

Why some progressives have futurate readings while others don't: Formalizing aspectual focusing with causal models

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Abstract

Across languages, some progressives have futurate readings and others do not. This is a puzzle under the consensus possible-worlds approach to progressives and futurates. Here I explain this puzzle via differences in aspectual focusing: some progressives focus the *reason* for the event (which can be the intention or plan), and therefore they permit futurate readings, while other progressives focus the *process*, and therefore do not permit futurate readings. Focusing here is based on a causal model approach which allows us to make direct use of causal reasoning for semantics (Nadathur and E. Bar-Asher Siegal 2026). I present a connection between causal models and lambda-calculus through speaker commitment to a causal model under discussion, and use lexically-constrained sets of causal models (*causal scenarios*) to build phrase structure, facilitate aspectual focusing, and explain the semantic “settledness” (Kaufmann 2005a) constraint on futurates. The framework also suggests an explanation of the differences between simple and progressive futurates in English.

1 The puzzle

Futurates have no future marking but allow future reference, as long as a constraint holds that has been described as “settledness” (Kaufmann 2005b). The puzzle we will address here is that the English progressive and the French présent (in its progressive reading) have futurate readings (1), but the French periphrastic progressive *être en train de* does not (2):

- (1) a. The Red Sox are playing/#defeating the Yankees tomorrow.
b. PSG joue contre/#battre Marseille demain.
PSG is.playing against/is.beating Marseille tomorrow
‘PSG is playing/#beating Marseille tomorrow.’
- (2) PSG est en train de jouer Marseille *demain.
PSG is in process of playing Marseille tomorrow.
‘PSG is playing Marseille (*tomorrow).’

Progressive futurate meanings are typically modeled using quantification over possible worlds (e.g., op. cit. and Karawani and Zeijlstra 2026). Yet while quantification over possible worlds alone can capture the truth conditions of progressive futurates, it is silent on the lack of futurate readings in progressives as in (2). A possible worlds framework also has nothing to say about why futurates have the particular modal bases they have, and no other modal bases, unlike modal auxiliaries which tend to have more than one.

By taking advantage of causal relations in the verb phrase, and using a sufficiently articulated representation of causal reasoning, we can grasp the compositional semantics of (1) and (2)

and be relieved of the question about modal bases. The mechanism pursued here has aspect “focusing” different parts of event structure, via causal representations of causal reasoning event structure, and owes much to Nadathur and E. Bar-Asher Siegal (2026), Ramchand (2008), and Schulz (2011).

2 Causal models and their relationship to progressives

Causal models (Pearl 2000; Halpern 2000) are a way to represent the structure causal relations give to our representation of the world:

Definition 2.1. A *causal model* $m = \langle \mathcal{U}_m, \mathcal{V}_m, \mathcal{R}_m, \mathcal{F}_m \rangle$ consists of a set $\mathcal{U}_m$ of exogenous variables, a set $\mathcal{V}_m$ of endogenous variables, a range function $\mathcal{R}_m$ that associates each variable with the set of its possible values, and a structural function $\mathcal{F}_m = \{f_X \mid X \in \mathcal{V}_m\}$ for each $X \in \mathcal{V}_m$, where f_X determines the value of X from the values of its parent variables (adapted from Halpern 2000).

Nadathur and E. Bar-Asher Siegal (2026) propose to explain progressive meaning using causal models alongside possible worlds, essentially defining the notion of being “in progress” as being on a still-open *culmination procedure* to an endpoint. A culmination procedure for them is a sufficient set for the truth of a culmination condition (represented with a variable in the model).

- (3) Nadathur and E. Bar-Asher Siegal (2026) truth conditions for Prog(P):
- a. The reference situation can be partially matched to a culmination procedure associated with P.
 - b. Some fact in this partially-realized culmination procedure has changed in value compared to the situation prior to reference time.
 - c. The facts in s do not already make the culmination false.

I take inspiration from their account in several ways. Their proposal allows semantics to interact cleanly with causal reasoning, through their use of causal models. They also point out that intentions are globally necessary conditions for the culmination of telic progressives, a fact that for us will take on additional significance. Finally, they note that causal reasoning uses a causal model, while meanings have to do with *properties* of causal models. Here we present one way to pursue these ideas, with a differently compositional account that retains their key advances for telic progressives, and moreover, explains the facts in (1) and (2).

