, 'officially' means something like 'in a recognized competition with accurate watches and trusted

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2.   The labels 'intensional' and 'extensional' as used here should be construed loosely as qualifying the extent to which actions serve as evidence for abilities. Note that the extensional notion of ability is intended to allow for abilities that are never actually exercised (such as Sarah's ability to count to one hundred thousand) and in this respect it is by no means completely extensional.

observers', but replicability is crucially not a requirement—it is sufficient to break the previous world record only once.[3]

From the present perspective, the advantage in adopting an extensional notion of ability is that we can now say that ability *able* and opportunity *able* (or Thalberg's two readings) share a common core of meaning, namely, an (extensional) ability component. The analysis that I will present in the next section will make use of such an ability component.

The only other analysis that I am aware of is due to Bhatt (1999), who claims that there is an underlying predicate ABLE with the meaning 'manage to' (corresponding to my opportunity *able*) and that the meaning 'have the ability to' (corresponding to my ability *able*) is derived from ABLE by the addition of a generic operator *Gen*, as shown in (13).

(13) a.   ABLE means 'manage to'
      b.   *Gen*(ABLE) means 'have the ability to'   (where *Gen* is a generic operator)

For Bhatt, the actuality implication of ABLE follows from the fact that *manage to*, an implicative verb with the same meaning, also has an actuality implication. For example, the following sentence with *manage to*, just like the sentence in (7b), entails that Rebecca actually swam across Lake Balaton yesterday afternoon:

(14)   Yesterday afternoon, Rebecca managed to swim across Lake Balaton. (cf. (7b))

Bhatt also points out that many languages express ABLE as the combination of an ability modal together with a perfective operator and *Gen*(ABLE) as the combination of an ability modal together with an imperfective operator. In Spanish, for example, if *poder* 'be able to' appears in the preterite tense (*pretérito*), it corresponds to opportunity *able*, and if it appears in the imperfect tense (*imperfecto*), it corresponds to ability *able*, as seen in (15a) and (15b), respectively.

(15) a.   Rebecca pudo nadar a la isla ayer.   (opportunity)
           Rebecca was.able.PRET swim to the island yesterday
           'Rebecca was able to swim to the island yesterday.'
      b.   Rebecca podía nadar a la isla hace cinco años.   (ability)
           Rebecca was.able.IMPF swim to the island it.makes five years
           'Rebecca was able to swim to the island five years ago.'

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3.   Of course, this is simplifying things a bit. Permission to enter a recognized sports competition typically depends on previous successes. However, the point remains that to break a world record, you only have to do so once, i.e., you only need to have the (extensional) ability to do so at the time in question.

Note that the use of *pudo* in (15a) carries an actuality implication, whereas the use of *podía* in (15b) does not. In Bhatt's terms, *pudo* would correspond to ABLE and *podía*, to *Gen*(ABLE).

Bhatt's analysis is initially attractive because it not only tries to relate the two readings of *be able to* but also attempts to tie these two readings to overt morphological differences crosslinguistically. Even so, I find that his analysis suffers from two main difficulties.

The first, and to my mind, decisive difficulty is that no semantics is offered for *Gen* that would plausibly yield the meaning 'have the ability to' when applied to ABLE, as required by the scheme in (13). In particular, a simple generalization over instances of managing to does not by itself yield 'have the ability to', as illustrated by the nonequivalence of the following sentences:

(16) a.   Sarah always managed to arrive at school on time.
      b.   Sarah had the ability to arrive at school on time.

