Stativity and 'Present Tense' Epistemics

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1 Epistemic Modality and the Stativity Puzzle

English shows a number of stativity sensitive linguistic behaviours (see Bohnemeyer and Swift 2004 for a classification of English in these terms, as opposed to telicity sensitive languages) It is relevant to note that with respect to these tests, both progressive and perfects pattern as states in English (see also Hallman 2010, while passives pattern as events)

In this paper, I add the following novel empirical generalization to this set of stativity sensitive phenomena in English:

(1) *Epistemic Stative Sensitive (ESS) Modals*:
    ESS Modals are those that are technically ambiguous between an epistemic and circumstantial interpretation, but can only get that epistemic interpretation when combined with a stative prejacent

An example of an ESS Modal, *must*, is shown in 2) below.

(2) a. Eeyore must be sad/in the field. (epistemic *or* obligational (future-oriented))
    b. Eeyore must go to Christopher Robin's party. (only obligational)

An example of non-ESS Modals, *might* is shown in 3 .

(3) a. Eeyore might be sad/in the field. (epistemic (present or future))
    b. Eeyore might go to Christopher Robin's party. (epistemic (present)

In the case of *must*, the possibility of an epistemic reading correlates with the stativity of the prejacent, whether basic or derived (4).

(4) *must*:
    (a) John must like you very much!   LEXICALSTATE
    Readings: epistemic (present); deontic
    ((b) John must be in his office/tired.   BE + PP/AP
    Readings: epistemic (present); deontic
    (c) John must be running the marathon (right now).   PROG
    Readings: epistemic (present/future); deontic
    (d) John must have seen that movie already.   PERF
    Readings: epistemic (past); deontic
    (e) John must work hard for a living.   HAB
    Readings: epistemic (present); deontic (future)
    (f) John must run to the store.   ACTIVITY
    Readings: deontic (future)
    (g) John must build a very big house.   ACCOMPLISHMENT
    Readings: deontic (future)
    (h) John must win the race.   ACHIEVEMENT
    Readings: deontic (future)
    (i) John must be arrested/be chased by the police.   PASSIVE
    Readings: deontic (future)

Modals that pattern like *must*: *can't*, *will*
Modals that pattern like *might*: *could*, *should*.

Generalization: ESS modals allow an epistemic reading only for (derived) states; Non-ESS modals allow epistemic readings even with eventive predicates.

Alternative Statement of Generalization: For ESS modals, if the verbal prejacent could possibly have occurred felicitously with the English simple present tense with that meaning, then it can get an epistemic reading with the modal.

The Question:
How can a constrained theory of modal compositional interpretation be combined with an analysis of stativity so as to derive the distribution of epistemic interpretations shown above?
What is the role of the specific modals lexical contribution in delivering this result, given that not all modals are ESS Modals?

2 Background on Modal Compositional Interpretation

Following the foundational work of Kratzer (1981) etc., modals in natural language have been claimed to be lexically distinguished with respect to a number of different dimensions:

- (i) Quantificational force, i.e. universal vs. existential

- (ii) Constraints on the type of modal base they are compatible with

- (iii)Nature of the preferential ordering relations among members of the modal base

Hacquard (2006), Hacquard (2010) and subsequent papers has already made an important and influential proposal extending the Kratzerian system to account for generalizations at the syntax-semantics interface. In particular, she is at pains to reconcile the elegance of the Kratzerian system where a single underspecified meaning can handle both epistemic and root interpretations, with the results of linguistic typology (cartography) which suggest the generalization that epistemic readings attach higher in the clause *outside* tense, and root meanings attach *inside* tense. She proposes a system which ties particular types of interpretation to height in the structure. Her idea is to replace the base world from with the modal base is calculated with an event instead, and relate the semantic differences to differences in event anchoring, which is sensitive to the height of the modal in question. Specifically, she claims in Hacquard (2010):
(i) when the modal is speaker-oriented, it is keyed to the speech time and receives an epistemic interpretation;
(ii) when the modal is attitude holder-oriented, it is keyed to the attitude time and receives an epistemic interpretation:
(iii) when the modal is subject-oriented, it is keyed to the time provided by Tense and receives a root interpretation.

