

Background: This work discusses a difficulty for Hacquard’s semantics for modal auxiliaries and proposes a novel solution within her event-relative framework, contributing to the discussion of the temporal orientation of modals. One of Hacquard’s innovations in [4], [5] was to reconfigure modal bases and ordering sources to take an event as opposed to a world argument, which in turn constrain the modal’s flavor. Epistemic modals sit high in the clause (above Tense) and take the speech event as an argument, yielding an epistemic modal base as in (1a). Root modals sit low (below Tense and Aspect), take the vP event as an argument, and yield circumstantial modal bases as in (1b). This permits modals’ lexical entry to be uniform as in (1c), despite the difference in height.

- (1) a. $\bigcap f_{ep}(e) = \{w' \mid w' \text{ is compatible with } \text{CON}(e)\}$
 b. $\bigcap f_{circ}(e) = \{w' \mid w' \text{ is compatible with the circumstances of } e\}$
 c. $\llbracket \text{must} \rrbracket^{w,f,g} = \lambda P \lambda f \lambda g \lambda w [\forall w' \in \text{BEST}_{g(e)}(\bigcap f(e)): P(e)(w')=1]$

The difficulty comes in balancing the event dependency of the modal with interpretive facts about the temporal perspective and orientation. (Cf. [2] for this terminology.) I’ll focus on a single example that exemplifies this difficulty: present tense root modals with eventive prejacent.

It’s commonly agreed that in English, root modal sentences with eventive complements have present perspective with a future-orientation. Take (2a) as an example. We’ll implement [7]’s semantics for **PRES** and **IMPF** as in (2b) and (2c). Ignoring the speech event, this gives us the truth conditions in (2d). We simplify [5]’s semantics in two ways. First, we gloss over the aspect movement which guarantees modals’ arguments are of a uniform type. Second, we adopt a standard semantics for **IMPF**; [5] adds an extra layer of modality to the imperfective. Neither simplification affects the verdict of the paper, but more on the second point later.

- (2) a. John must stock his refrigerator.
 b. **IMPF**: $\lambda P. \lambda t. \lambda w. \exists e[t \subseteq \tau(e) \ \& \ P(e)(w)=1]$
 c. **PRES**: $\lambda P. \lambda w. \exists e[t = t_u \ \& \ P(e)(w)=1]$
 d. $[_{TP} \text{PRES } [_{AspP} \text{IMPF } [_{Mod} \text{MUST } [_{vP} \text{John stock his refrigerator }]]]]$
 $= \exists e[t \subseteq \tau(e) \ \& \ t = t_u \ \& \ \forall w' \in \text{BEST}_{g(e)}(\bigcap f(e)): \text{John-stock-his-fridge}'(e)(w')=1]$

Notice that e in (2d) is both (i) the source of the modal parameters for *must*, and (ii) an event of John stocking his fridge in the teleologically ideal worlds. These features conspire to yield two problems.

The Event Identification Problem (EIP): f and g project from the vP’s event argument. With Aspect sitting above the root modal, existential quantification of the vP’s event argument takes wide scope over the modal. This commits us to an eventuality which exists in the actual world (or in the *generic worlds*, on the semantics of **IMPF** favored by Hacquard), but which is a fridge-stocking event in the ideal worlds. Intuitively, actual-world e is a state consisting of John’s circumstances (“CIRCUMSTANCE $_e$ ”), which are held fixed in the worlds delivered by $\bigcap f(e)$ and where the stocking-the-fridge event occurs (“MODAL $_e$ ”). Suppose John’s mother is due for a visit and his refrigerator is empty. The relevant circumstances picked out by f and g involve John’s empty refrigerator and his goals. Let’s say his sole goal is to have food in the fridge when his mother arrives. So $\bigcap f(e)$ yields a set of worlds where John’s fridge is empty, and $g(e)$ is the set of John’s goals. $\llbracket (2a) \rrbracket$ is true, relative to this f and g , just in case every world in $\bigcap f(e)$ in which John has food in his fridge by the time of his mother’s visit is one in which he stocks his fridge. But we can’t identify CIRCUMSTANCE $_e$ with MODAL $_e$, because any fridge-stocking event is *eo ipso* not an empty-fridge state. At best, we can perhaps say CIRCUMSTANCE $_e$ is a state which partially overlaps MODAL $_e$, but this is properly speaking a different event.