Always managing to do something is simply not the same as having the ability to do that thing, even if it is granted that the former presupposes the latter. (Recall that Sarah has the ability to count to one hundred thousand even though she may never actually do so.) The difficulty is not so much that Bhatt does not work out the semantics of *Gen* (which would be a formidable task) but rather that he does not make it plausible that *Gen* is able to do what he asks of it. In particular, since the meaning of ABLE lacks an ability component,[4] the meaning of *Gen* has to contribute one, and yet it is implausible that the meaning of *Gen* has an ability component to contribute to begin with. Insofar as *Gen* is a generally applicable generic operator roughly comparable to an adverb of universal quantification like *always*, it is implausible that its meaning should include an ability component. Of course, if *Gen* were instead a kind of ability operator, then this objection would not apply, but in this case it would be misleading to speak of a generic operator. (It would be another question whether this ability operator plus 'manage to' yielded the desired result.)[5]

The second difficulty concerns Bhatt's proposal that ABLE has the meaning of *manage to*. For one, this does not account for why ABLE cannot appear in the future tense. Formulated in terms of the present paper, this amounts to the question of why opportunity *able* lacks an actuality implication in the future tense, as pointed out above in connection with the sentences in (10).

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4.   In this respect, Bhatt (p. 80) follows Thalberg in adopting (what I have called) an intensional notion of ability.
5.   Since Bhatt (p. 85) draws a parallel between *Gen*(ABLE) and Chierchia's (1995) analysis of individual-level predicates as predicates that must occur with the generic operator, he apparently does not intend for *Gen* to be a kind of ability operator.

Indeed, if ABLE has the meaning of *manage to*, then it is puzzling why ABLE cannot appear in the future tense, given that *manage to* can unproblematically do so, preserving its actuality implication, as seen in (17).

(17)   Sarah will manage to arrive at school on time.

Although there may be an independent reason for this divergence in behavior between ABLE and *manage to*, until more is said, the puzzle remains.[6]

Another problem with treating the meaning of ABLE as basically equivalent to the meaning of *manage to* is that it leaves the contrast between (18b) and (18c) unaccounted for:

(18)   a.   I saw Sarah catch the bus.
       b.   I saw Sarah manage to catch the bus.
       c.   #I saw Sarah (be) able to catch the bus.

If ABLE has the meaning of *manage to*, then it is puzzling why it cannot appear as a complement of *see*, given that *manage to* can. Again, there may be an independent reason for this divergence in behavior, but as things stand it is not evident what that reason may be if we assume that ABLE has the meaning of *manage to*.

In conclusion, these two difficulties suggest that it is incorrect to basically equate the meaning of opportunity *able* with the meaning of *manage to* and then to try to derive the meaning of ability *able* from the latter with the help of a generic operator, as proposed in (13).

3. A scopal analysis

I will now outline a rather different approach to the difference between ability *able* and opportunity *able*. The leading idea is to keep the 'descriptive content' of both readings constant but to postulate a difference between them in terms of the relative scope of operators, as anticipated at the end of Section 1. Once again, my proposal is the following:

(19)   With ability *able*, tense takes scope over modality, but with opportunity *able*, modality takes scope over tense.   (scopal difference)

I assume that tense taking scope over modality is usual but that modality taking scope over tense is somewhat unusual. The strategy will be to implement this scopal difference in such a way that the asymmetry between the past and future with respect to the actuality implication of opportunity *able* falls out.

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6.   To be fair, Bhatt does not observe that the actuality implication of ABLE (in my terms, opportunity *able*) fails to hold in the future tense; consequently, he does not try to account for it.
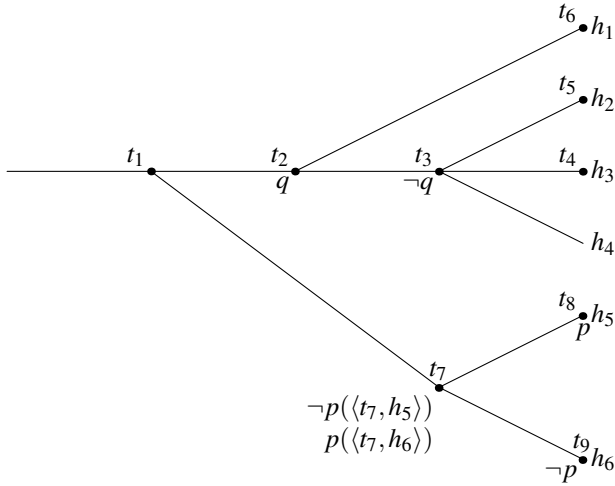
Figure 1: Branching time.

