

PLING228 Semantics Research Seminar

Yalcin on epistemic modals

1 Epistemic modals

Standard (truth conditional) view: ‘might p’ – ‘may’, ‘could’ (?), ‘be possible’, etc. – expresses proposition that p is compatible with “some epistemic state or body of evidence”.

Possible worlds implementation of standard view:

- (1) It might be raining
 $\llbracket \Diamond r \rrbracket^{c,w} = T$ iff $\exists w' (wRw' \ \& \ \llbracket r \rrbracket^{c,w'} = T)$
 wRw' iff w' is compatible with epistemic/evidential state S in w .

That is, the domain of quantification is the set of worlds not ruled out as live possibilities (as possibly actual) in w by some body of evidence or information S in w . Notice that S thus depends on context (e.g. for answering “whose evidence”) but only partially; content of S is world relative. (A context c is a spatio-temporal location at which a speech act takes place: an utterance time, speaker, etc. and determines values for “now”, “I”, “actual world”, etc.)

Debated question: which/whose, and exact type of linguistic/context dependency involved (exhibits shiftiness).

Yalcin gives an argument that purports to abstract away from issue of “which S ”, applying to the more general underlying view: that ‘might p’ expresses the proposition that some epistemic state is compatible with p .

2 Yalcin

Argument is that EPISTEMIC CONTRADICTIONS like (2) are wrongly predicted to embed coherently in at least some cases:

- (2) #It’s raining but it might not be raining.

The contradictory ring of (2) *itself* is readily explainable if the contextually relevant epistemic state is the speaker’s (or one he is committed to); faithful assertion then would seem to require that this state not be compatible with rain.

- (3) a. #Suppose that it’s raining but it might not be raining
b. #Imagine that it’s raining but it might not be raining.
c. #If it’s raining but it might not be raining, (not playing it safe and bringing an umbrella will prove to be a mistake.)

There’s nothing contradictory about it being the case, or supposing or imagining it to be the case, that it is raining but the contextually relevant (your?) epistemic state is compatible with no rain.

Non-ways out. (a) apparently it is not that ‘might’ simply cannot embed in these constructions in the first place, for syntactic or for semantic reasons (say because it is indexical to an *actual* body of evidence) (b) nor is the problem the apparent shift to the *addressee*’s epistemic state:

- (4) a. You are certain that your husband isn’t cheating on you. But imagine/suppose that he might be? What would you do?
b. #For the sake of argument I will suppose/imagine that it is raining but it might not be. How likely is it that I’d bring an umbrella anyway?

Broadly put, the explanation Yalcin goes on to propose is that ‘might’ has to be interpreted relative to the same state of information which is said to entail that it’s not raining. Implementation:

2.1 Semantics for ‘might’

Yalcin’s proposes that truth of ‘might p’ depends **only** on the epistemic state, now represented by an explicit parameter s (picking out a set of epistemically possible worlds).

- (5) $\llbracket \Diamond \phi \rrbracket^{c,s,w} = T$ iff $\exists w' (w' \in s \ \& \ \llbracket \phi \rrbracket^{c,s,w'} = T)$

w/ standard semantics for conjunction:

$$(6) \quad \begin{aligned} \llbracket r \wedge \Diamond \neg r \rrbracket^{c,s,w} = T & \text{ iff} \\ \llbracket r \rrbracket^{c,s,w} = T \ \& \ \exists w' (w' \in s \ \& \ \llbracket r \rrbracket^{c,s,w'} = T) \end{aligned}$$

general observation: epistemically modalized (sub-)sentences are world-parameter insensitive, all others are s -insensitive.

While $r \wedge \Diamond \neg r$ is true for many $\langle c, s, w \rangle$, including some where s is “the” epistemic state of the context (e.g speaker’s epistemic state) and w is the world of context, it is not true at any $\langle c, s, w \rangle$ such that $w \in s$. This fact can plausibly be used to account for the deviance of asserting $r \wedge \Diamond \neg r$ (more below).

2.2 Embedding epistemic contradictions

Their infelicity is derived by treating verbs/operators in (3) as manipulating not just w as expected but also s . For example, “suppose” forces $s = S$, where S is the agent’s *supposition* state (the worlds compatible with what he is supposing things to be).

$$(7) \quad \llbracket x \text{ supposes } \phi \rrbracket^{c,s,w} = T \text{ iff } \forall w' \in S_x^w : \llbracket \phi \rrbracket^{c,S_x^w,w'} = T$$

$$(8) \quad \begin{aligned} \llbracket x \text{ supposes } (r \wedge \Diamond \neg r) \rrbracket^{c,s,w} = T & \text{ iff} \\ \forall w' \in S_x^w : \llbracket r \rrbracket^{c,S_x^w,w'} = T \ \& \ \exists w'' (w'' \in S \ \& \ \llbracket r \rrbracket^{c,S_x^w,w''} = T) \end{aligned}$$

Thus: x is supposing rain, and what he is supposing is incompatible with rain. Contradiction. ‘Imagine’ can be treated analogously.