Hacquard otherwise keeps intact the central structure of the Kratzerian solution: modals are functions from sets of possible worlds to sets of possible worlds; a restriction via contextually defined modal bases, ordering sources, existential vs. universal quantification.

However, as it stands, Hacquards account does not allow us either to understand the state sensitivity of the epistemic reading, or to distinguish between ESS and non-ESS modals in a principled way.

In other words, why does the epistemic reading go away in (5b) but not in (6b)?

(5) (a) John must be in his office.
     (b) John must go to the party.

(6) (a) John might be in his office.
     (b) John might go to the party.

RoadMap:

•To capture core intuition behind the generalization, I will explore a rather different model for modal interpretation that makes the modals themselves more like tense in a certain respect: both modals and tense predicates combine with *situational descriptions* to create richer, modified situation descriptions.

•I will shift some of the work done by the contextual component in the classical theories into the compositional semantics directly, thereby making the interpretation of the modal directly sensitive to height via the properties of its complement (as opposed to via the accessibility of different event binders for contextual variables, as in Hacquard's account).

•The shift will involve analyzing modals as operators over situational alternatives, involving the notion of CHOICE as a primitive notion, and relativized to a TOPIC for the choice.

•The contextual component remains in the explication of the GROUNDS for the choice in question, which will be the black hole where the rest of the work done by modal bases and ordering sources disappears into.

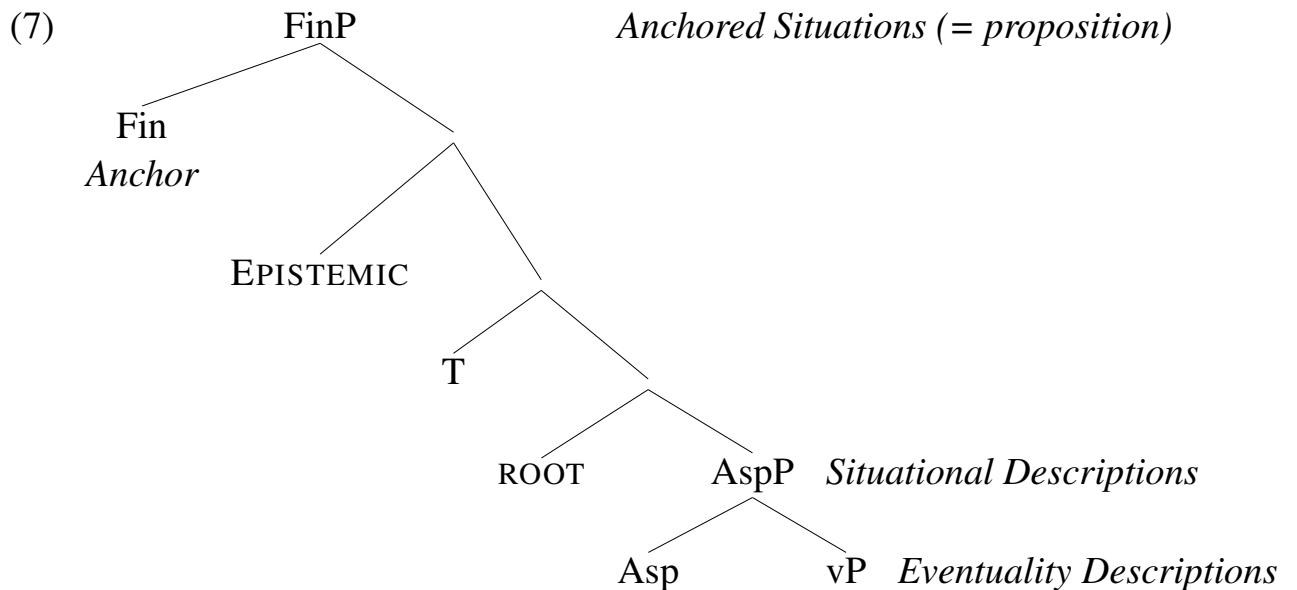# 3 A New Theory: Modals as Operators over Situational Alternatives

3.1 Situations

Kratzer (2008) I will follow Kratzer (2008) in claiming that propositions are not sets of possible worlds, but are rather characteristic functions (sets of) of situations. Under this view, situations have time, world and location parameters and can be modified by both temporal and modal operators equally. Situations are smaller and more specific than worlds, and have no transworld reality except via the counterpart relation of Lewis (1986).