3.1. The framework: branching time

The general framework that I will adopt is that of *branching time* (Thomason (1984); Horty and Belnap (1995)). The theory of branching time takes time to have a treelike structure, with forward branching indicating the indeterminacy of the future and the absence of backward branching representing the determinacy of the past. The standard notions of branching time are as follows:

- a set of *instants*: $t, t', \ldots$
- a *temporal precedence* relation between instants: $\prec$[7]

Histories ($h, h', \ldots$) are defined as maximal sets of linearly ordered instants (accordingly, instants belong to histories). For convenience, I will refer to instants simply as 'times'.

A partial model of branching time is depicted in Figure 1 (where the exact labels are arbitrary). Any two histories overlap (i.e., they share the same times) until they branch. For example, h_1 and h_3 overlap until t_2. After any two histories branch, they contain different times. Thus, t_6 belongs only to h_1, whereas t_4 belongs solely to h_3. In contrast, t_3 belongs to h_2, h_3, and h_4.

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7.   This relation should determine a treelike ordering: if $t \prec t''$ and $t' \prec t''$, then either $t = t'$ or $t \prec t'$ or $t' \prec t$. Observe that this condition permits forward branching but not backward branching.

   Logics based on branching time, which in practice tend to be overwhelm-
ingly propositional, treat propositions (p, q, …) as sets of time/history pairs,
i.e., propositional constants are interpreted as true or false at time/history
pairs. In Figure 1, for example, the proposition q is true at the pair $\langle t_2, h_2\rangle$
(also at the pairs $\langle t_2, h_1\rangle$, $\langle t_2, h_3\rangle$, and $\langle t_2, h_4\rangle$, for that matter), whereas $\neg q$
holds at $\langle t_3, h_2\rangle$ (not to mention at $\langle t_3, h_3\rangle$ and $\langle t_3, h_4\rangle$ as well). I will adopt
this idea but will employ a predicate logic in which time/history pairs are
explicitly represented in the object language, which ultimately involves en-
dowing atomic (nonlogical) predicates with an extra argument position for
time/history pairs. A condition is then needed to the effect that if an atomic
predicate holds between a pair $\langle t, h\rangle$ and entities a, b, …, then t belongs to h.
   In addition to the branching time structure, the basic notions that play an
essential role in the present analysis are the following:[8]

- a set of (ordinary) *individuals*: x, y, …
- a set of relations between time/history pairs and individuals: R, R', …
- an *agent* relation between time/history pairs, individuals, and relations be-
  tween time/history pairs and individuals: agent

A condition on the agent relation is that if x is the agent with respect to R at
$\langle t, h\rangle$, then R holds of x at $\langle t, h\rangle$, as expressed in (20). Intuitively, R specifies
the 'action type' for the agent relation.

(20) $\forall \langle t, h\rangle \forall x \forall R[\text{agent}(\langle t, h\rangle, x, R) \rightarrow R(\langle t, h\rangle, x)]$
         (agent with respect to R implies realization of R)

   The next step is to define three further notions that figure in the analysis.
The first is *historical possibility* ($\Diamond$): proposition p is historically possible at
$\langle t, h\rangle$ just in case there is a history h' such that p holds at $\langle t, h'\rangle$ and t belongs
to h':

(21) $\Diamond \overset{\text{def}}{=} \lambda p \lambda \langle t, h\rangle [\exists h'[p\langle t, h'\rangle \wedge t \in h']]$
         (historical possibility)

In Figure 1, for example, the proposition $\Diamond(p)$ is true at the pair $\langle t_7, h_5\rangle$. This
is because p holds at $\langle t_7, h_6\rangle$. Similarly, $\Diamond(\neg p)$ is true at $\langle t_7, h_6\rangle$, because $\neg p$
holds at $\langle t_7, h_5\rangle$.
   The remaining two notions are two tense operators, one for the *past* and
another for the *future*. The past tense operator (past) asserts that proposition
p is past at $\langle t, h\rangle$ just in case there is a time t' such that p holds at $\langle t', h\rangle$, t'
belongs to h, and t' precedes t:

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8.   For semantic applications, it would be more realistic to try to define a predicate
logic for branching time structures based on intervals, with a possible role for events
as well. In what follows, I will keep to instants, though this is clearly an idealization.