3 The framework

3.1 From causal models to lambdas: Speaker commitment and causal scenarios

To connect a causal model under discussion to lambda calculus, we first propose that every node X of the causal model has a corresponding type *st* proposition P_X . Then we take the speaker to be *committed* to a causal model in a situation just in case the values of variables in the model match the truth values the speaker takes the corresponding propositions to have in the situation in question, as in Definition 2.2:

Definition 3.1. *Speaker commitment to a causal model:* For all individuals x , causal models $m = \langle \mathcal{U}_m, \mathcal{V}_m, \mathcal{R}_m, \mathcal{F}_m \rangle$, situations s , times i : a speaker x is committed to m in s at i iff for all variable assignments σ in m : x believes in s at i that for all variables $X \in \mathcal{U}_m \cup \mathcal{V}_m$: $\sigma(X) = 1$ iff $P_x(s) = 1$. In that case $P_X(s) \in D_{st}$ is the corresponding proposition for X relative to x , s , i .

Following (Baglini and Francez 2015; Nadathur and Lauer 2020), and (Copley and Mari 2022), I assume that sentences make reference to a causal model under discussion, allowing us to relate language to causal reasoning. I propose that lexical/functional meanings describe a *causal scenario*, a set of causal models, as defined in Definition 2.3. In uttering the sentence, the speaker predicates the described causal scenario of the causal model under discussion (the “scenario predication”).

Definition 3.2. A *causal scenario* $\mathcal{S}$ is a characteristic function of a set of causal models, placing these conditions on a causal model $m = \langle \mathcal{U}_m, \mathcal{V}_m, \mathcal{R}_m, \mathcal{F}_m \rangle$, relative to speaker x , situation s , time i :

1. $\exists$ an exogenous node $A_{\mathcal{S}} \in \mathcal{U}_m$ whose corresponding proposition relative to x, s, i , namely $P_{A_{\mathcal{S}}}$, is the type *st* proposition designated by $\text{REASON}_{\mathcal{S}}$.
2. $\exists$ an endogenous node $B_{\mathcal{S}} \in \mathcal{V}_m$, whose corresponding proposition, namely $P_{B_{\mathcal{S}}}$ relative to x, s, i , is the type *st* proposition designated by $\text{EFFECT}_{\mathcal{S}}$.
3. $B_{\mathcal{S}}$ is causally reachable from $A_{\mathcal{S}}$ in m : $A_{\mathcal{S}} \rightarrow_m^+ B_{\mathcal{S}}$.
4. Causal selection: The value of B depends **only** on the value of A (there are no arrows pointing at B that are not on a causal pathway from A).

A causal scenario constrains the causal model to have a particular **effect** node, a **reason** node (often underspecified), and an underspecified causal **pathway** along the edges of the model between those two nodes. For the progressive futurate readings we are interested in here, as well as any other intentional progressive, the reason is an intention (Copley 2018), but other reasons are possible as well for non-intentional sentences.

Clause 4 of Def. 2.3 says that reasons (including intentions) are treated as “the cause” in causal scenarios. The privileging of a single reason or cause of an effect is known *causal selection*. As (Baglini and E. A. Bar-Asher Siegal 2019) argue, causal selection is a linguistic phenomenon, and this is true here. Reasons are selected to be presented linguistically as the only thing that matters for whether the effect occurs. This means that when a causal scenario is predicated of a causal model, the causal model is constrained such that any other necessary causal conditions, or sets of conditions, on the effect have the correct value to make the effect have a value of 1, provided the reason variable has a value of 1. This has the result of attributing to the holder of the intention the ability to make the effect come about. Below we will cash out what this means for settledness in futurates.

If the pathway from reason node $A_{\mathcal{S}}$ to effect node $B_{\mathcal{S}}$ includes nodes other than $A_{\mathcal{S}}$ and $B_{\mathcal{S}}$, there is also a proposition $\text{PROCESS}_{\mathcal{S}}$ as in Definition 2.3.