Parameters of Situations:

A situation is a complex object: an event description (e) together with its run-time interval (t) and the world it is embedded in (w) as parameters: s $_{(e,t,w)}$

Following Ramchand and Svenonius (2013), the functional sequence gives us
(7)

(7)   FinP   *Anchored Situations (= proposition)*
        Fin
      Anchor
            EPISTEMIC
                  T
                      ROOT   AspP *Situational Descriptions*
                                Asp   vP *Eventuality Descriptions*

Note that this use of topic situations brings the theory of modality in line
with the neo-reichenbachian theories of tense/aspect whereby a reference time
or topic time (see Klein (1994) and Demirdache and Uribe-Etxebarria (2008))
is the intermediary between the utterance time and the event time.

(8)   KLEINIAN (1994) MODEL FOR T

      Utterance Time
                  T   Topic Time
                  <
                  =
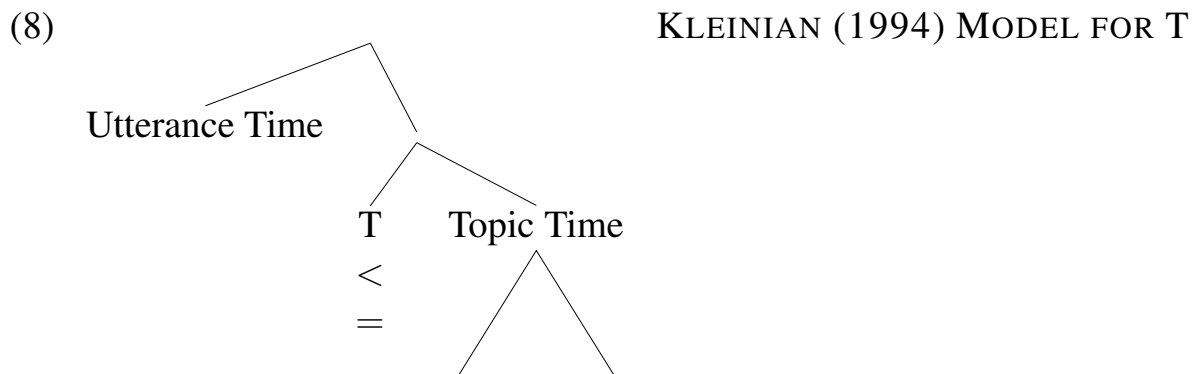
But now, in place of the utterance *time*, we need to think of topic situations
more generally as being anchored to the utterance *situation*.

(9)   KLEINIAN MODEL GENERALIZED

      Utterance Situation
                  T   Topic Situation
                  ≠
                  =

5
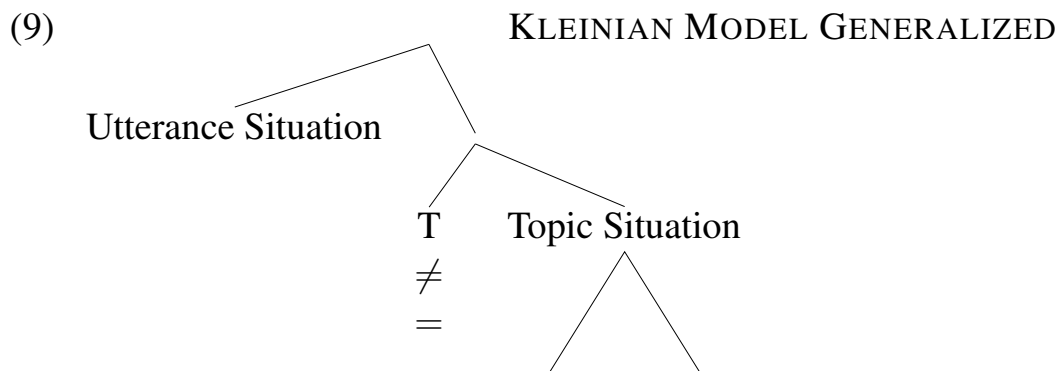
Actually, the notion of Utterance situation needs to be generalized to 'Anchor situation' to accommodate embedded attitudes and indirect discourse.