The universal quantification from the verb ends up vacuous in “ x supposes $\Diamond \phi$ ”; it’s true iff there is a ϕ -world compatible with what x supposes. This seems like not a bad result in terms of truth conditions. cf. also ‘John believes that it might be raining’, which seems to mean that it might be raining (relative to John’s beliefs). Yalcin suggests his result is better than what the standard theory gives, as it makes such statements 2nd order beliefs.

Conditionals.

Treated as epistemic necessity given antecedent (a la Kratzer).

$$(9) \quad \llbracket \alpha \rightarrow \beta \rrbracket^{c,s,w} = T \text{ iff } \forall w' \in s_\alpha : \llbracket \beta \rrbracket^{c,s_\alpha,w'} = T$$

where $s_\alpha = \text{MAX } s' \subseteq s (s' \neq \emptyset \ \& \ \forall w' \in s' : \llbracket \alpha \rrbracket^{c,s',w} = T)$

In the simple case of α a contingent non-modal sentence, s_α is just the set of α worlds in s . For $\alpha =$ (contingent) ‘might ϕ ’, s_α is either undefined or s itself; basically the antecedent just tests the compatibility of s with ϕ (is this right?). For the case of (3-c): as already observed there is no $\langle c, s, w \rangle$ where $w \in s$ relative to which the antecedent is true: thus we get undefinedness; same for for any contradiction.

(Yalcin might be read as suggesting that (3-c) comes out (necessarily) false on his semantics? If that’s more desirable, fairly easy to see how to get the result: me non-emptiness requirement from definition of s_α into r.h.s of truth clause).

Though further change also might be wanted in light of examples like

$$(10) \quad \text{If it’s not the case that (it might be raining and it might not be raining), I will know whether to bring an umbrella.}$$

for which the maximality requirement can fail (as Dorr and Hawthorne observe), but which intuitively may be true. Possible fix: take set of maximal subsets, require existing truth clause to hold of reach s_α in this set.

Must

$$(11) \quad \text{If must } p, q.$$

Treating ‘must’ as universal counterpart of ‘might’, this comes out equivalent to ‘must q ’ if defined. Also equivalent: ‘if p , q ’, ‘if p , must q ’ – as on Kratzer’s semantics.

2.3 Dynamic variant

See e.g. Veltmann (next week), K&R 2012, next week.

A slightly different way of approaching Yalcin’s data is to appeal to a “dynamic” treatment of connectives. For example, the second conjunct of a conjunction might plausibly be interpreted relative to the added assumption that the first conjunct is true:

$$(12) \quad \llbracket \phi \text{ and } \psi \rrbracket^{c,s,w} = T \text{ iff } \llbracket \phi \rrbracket^{c,s,w} = T \ \& \ \llbracket \psi \rrbracket^{c,s[\phi],w} = T$$

where: $s[\phi] = \{w : w \in s \ \& \ \llbracket \phi \rrbracket^{c,s,w} = T\}$

Combined with Yalcin’s treatment of ‘might’, we retain that ‘It’s raining but it might not be raining’ is false at any $\langle c, s, w \rangle$ where $w \in s$. But unlike Yalcin, not so for ‘it might not be raining but it’s raining’ (suppose s contains both rain and not-rain worlds, and let w be one of the former). In fact,

$$s[\Diamond \neg r \text{ and } r] = \emptyset \text{ or } \{w : w \in s \text{ and it's raining in } w\}$$

Is there a difference between the accounts?

- (13) a. Suppose that it might be raining but it isn’t.
 b. If it might be raining but it isn’t...

Yalcin obviously predicts these ok since he uses static conjunction. They’re not predicted bad even with dynamic conjunction above, given Yalcin’s semantics for ‘suppose’ and conditional. (Because they require truth (of second conjunct) at *all* worlds in shifted information parameter.)

But, we might get different predictions if dynamic ‘and’ is coupled with a dynamic treatment for ‘if’

$$(14) \quad \llbracket if \phi, \psi \rrbracket^{c,s,w} = T \text{ iff } (s[\phi])[\psi] = s[\phi] \quad \text{i.e. } s[\phi] \text{ supports } \psi$$

If s is compatible with no-rain then ‘If it might be raining but it isn’t...’ is true iff ‘If it’s not raining...’ is.