(22)   past $\overset{\text{def}}{=} \lambda p \lambda \langle t,h \rangle [\exists t'[p\langle t',h \rangle \wedge t' \in h \wedge t' \prec t]]$
       (past tense)

As expected, the definition of the future tense operator (fut) is similar, but now with t' following t:

(23)   fut $\overset{\text{def}}{=} \lambda p \lambda \langle t,h \rangle [\exists t'[p\langle t',h \rangle \wedge t' \in h \wedge t \prec t']]$
       (future tense)

Despite the similar definitions, there is an asymmetry in how past tense and future tense statements are evaluated. In the meaning of the past tense operator in (22), the history h plays a 'passive' role, because any time t' preceding t automatically belongs to any history h' that has not yet branched off from h (past histories overlap), hence the reference to h is in principle dispensable.[9] In contrast, in the meaning of the future tense operator in (23), h plays an 'active' role, because it fixes the future history that t' belongs to (not every future history will contain t'). In Figure 1, for instance, the proposition $\text{fut}(\neg p)$ is true at $\langle t_7, h_6 \rangle$ but false at $\langle t_7, h_5 \rangle$, given that t_9 belongs to h_6 and not to h_5.

Evidently, this framework permits the possibility operator and the tense operators to interact scopally in various ways. However, I want to point out one interaction in particular, namely, the case in which the possibility operator takes scope over the past tense operator. In this case, the sequence of the possibility operator followed by the past tense operator can be reduced to the past tense operator alone. In semantic terms, if the proposition $\Diamond(\text{past}(p))$ holds at $\langle t,h \rangle$, then $\text{past}(p)$ also holds at $\langle t,h \rangle$, as formalized in (24).[10]

(24)   *Fact.* $\forall \langle t,h \rangle \forall p[\Diamond(\langle t,h \rangle, \text{past}(p)) \rightarrow \text{past}(\langle t,h \rangle, p)]$
       ($\Diamond(\text{past}(p))$ entails $\text{past}(p)$)

Crucially, none of the other permutations of these operators—past$\Diamond$, fut$\Diamond$, or $\Diamond$fut—allow the possibility operator to be eliminated.

3.2. *Being able to* again

The final step of the analysis is to make the scopal difference described in (19) more precise. The modality in question is historical possibility. Due to this scopal difference, ability *able* and opportunity *able* will receive slightly different representations, and so for clarity I will orthographically distinguish these two readings as *be able$_a$ to* and *be able$_o$ to*, respectively.

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9.   More precisely, if the proposition $\text{past}(p)$ holds at $\langle t,h \rangle$, then $\text{past}(p)$ holds at $\langle t,h' \rangle$, for any h' that t belongs to.
10.   The (straightforward) proof of this fact makes use of the 'passive' role of the history argument in the interpretation of past tense statements—see fn. 9.

I propose that *be able to* on either reading expresses the possibility of an individual to carry out an action of a certain type at a given time. The difference between the two readings depends on where tense comes in. Since ability *able* is simpler, I will begin with it. The meaning of *be able*$_a$ *to* is represented as follows:

(25)   be able$_a$ to $\rightsquigarrow \lambda R \lambda x \lambda \langle t, h \rangle [\Diamond(\langle t, h \rangle, \mathsf{agent}(x, R))]$
          $\overset{\text{def}}{=}$ able_a

Syntactically, I assume that *be able to* on either reading subcategorizes for a (subjectless) VP. The semantic correspondent of this VP is R, a relation between time/history pairs and individuals. For example, if the VP is *swim across the Balaton*, then R is that relation between time/history pairs $\langle t, h \rangle$ and individuals x such that x swims across Lake Balaton at $\langle t, h \rangle$ (see (26b) below). The formula in (25) applies to a relation R, an individual x, and a time/history pair $\langle t, h \rangle$ and asserts that it is possible for x at $\langle t, h \rangle$ to carry out an action of type R (recall in this connection the postulate on agent in (20)).