Definition 3.3. For all causal models m , causal scenarios $\mathcal{S}$ such that $\mathcal{S}(m)$, $\text{PROCESS}_{\mathcal{S}}$ refers iff there is a assignment for $\mathcal{S}$ in m , namely σ_{witness} , such that $\sigma_{\text{witness}}(P) = 1$ and a non-empty partial assignment $\sigma_{\text{process}} \subset \sigma_{\text{witness}}$ assigns values to exactly the nodes X such that $A_{\mathcal{S}} \rightarrow_m^+ X \wedge X \rightarrow_m^+ B_{\mathcal{S}}$. If $\text{PROCESS}_{\mathcal{S}}$ refers, $\text{PROCESS}_{\mathcal{S}} = \lambda s. \bigwedge P_X(s)$

3.2 Compositional semantics

$\text{REASON}_{\mathcal{S}}$, $\text{PROCESS}_{\mathcal{S}}$ and $\text{EFFECT}_{\mathcal{S}}$ are reminiscent of Ramchand’s (2008) **init**, **proc**, and **res**, though they are type *st* propositions, and not heads. We can also think of REASON , PROCESS and EFFECT as something a bit like theta roles, but instead of relating individuals to events, they relate propositions to causal scenarios.

Introducing propositions into phrase structure, or not: In referring to a causal scenario $\mathcal{S}$, a denotation that takes a situation argument s will not necessarily predicate $\text{REASON}_{\mathcal{S}}$ or

PROCESS_S or EFFECT_S of s . However, aspects *can* introduce these propositions into the at-issue meaning, thereby predicating them of s : This is aspectual “focusing”. Conditions placed on the causal model by the causal scenario and not introduced into phrase structure are thereby not-at-issue meaning.

Binding free times: In progressives, these propositions have free temporal arguments i, j, k (written as superscripts). To anchor the event structure (the causal scenario) in time, at least one of REASON_S ^{i} , PROCESS_S ^{j} , and EFFECT_S ^{k} must be in the denotation, with its time argument bound. As long as one is bound, the others need not be, since the causal relations in the scenario impose temporal relations: k cannot begin before j , and j cannot begin before i . The weaker relation than Ramchand’s between PROCESS_S and EFFECT_S is there to include atelic predicates, which do not have a Ramchand-style result, but which do have an entrained effect as per Harley (2005) (e.g. the proposition that “a baseball game is created” for *play a baseball game*). This effect is causally influenced by, but distinct from, the actions (process) that make up the game; one could perceive the actions without knowing it was a baseball game. But whether the predicate is telic or atelic, note that if the reason is the intention or plan, it *can* start holding well before the process, but *must* hold throughout the process. For if it did not, the process would stop; the process continues only as long as the intention holds.

4 Solving the puzzle

4.1 How do progressive futurates differ from non-futurate progressives?

In progressive futurates, a future temporal adverbial binds k in EFFECT_S ^{k} . Only reasons that can hold both before any process has begun and also at a later time during the process and effect can yield futurates: usually this is just intentions, though we will discuss exceptions below.

4.2 What’s the difference between progressives that accept futurate readings and those that don’t?

The aspects in (2) introduce, and bind the free time i of, REASON_S ^{i} ; while *être en train de* in (3) introduces, and binds the free time j of, PROCESS_S ^{j} . Since futurate readings require intentions to be introduced into the denotation, and since intentions are reasons, not processes, the sentences in (2) can have a futurate reading. The sentence in (3) does not have the reason introduced into the denotation, and so does not have a futurate reading (Fig. 1).

Figure 1 shows the compositional semantics of these aspects. Causal models have their own type m . Free temporal variables are written as superscripts; if introduced into the sentence, they must be bound.

Using this proposal, we can also account for the contrast that in English, *#I am calling you* does not report a spur-of-the moment decision to call, while in French, *présent Je t’appelle* does exactly that. In this framework, what this means is that for English progressives, the reason can only *already* be holding; it cannot be *beginning* to hold. The English progressive involves a stative Pred head while the French *présent* does not; we use this distinction to account for the contrast.¹

4.3 Settledness

In this framework, settledness is derived from the fact that the future truth value is conditional on the speaker’s commitment to the model. In predicating the causal scenario of the model, the

¹*#I call you* is also bad in this context, but it is bad in any non-narrative, non-modally-subordinated context. I suspect this is because there is a free temporal variable that is not bound, but this is a question for another paper.