Rescuing a truth conditional approach?

If we indeed find order effects, we might try to salvage the idea that ‘might p’ has a determinate truth value at a world / expresses a proposition. Would the following work?

$$(15) \quad \llbracket \Diamond \phi \rrbracket^{c,s,w} = T \text{ iff } \exists w' (w' \in s_w \ \& \ \llbracket \phi \rrbracket^{c,s_{w'},w'} = T)$$

$$(16) \quad \llbracket \phi \text{ and } \psi \rrbracket^{c,s,w} = T \text{ iff } \llbracket \phi \rrbracket^{c,s_w,w} = T \ \& \ \llbracket \psi \rrbracket^{c,s_w[\phi],w} = T$$

This is very close to the classical approach – the domain of quantification for ‘might’ is world relative – just with “dynamic” conjunction. One might also try to achieve the same thing pragmatically, without hardwiring the dynamic effect into the semantics. More on this next time.

2.4 Assertion

§5 of Yalcin’s paper deals with metasemantic questions: How does s get “fixed” in evaluating truth of utterances? What’s asserted with epistemic modals?

Yalcin maintains here and elsewhere an “expressivist” interpretation of his semantics: just as ‘might ϕ ’ doesn’t express a proposition under ‘suppose’, in conditional antecedents etc., assertions of ‘might p’ are not, Yalcin urges, assertions of propositions. Possible candidates:

$$\begin{aligned} \text{“standard” content: } & \{w : \llbracket \Diamond \phi \rrbracket^{c,s_c,w} = T\} \\ \text{diagonal content: } & \{c : \llbracket \Diamond \phi \rrbracket^{c,s_c,w_c} = T\} \end{aligned}$$

Yalcin’s position, argument for it, and the issues are familiar from literature on relativism.

To say $\Diamond \phi$ is not to propose to add some informational content, some proposition, to the common ground, as with assertions. Rather, it is to make explicit that ϕ -possibilities are compatible with the common ground – to make explicit that the negation of ϕ is not presupposed in the context (to quote a passing suggestion of Stalnaker, 1970, p. 45).

So: in uttering $\Diamond \phi$ we express a property of epistemic states:

$$\{s : \llbracket \Diamond \phi \rrbracket^{c,s,w} = T\}$$

And urge adopting a common ground with that property (which indicates personal commitment to such a state, at least for purposes of conversation).

Suppose the following. (1) Nobody – including ourselves – knows whether or not there is lead on Pluto, and indeed nobody is even close to having any evidence on the question of whether there is lead on Pluto. (2) As a matter of fact, there is no lead on Pluto. Now, on the basis of the information provided by these two premisses, is the following sentence true or false?

There might be lead on Pluto

There is strong pull to answer false. What that suggests is that the unembedded sentence There might be lead on Pluto

is not really understood as literally describing the condition of some agents evidential state, as on the diagonal view. (If it were, you would presumably be inclined to say true, since we have stipulated that, in the envisaged scenario, there is lead on Pluto for all anyone knows.) Rather, the behaviour of the sentence is akin to its behaviour in embedded contexts. The epistemic possibility operator is sensitive, not to the possession of some body of information by some agents, but rather only, as it were, to what is possessed: to the information itself. **It's role is to place a condition on a possible body of information.**

Shifted uses.

Sometimes 'might' appears to be shifted, as if s is set to some contextually salient body of information (e.g. that of experts).

(21) Cheerios may reduce the risk of heart disease.

(22) Late Antarctic spring might be caused by ozone depletion.

Yalcin wants to maintain a pragmatic story, that the shift is a matter of aiming to co-ordinate our epistemic state(s) with that of experts. Other cases:

These would presumably be handled more naturally by fixing s .

(17) Sally is hiding on the back of the bus because I might be on it.
[E,H&W 2005]

(18) Fred is putting a tick beside the name of each student who might be worth admitting. [H&D]

A third type of case:

(19) (23) I do not know whether the late Antarctic spring might be caused by ozone depletion

Y seems to concede a tacit shift to the s of relevant experts. Though as Hawthorne and Dorr point out, it's not clear how this is effected given that 'know' operates on the s parameter. Seems as if this case forces us

posit a non-information sensitive, world relative interpretation. (Perhaps extend that to (21) and (22)).

A worry the H&D raise is that, given that such interpretations are *available*, why is it so hard to hear $\phi \wedge \Diamond \neg \phi$ as non-contradictory: you might think that, given Y's semantics, those sentences would force a reading as in (23). But since that reading is already highly marked, the force of their objection is somewhat unclear.

Next time: more on H&D on Yalcin and their positive view, more on dynamic issues with modals.