I will assume that in general, an utterance has 'truth conditions' only once it has been 'anchored', i.e. the situational description is embedded in the world via the utterance context c.
There are no propositions until we get to this point, only situational descriptions of more or less specificity. I will use the notion of *support* of a situational description s in a context c to correspond to propositional assertion in the classical sense.

(10) $[\![C]\!]^{g,c} = \lambda P \exists s[P(s) \ \& \ c \ supports \ s]$
which means that the context c is an information state that entails the truth of a situation s with the descriptive content P.

Notation:
I will use the * notation to indicate the parameters in the anchoring context c, t* = anchor time and w* = anchor world . Under normal matrix conditions, this will simply be the utterance time, and the actual world respectively, but I assume that this can be relativized to deal with embedded attitudes and free indirect discourse.

3.2 Alternatives

Alternatives are needed in the explication of natural language in the domains of focus, calculation of implicatures and interrogative sentences (Rooth 1985, Rooth 1992, Hamblin 1973, Ramchand 1997), and possibly also for certain kinds of indefinites (Kratzer and Shimoyama 2002). They have also been used recently to understand disjunction under modals, and in analyzing imperatives (Aloni 2007).
One important difference is that these are not propositional alternatives, but alternative situational descriptions. They are constructed by the filling in of contextual variables in the description (see also Greenberg 2013) left underspecified at that point. They are constrained to be options that are still 'live' or 'in play' for the interlocutors— their successful embedding in a context is actually agreed by the interlocutors to be technically unknown.

$[\![\text{Modal}]\!]^{g,c} = \lambda P \lambda x \lambda s1[P(s1) \ \& \ s1$ is a CHOICE for x in c], where $s1 \in \text{ALT}(s1)$ MODAL ALTERNATIVE SEMANTIC VALUE (ALT(s1)) : $\{s : s$ is a 'live alternative' for s1, created by substituting different values for the free contextual parameters of the situational description of s that are still in play. $\}$

6

In addition, a crucial component of the modal alternative meaning is that it includes a *polar alternative* to the event parameter of s1.

With respect to the time parameter, past times are considered to be not in play any more— they are 'decided' in the sense of Werner (2006) and only present and future time choices for the t parameter are eligible. I will assume that temporal alternatives are calculated with respect to a time variable t_0, which is the one that will be anchored to tense. This is my way of implementing the future orientedness of 'live' alternatives with respect to the time variable that is eventually modified by tense. It is essentially a stipulation about what it means to be a 'live' alternative— something I take to be a primitive in this system.[1] Similarly, counterfactual worlds, worlds *known* to be counterfactual at the time of the anchor situation cannot be part of the the alternative semantic value.

In epistemic contexts, the modal attaches after the time parameter has been set. This restricts the alternatives to a particular time. 'Live' Alternatives are thus going to be things that are still in play *at that time*. This is just going to be the existence or non-existence of the event described in P.

The so-called universal modals have an *exhaustive* semantics for the Choice relation between the ordinary semantic value and the alternative semantic value (s1 is the *only* choice for x in c)

The so-called existential modals have a *non-exhaustive* semantics for the Choice relation between the ordinary semantic value and the alternative-semantic value (s1 is *one* choice for x in c).
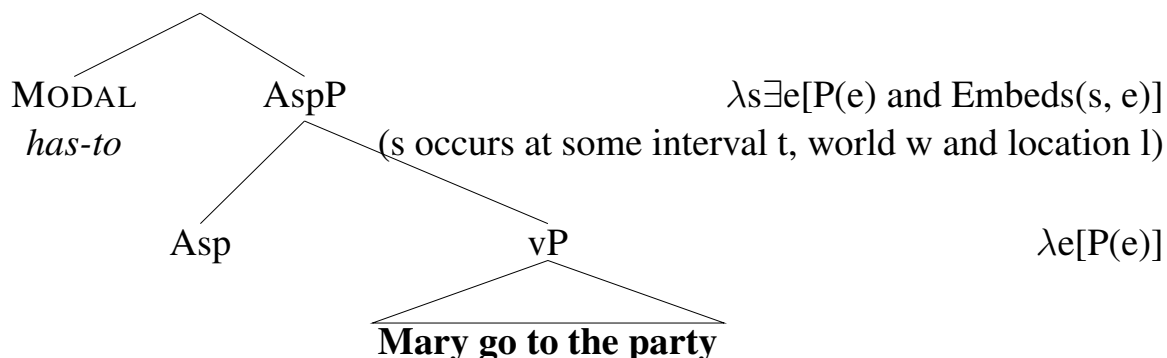
4 Size Matters

4.1 Circumstantial Modality

I illustrate first with the modal *have-to* on its deontic interpretation. The sentence in (11) is given a schematic tree representation in (12).