Observe that the meaning of *be able*$_a$ *to* as represented in (25) corresponds to the extensional notion of ability discussed in Section 2. In particular, if an individual x carries out an action of type R at the pair $\langle t, h \rangle$, then x is able$_a$ to carry out R at $\langle t, h \rangle$, whether or not x manages to carry out R at other time/history pairs. However, the converse does not hold: if x is able$_a$ to carry out R at $\langle t, h \rangle$, then it does not necessarily follow that x carries out R at $\langle t, h \rangle$.

For an example of *be able*$_a$ *to* at work, consider the derivation of the sentence in (7a) (for simplicity, I ignore the adverbial *in her early twenties*):

(26)   a.   Rebecca $\rightsquigarrow$ rebecca
       b.   swim across Lake Balaton $\rightsquigarrow$
                $\lambda x \lambda \langle t, h \rangle [\mathsf{swim\_across\_lake\_balaton}(\langle t, h \rangle, x)]$
       c.   Rebecca was able$_a$ to swim across Lake Balaton (= (1a)) $\rightsquigarrow$
                $\mathsf{past}(\mathsf{able\_a}(\mathsf{rebecca}, \mathsf{swim\_across\_lake\_balaton})) =$
                $\mathsf{past}(\Diamond(\mathsf{agent}(\mathsf{rebecca}, \mathsf{swim\_across\_lake\_balaton})))$

The resulting formula in (26c) asserts that at some time in the past it was possible for Rebecca to carry out an action of the type 'swim across Lake Balaton'. In other words, at some time in the past she was able$_a$ to swim across Lake Balaton. Whether she did or did not actually swim across Lake Balaton is left open—there is no actuality implication with *be able*$_a$ *to*, as desired. The derivation of this sentence in the future tense would differ only in that fut would be employed instead of past.

In order to represent the meaning of *be able*$_o$ *to*, I make use of a higher-order predicate variable T for the tense operators past and fut. The meaning of *be able*$_o$ *to* first applies to a tense operator and embeds it within the scope

of the possibility operator, as shown in (27).

(27) be able$_o$ to $\rightsquigarrow \lambda T \lambda R \lambda x \lambda \langle t, h \rangle [\Diamond(\langle t, h \rangle, T(\mathsf{agent}(x, R)))]$
$\stackrel{\text{def}}{=} \mathsf{able\_o}$

Note that the relative scope of the tense operator with respect to the possibility operator is the sole difference between the meaning of *be able*$_a$ *to* and that of *be able*$_o$ *to*.

For an illustration of *be able*$_o$ *to* at work, consider the representation of the sentence in (7b) (again, I ignore the adverbial *yesterday afternoon*):

(28) Rebecca was able$_o$ to swim across Lake Balaton (= (7b)) $\rightsquigarrow$
$\mathsf{able\_o}(\mathsf{rebecca}, \mathsf{swim\_across\_lake\_balaton}, \mathsf{past}) =$
$\Diamond(\mathsf{past}(\mathsf{agent}(\mathsf{rebecca}, \mathsf{swim\_across\_lake\_balaton})))$

The formula in (28) asserts that it is possible for Rebecca to carry out an action of the type 'swim across Lake Balaton' at some time in the past. More colloquially, she was able$_o$ to swim across Lake Balaton at some time in the past. Since this proposition has the form $\Diamond(\mathsf{past}(p))$, the fact in (24) is applicable and thus it follows that Rebecca did actually swim across Lake Balaton ($\mathsf{past}(p)$). In other words, *be able*$_o$ *to* has an actuality implication just in case it applies to the past tense operator, as desired. The future tense variant of this sentence in (10a) would receive virtually the same analysis, but with fut in place of past. Notably, there would be no actuality implication in this case.[11]

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11. In the present analysis, the unacceptability of the sentence in (18c) is due to the fact that *be able to* on both readings is (i.e., remains) a modal verb, and modal verbs are stative. Many stative verbs cannot appear as a complement of *see*, however this is to be accounted for.