the Orientation Problem (OP): In (2d), **IMPF** introduces a reference time, and says that this reference time is included in the temporal trace of the event time; in this case— the “modal” event of John-stocking-his-fridge. The reference time is identified with the utterance time via **PRES**. By the transitivity of identity, $\tau(e)$ is included in the utterance time, albeit where this time occurs in another world. This is the wrong prediction. The fridge-stocking event should be future-oriented with respect to the circumstances. We want MODAL $_e$ to follow CIRCUMSTANCE $_e$ in the ideal worlds, not be contemporaneous with it; this doesn’t capture the future orientation of the modal event.

The Proposal: Here’s a quick diagnosis of the problem. (2a) has a present perspective but a future orientation; we don’t get this easily if the vP event is also the source of the modal’s parameters. OP suggests that we want CIRCUMSTANCE_e to be present for fixing the perspective, but MODAL_e to be future, for securing the orientation. EIP suggests that we shouldn’t identify CIRCUMSTANCE_e with MODAL_e . We can avoid OP and EIP if we i) differentiate the circumstances from the modal event, ii) reify the circumstance state such that has its own event argument introduced by a vP-shell sitting above vP, and iii) relate this to the modal event in a way that captures the latter’s future orientation.

- (3) a. $[[\text{vP}_2]] = \lambda e_2. \lambda P. \exists e_1 [P(e_1) \ \& \ R(e_2, e_1)]$
 b. $[_{TP} \text{PRES } [_{AspP} \text{IMPF } [_{Mod} \text{MUST } [_{vP}_2 \text{ } [_{vP}_1 \text{ John go to the store }]]]]]$
 $= \exists(e_2) [t \subseteq \tau(s) \ \& \ t = t_u \ \& \ \forall w' \in \text{BEST}_{g(e_2)}(\bigcap f(e_2)): [\exists(e_1)[\text{John-go-to-store}'(e_1)$
 $\ \& \ \text{CAUSE}(e_2, e_1)](w') = 1]]$

Our proposal draws on work by Homer [6], Copley [3], and Matthewson [8]. From Homer, we adopt the idea that root modals have their own event argument. Matthewson argues that modals themselves are not future-oriented and have an independent mechanism to secure the future orientation. However, she proposes a prospective aspect operator for this. On the event-relative framework, prospective aspect would solve OP, but EIP would remain. (Likewise, Hacquard’s favored semantics for **IMPF** would bypass OP but not EIP.) The present proposal adopts her insight that an independent mechanism is responsible for future orientation, which we secure in (3a) by a temporal predicate relating e_2 to e_1 . The mechanism we propose owes to Copley’s causal chain analysis of futurates, and identifies R with the predicate CAUSE (cf. (3b)) to get the temporal relation right.

The proposal embodied in (3) is a coercion claim. Unlike Homer, we don’t assume that root modals *introduce* a new event argument. Not all English root modals are future-oriented, nor do their perspective always differ from their orientation. Prejacents with stative predicates (like those in (4)) can have present perspective and present orientation, and do not give rise to OP or EIP.

- (4) a. There should to be world peace.
 b. Milton, you should be alive at this hour! (paraphrased from Wordsworth)

Our idea is that root modals themselves do not affect the underlying aspectual class of the eventuality they project from. In English, eventive predicates trigger default perfective readings (Cf. [1]). Eventive prejacents without (3a) would therefore trigger **PFV**, but the **PFV** + **PRES** configuration is ruled out in English. (3a) allows the expression to compose with **IMPF**.

I note a final virtue of this proposal. Philosophers and deontic logicians have puzzled about specific kinds of deontic modal claims that seem to enjoin agents to perform the actions denoted by the prejacents (as opposed to indicating that a state of affairs obtaining is deontically ideal). This goes by various names in the philosophy literature; *ought-to-do* vs. *ought-to-be*, agentive vs non-agentive *oughts*, etc. If vP_2 introduces its own event argument, it may also get its own agent argument (in much the same manner Copley has claimed that futurates have an unpronounced director argument), allowing for a novel account of such “agentive” root interpretations as (2a).

References

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