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[1] In other implementations, such as Condoravdi (2002), the temporal futurity of the event time with respect to the perspective time is also simply stipulated for root modality. My own stipulation is a slight improvement in the sense that it derives in part from modal height, although the definition of what it means for something to be a 'live' alternative is still axiomatic.

(11) Mary has to go to the party.

(12)

MODAL   AspP $\lambda s \exists e[P(e)$ and Embeds(s, e)]
has-to   (s occurs at some interval t, world w and location l)

        Asp   vP $\lambda e[P(e)]$

            Mary go to the party

(13) $[[$ have-to $]]^{g,c} = \lambda P \lambda x \lambda s1_{e1,t1,w1}[P(s1)$ & s1 is **the only** CHOICE for x in c],
where s1 $\in$ ALT(s1)
MODAL ALTERNATIVE SEMANTIC VALUE (ALT(s1)): $\{s : s = s_{e,t,w}$
where alternative values of e are e1 and not-e1, alternative values of t are t
$\geq t_0$, and w ranges over possible worlds $\}$
(The variable t_0 is the one that will be later anchored by tense.)

Higher up the tree, the temporal parameters t_0 will be bound by the assertion, and the modal will be relativized to the temporal anchoring of the matrix clause, as in Hacquard (2006).

(14) a. Mary has to go to the party.
$t_0 = t^*$, and the situational alternatives are in the future of the utterance time.
b. Mary had to go to the party.
$t_0 \leq t^*$, i.e. a specific moment/interval in the past of t^*, and the situational alternatives are in the future of that time.

I am assuming that the variable for the individual x, who is the topic for the choice situation, is going to be filled by an argument of the event predicate in the normal case, but also sometimes by a general topic situational variable in other cases. The topic position will be filled by movement in the latter case. A discussion of the details is beyond the scope of this paper.

(15) (a) Mary has to go to the party.
(b) Mary has to be in bed by 11 at the latest! (to the babysitter)
(c) There has to be silence in the house when I am thinking!

For the existential deontic modal *can*, its exactly the same except without the exhaustive semantics.

There is obvious room in these definitions for different presupposed information or pragmatic contextual information about GROUNDS for why the topic for the choice situation has the choice he/she/it does. This framework is not intended to replace the contextual input to modal semantics. The contextuality of modal bases etc., has been relegated to the filling in of the notion GROUNDS for a choice, and can be made explicit by use of adverbials or retrieved from the context.

(16) GROUNDS for Choice coming from Discourse Context:
   A: Oh no, I have a meeting at 9am tomorrow morning!
   B. Then, you will have to get up before 8 for once.

(17) GROUNDS for Choice coming from Adverbial Modification:
   If you want to make that meeting, you will have to get up before 8.
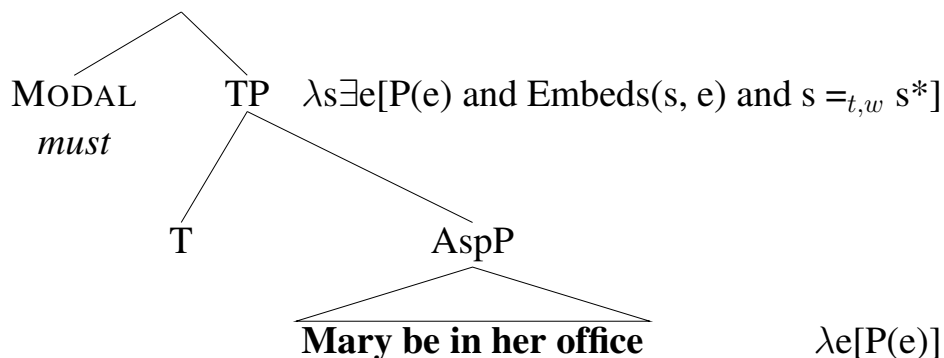   Because of the 9am meeting, she had to get up before 8 for once.
   In view of my schedule tomorrow, I will have to get up before 8 for once.

