## Aspect and ability

In many languages, ability modals can occur with imperfective or perfective marking. Cross-linguistically, when a past tense ability modal appears with imperfective marking, the result does not entail that the eventuality actually happened. But when a past tense ability modal appears with perfective aspect, it does entail that the eventuality happened. This effect is documented in a number of different languages in Bhatt (2000), in cases where the aspectual marking is on the modal, as in the Hindi examples below.

(1) a. Yusuf havaii-jahaaz uṛaa sak-taa thaa lekin vo havaii-jahaaz nahĩ uṛaa-taa thaa.
Yusuf air-ship fly CAN-impf be.Pst but he air-ship Neg fly-impf be.Pst
'Yusuf was able to fly airplanes but he didn't fly airplanes.'

b. # Yusuf havaii-jahaaz uṛaa sak-aa lekin us-ne havaii-jahaaz nahĩ uṛaa-yaa.
Yusuf air-ship fly CAN-pfv but he-erg air-ship Neg fly-pfv
'Yusuf could fly the airplane, but he didn't fly the airplane.'

What is the denotation of CAN and of (im)perfectivity in these cases? Suppose we start with a Kratzer (1991) modal and Klein (1997) (im)perfective, minimally modified to correct any type mismatches:

(2) $[\![ \text{can}_{Kratzer+} ]\!]^g$ (p)(i)(w) = 1 iff $\exists w'_i w$ [$\exists$j [p(j)(w)]]
"= 1 iff there exists a world w'ccessible at i from w such that for some j, p(j)(w'"

(3) a. $[\![ \text{impf}_{Klein+} ]\!]^g$ (p)(i)(w) = 1 iff $\exists i'$ [i $\subseteq$ i' & p(i')(w)]
b. $[\![ \text{pf}_{Klein+} ]\!]^g$ (p)(i)(w) = 1 iff $\exists i' i' \subseteq$ i & p(i')(w)]

(4) a. $[\![ \text{impf}_{Klein+}\ \text{can}_{Kratzer+} ]\!]^g$ (p)(i)(w) = 1 iff $\exists i'$ [i $\subseteq$ i' $[\![ \text{can}_{Kratzer+} ]\!]^g$ (p)(i'(w)]
= 1 iff $\exists i' i \subseteq i'$ $\exists w'_{i'}$ w [$\exists$j [p(j)(w)]]]

b. $[\![ \text{pf}_{Klein+}\ \text{can}_{Kratzer+} ]\!]^g$ (p)(i)(w) = 1 iff $\exists i'$ [i'$\subseteq$ i & $[\![ \text{can}_{Kratzer+} ]\!]^g$ (p) (i'(w)]
= 1 iff $\exists i' i' \subseteq$ i & $\exists w'_{i'}$
$w$[$\exists$j [p(j)(w)]]]

The perfective version says is that there is an interval included in the interval under discussion, from which there is at least one world accessible such that p at some time in that world. But in that case the actuality entailment — the entailment that p is true at some time (Klein's Topic Time) in the actual world — is unexplained.

A denotation of (im)perfectivity inspired by event semantics also makes incorrect predictions.

I present a situation-based (Kratzer, 1989) semantics of perfectivity on modals which accounts for the contrast in (1). I assume a version of Hackl's (1999) denotation of the ability modal: "CAN" in (3a), representing a generic quantification over situations of a certain description.

(5) a. John can swim
b. John can answer this question.
c. This elevator can lift 1500 lbs.

(6) a. John swims in all situations in which he wants to swim, there is water, he is not tied up, ...
b. John answers this question in all situations in which he wants to answer the question, he is not prevented from doing so, ...

c. This elevator lifts 1500 lbs in all situations in which normal operating conditions hold, and 1500 lbs is placed on it ....

(7) Generic quantification over situations, with an added proposition C "circumstantial proposition":
   a. John can swim
   b. $GEN_s$[John in s & C(s)] $\exists$s′s overlaps with s′ John swims in s′
   c. 'All situations that include John and certain felicity conditions are expandable to situations in which he swims.'

For our purposes, CAN is similar to this denotation, but crucially lacks a generic quantifier (and is thus technically not a modal); the situation argument in CAN is bound by a quantifier in the aspect. The genericity of CAN in the imperfective comes precisely from the imperfective, not from CAN itself. The denotations of imperfective and perfective aspect in (8b,c) are the same as in Klein (1997) but with situations instead of times; the imperfective ends up very similar to Kratzer's generic operator. The results of combining these operators with CAN is given in (8c).

(8) a. $[\![ \text{CAN}_{\mathbf{q}} \text{ VP} ]\!](s) = 1$ iff $[\mathbf{q}(s) \,\&\, \text{VP}(s)]$
   b. $[\![ \text{sit.impf} ]\!](p)(s) = 1$ iff $\exists s\prime\, [s \subset s\prime \,\&\, p(s\prime)]$

Given a few key assumptions, this analysis explains the contrast in (1): where the VP situation variable is bound by an existential operator in the denotation of imperfective aspect, the VP is asserted to hold of a supersituation of the situation being discussed. When perfective is used, the VP is asserted to hold of a subsituation of the situation being discussed. While a subsituation of an actual situation must always itself be actual, I raise the question whether a supersituation must always be actual (as in Kratzer, 1989). Bearing on that question are familiar data about the reality of instantiating eventualities in generic sentences:

(9) Carlson 1995
   a. This machine crushes up oranges and removes the seeds.
   b. The Speaker of the House succeeds the vice president.
   c. Sally handles the mail from Antarctica.

To summarize, the ability modal on this account is not a true modal because it has no existential operator; the existential operator that binds the situation variable is in the denotation of aspect. This approach explains similarities of meaning between the ability "modal" and other morphemes, such as Tohono O'odham *cem*: Hale, 1969; Devens, 1972) which are not analyzed as modals, and in which the aspect affects the VP despite the intervention of another operator:

(10) a. Huan 'o cem kukpi'ok g pualt.
   Huan 3sg.aux.impf cem open.impf Det door
   'John was trying to, was going to open the door.'
   b. Huan 'at cem ku:pi'o g pualt.
   Huan 3sg.aux.pf cem open.pf Det door
   'John tried to, was going to open the door.'

(11) a. John tripped on his way to open the door: *(10a), *(10b)
   b. John got to the door and tried it, but it was locked: (10a), *(10b)
   c. John opened the door, but the wind blew it shut: *(10a), (10b)