4.2   Epistemic Modality

Things are different when we consider what happens to alternative construction when we place the modal higher up in the clausal structure. If we base generate *have-to* higher than T, we get the following tree (18), and the following meaning (19).

(18)

MODAL   TP $\lambda s \exists e[P(e) \text{ and Embeds}(s, e) \text{ and } s =_{t,w} s^*]$
must

   T   AspP

            Mary be in her office $\lambda e[P(e)]$

(19) $[[\text{ have-to }]]^{g,c} = \lambda P \lambda x \lambda s1_{e1,t^1,w^1}[P(s1)$ & s1 is **the only** CHOICE for x in c], where s1 $\in$ ALT(s1)
   MODAL ALTERNATIVE SEMANTIC VALUE ALT(s1) : $\{s : s = s_{e,t^1,w^1}$, where alternative values of e are e1 and not-e1 $\}$

5 Modals and Anchoring

(20) *Generalized Anchoring (Informal)*:
I will assume that the topic situation must be anchored in some way to the utterance/anchor situation to make a well-formed utterance. A well formed utterance therefore always takes the logical form: c *supports* s

The idea that modals in some sense do the same job as tense has echoes in the proposal found Iatridou (2000) (see also Isard 1974) that past tense morphology is not a primitive tense category, but is one of the manifestations of the more general semantic category (REMOTE, in their terms) According to Iatridou (2000), the remote relation can relate worlds as well as times, accounting for some cases of 'past' morphology on modals. (21):

(21) PAST morphology in Iatridou 2000:
(i) REMOTE: $t \neq t^*$ (i.e. $t < t^*$) or
(ii) REMOTE: Reference $w \neq w^*$

(22) ANCHORING INFORMATION IN MODALS
INDEX: $s = s^*$. The situational variable is identified directly with the deictic anchor, the utterance situation.
ANAPHORIC: If s must have its reference resolved *anaphorically*, either by binding from something in the linguistic context, or to some purely discourse contextual topic situation.

To see the intuition behind INDEXICAL vs. ANAPHORIC, we need to think of the situational variable essentially as a pronominal which needs to have its reference specified. Anaphoric reference in this sense covers many difference modes of reference resolution (being essentially negative), it is intended to mirror the cut in the pronoun system between indexical forms like *I/you* on the one hand, and non-indexical ones like *he/she/it* on the other, regardless of the means of reference assignment of the latter. It is well known that this is the cut that is almost universally instantiated crosslinguistic within pronoun systems.

5.1 Indexical vs. Anaphoric Modals

In addition to its semantics of quantification over alternatives, *must* also possesses information that anchors the situational description to the utterance situation by asserting an identity between the time and world variables of that situation with the utterance contextual ones, much like the English present tense (see 23).

(23) $[[\text{ must }]]^{g,c} = \lambda x \lambda P \lambda s1_{e1,t^*,w^*}[P(s1) \text{ \& } s1 \text{ is } \textbf{the only } \text{CHOICE for x in c}]$,
where $s1 \in \text{ALT}(s1)$
MODAL ALTERNATIVE SEMANTIC VALUE $\text{ALT}(s1) : \{s : s = s_{e,t^*,w^*}$,
where alternative values of e are e1 and not-e1 $\}$

On the other hand, *might* is not indexical in this sense, but anaphoric, and the temporal and world variables may be anaphorically resolved to a salient discourse interval, or identified with some linguistically present time via binding.

(24) $[[\text{ might }]]^{g,c} = \lambda x \lambda P \lambda s1_{e1,t^1,w^1}[P(s1) \text{ \& } s1 \text{ is } \textbf{one } \text{CHOICE for x in c}]$, where $s1 \in \text{ALT}(s1)$
MODAL ALTERNATIVE SEMANTIC VALUE $\text{ALT}(s1) : \{s : s = s_{e,t^1,w^1}$,
where alternative values of e are e1 and not-e1 $\}$

Thus, for *might*, even though it is epistemic in the sense of being about polarity alternatives alone, it is not confined to alternatives at the utterance time or world, since the situational parameters can be chosen pragmatically to be identical to some discourse salient 'at-issue' time or world.

We can now answer the question of why the epistemic version of *must* is confined to stative complements. Notice that the denotation built up above includes the denotation for 'present tense' (by assumption, the very same present tense found in simple clauses in English). However, we know that the English present tense is special in requiring a stative complement. In some sense it does not matter how we implement the semantic reason for this, as long as the reason is based directly on the denotation that the present tense and the epistemic reading given above have in common. However, I will assume a concrete explanation for this fact, directly building on Taylor (1977)'s original intuition.

Events vs. States (inspired by Taylor 1977)
If α is a *stative* predicate, then $\alpha(x)$ is true at an interval I just in case $\alpha(x)$ is true at all moments within I; (ii) If α is an *eventive* predicate, then $\alpha(x)$ is only true at an interval larger than a moment.

We now simply assume that this applies to the temporal parameter of situations in our sense: *situations that have a point in time as their temporal parameter, can only embed states*.

6 Extensions

In the sentences in (25), the perspectival anchor for the modal interpretation is shifted to be identical with the event expressed in the matrix.

(25) (a) John said that Mary could borrow his horse.
(b) John said that Mary might borrow his horse.
(c) John said that Mary should borrow his horse.
(d) John said that Mary would borrow his horse.

Crucially here, we can get an interpretation where the modal calculation is based on alternatives that fan out from the time of John's 'saying'. In particular, these sentences are true if Mary indeed borrowed John's horse and has already returned it at the actual time of (speaker) utterance. Compare this with the corresponding sentences that embed indexical modals.

(26) (a) John said that Mary can borrow his horse.
(b) John said that Mary may borrow his horse.
(c) John said that Mary must borrow his horse.
(d) John said that Mary will borrow his horse.

To my ear, the versions with indexical modals are good only under a kind of double access reading— the borrowing of the horse event is in the future both of the saying event and the speech time.

Proposal: For non-ESS modals, the temporal parameters of the situation that is 'chosen' can be dependent on the main clause parameters, and anaphorically bound. For ESS modals, the temporal parameters of the situation that is 'chosen' must be identified with the clausal anchoring parameters.

Consider the sentence in (27), which is claimed to have at least two, and possibly three different readings.

(27) John could have won the race.
(a) .... let's go and find out. (Epistemic Uncertainty reading)
(b) .... but he didn't in the end. (Counterfactual reading)
(c) ......(still) at that point. (Backshifted or metaphysical reading)

The backshifted metaphysical reading is closely connected to the counterfactual reading, at least in the sense of being allowed by the same set of modals. Accounts in Condoravdi (2002), Stowell (2004), Demirdache and Uribe-Etxebarria (2008) all analyse the counterfactual reading as involving a scope reversal between PAST and modal (either in the syntax or the semantics). Note that these

accounts all assume that the perfect auxiliary contributes a relation that is the same as the temporal relation PAST. Under this kind of story, it is accepted that the surface order in (27) involves a mismatch between morphology and the semantics, which is repaired either by movement in the syntax, or in some semantic component. Note that in Demirdache and Uribe-Etxebarria (2008), in English modals themselves are explicitly claimed to be tenseless, unlike their Romance counterparts and the PAST predicate is contributed entirely by the perfect auxiliary.

(28) **Epistemic Uncertainty Only**
    (a) John must have won the race.
    (b) John may have won the race.
    (c) Can John have won the race?

(29) **Counterfactual and Backshifted Readings Possible**
    (a) John could have won the race.
    (b) John might have won the race.
    (c) John should have won the race.

The epistemic uncertainty reading is straightforwardly predicted under the present account by allowing the perfect tense to denote a resultant state, and anchoring the epistemic alternatives to the utterance context. But how do the other two readings emerge and why are readings (b) and (c) only possible with the 'anaphoric' modals in my terms?

Proposal: For non-ESS modals, the temporal parameters of the situation that is 'chosen' can be a counterfactual world (counterfactual reading) or past time (back shifted reading). For ESS modals, the temporal parameters of the situation that is 'chosen' must be identified with the speech time. In the above cases, the prejacent is a perfect auxiliary phrase, which as we saw above patterns with statives in describing a resultant stative situation with entailments about past time events.

7 Conclusion

Advantages of the Current Approach
    Although this paper has advocated a rather non-standard approach to the compositional semantics of modals, it has, I believe, a number of broad advantages, which I list in summary here.

- Like Hacquard, we derive the correlation between syntactic height and the epistemic-root distinction

- Like Hacquard, ambiguous modals do not have to have distinct lexical entries, but can be built from one more abstract lexical entry plus the semantic 'size' of the prejacent.

- Alternative semantics necessary anyway for the interpretation of focus, interrogatives and indefinites

- Allows the sensitivity to time to follow directly from the size of the prejacent: epistemic time identity and deontic futurity do not need to be stipulated.

- Allows for interaction with focus, and disjunction within the prejacent directly (see von Fintel 2012)

- Independent anchoring distinctions such as indexicality can express the difference between ESS modals and non-ESS modals in English

References

Aloni, Maria. 2007. Free choice, modals, and imperatives. *Natural Language Semantics* 15: 65–94.

Bohnemeyer, Juergen and Mary Swift. 2004. Event realization and aspectual interpretation. *Linguistics and Philosophy* 27 3: 263–296.

Condoravdi, Cleo. 2002. Temporal interpretation of modals. modals for the present and for the past. In *The Construction of Meaning*, edited by S. Kaufmann D. Beaver, L. Casillas and B. Clark, pp. 59–87. CSLI Publications, Stanford, CA.

Demirdache, Hamida and Myriam Uribe-Etxebarria. 2008. Scope and anaphora with time arguments: The case of 'perfect modals'. *Lingua* 118 11: 1790–1815.

von Fintel, Kai. 2012. The best we can (expect to) get? challenges to the classic semantics for deontic modals. Ms. MIT.

Greenberg, Yael. 2013. External and internal alternative-sensitive operators. In *Paper presented at a workshop on "Focus Sensitive Expressions from a Cross Linguistics Perspective", Bar Ilan University*. Ms., Bar Ilan University.

Hacquard, Valentine. 2006. *Aspects of Modality*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, MA.

Hacquard, Valentine. 2010. On the event-relativity of modal auxiliaries. *Natural Language Semantics* 18 1: 79–114.

Hallman, Peter. 2010. Instants and intervals in the event/state distinction. Ms., UCLA.

Hamblin, C. L. 1973. Questions in montague english. *Foundations of Language* 10: 41–53.

Iatridou, Sabine. 2000. The grammatical ingredients of counterfactuality. *Linguistic Inquiry* 31 2: 231–2.

Isard, Steven. 1974. What would you have done if... *Theoretical Linguistics* 1: 233–255.

Klein, Wolfgang. 1994. *Time in Language*. Routledge, London and New York.

Kratzer, Angelika. 1981. The notional category of modality. In *Words, Worlds and Contexts*, edited by H.J. Eikmeyer and H. Reiser, pp. 38–74. de Gruyter, Berlin/New York.

Kratzer, Angelika. 2008. Modals and conditionals again (chapter 2). Online version on website, University of Massachusetts, Amherst.

Kratzer, Angelika and Junko Shimoyama. 2002. Indeterminate pronouns: The view from japanese. In *Paper presented at the 3rd Tokyo Conference on Psycholinguistics*.

Ramchand, Gillian. 1997. Questions, polarity and alternative semantics. In *Proceedings of NELS 27*, pp. 383–396. GLSA University of Massachusetts, Amherst, MA.

Ramchand, Gillian and Peter Svenonius. 2013. Deriving the functional hierarchy. ms., University of Tromsø.

Rooth, Mats. 1992. A theory of focus interpretation. *Natural Language Semantics* 1 1: 75–116.

Rooth, Mats Edward. 1985. *Association with focus*. Ph.D. thesis.

Stowell, Tim. 2004. Tense and modals. In *The Syntax of Tense and Aspect*, edited by J. Guéron and J. Lecarme, pp. 621–636. MIT Press, Cambridge, MA.

Taylor, B. 1977. Tense and continuity. *Linguistics and Philosophy* 1.2: 199–220.

Werner, T. 2006. Future and nonfuture modal sentences. *Natural Language Semantics* 14 3: 235–255.