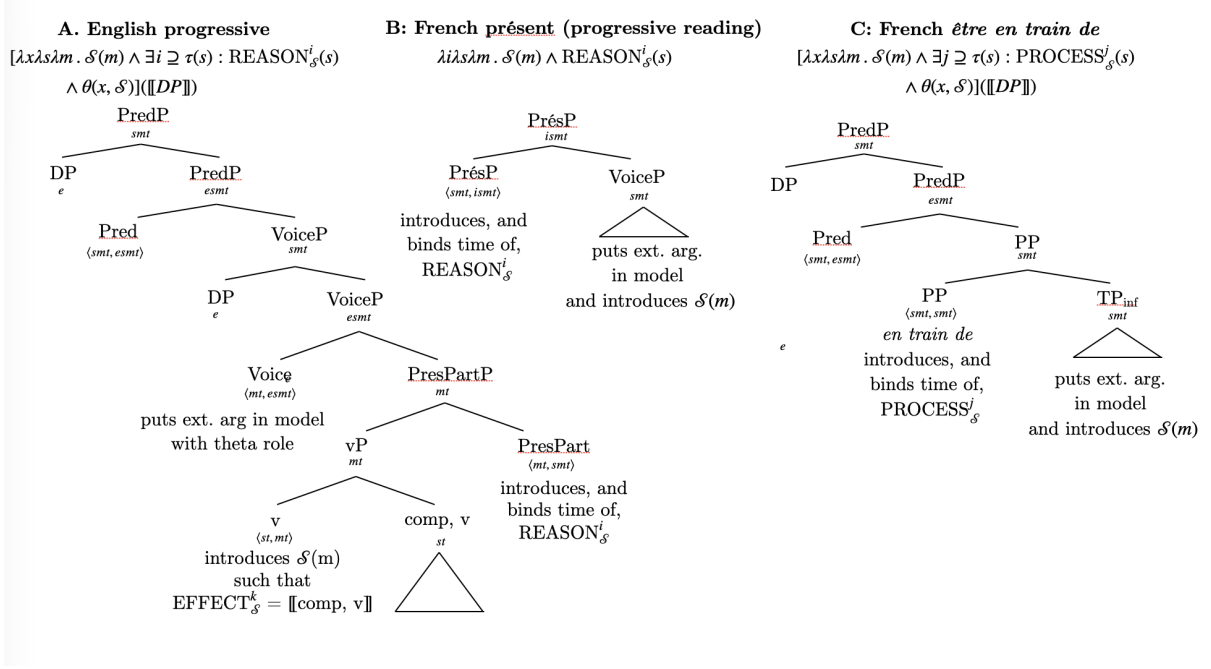


Figure 1: Compositionality

speaker selects the intention as the exhaustive cause, attributing to the holder of the intention the ability to have the effect come about. This is what provides the speaker certainty, as well as the ultimate defeasibility, of futurate utterances.

The speaker is committed to a causal model under discussion, and in uttering a sentence referring to a causal scenario, they predicate the causal scenario of that model. They are committed to the causal model because they believe it is a good “map” for reality (Definition 2). And since good maps contain exactly what is relevant, the speaker believes that the causal model in question exhaustively represents everything causally relevant to the occurrence of causal scenario’s effect. Any necessary lexically-provided background conditions (e.g. in order to play baseball, a baseball is necessary) are presupposed to be already satisfied in the model, along with normal conditions (e.g., there will be no pandemic-style lockdowns that prevent the game from happening). With these conditions satisfied, $\text{REASON}_{\mathcal{S}}$ is singled out as being the only thing that matters.

Time is also important to how futurates work in this framework. The causal model under discussion is built on what the speaker believes up to the reference time R , and predicts what happens after R , as formalized by Schulz’s (2011) *causal entailment*. That is, treating the model as a map of s , the speaker uses the variable values in the model for times after R to determine the truth values in s for times after R . Note that the speaker *is* thereby making a claim about the situation s , but *uses* the causal model to do so.

Definition 2 is thus used in two different ways. For timed propositions about s that are anchored to times before or at R , the real truth value of the proposition P_X in s determines X ’s value in the model. But for timed propositions about s anchored to times that are after R , it’s the other way around: The variable X ’s value in the model determines the truth value for the corresponding proposition P_X in s .

Hence, a “true” truth value for a future affirmative sentence is conditioned on the speaker’s belief that reality will ultimately vindicate their commitment to the model. E.g., I say the Red Sox are playing the Yankees tomorrow because I currently believe the plan is the only relevant reason (given background and normal conditions) determining whether they will, due to my

beliefs about the plan-holder’s ability to overcome any other factors in my current understanding of the world. Definition 2 and its use thus account for Kaufmann’s (2005) Certainty Condition and Copley’s (2008) conditional presupposition for futurates.

But a negative sentence does not presuppose exhaustivity. For suppose we have a context where my daughter plays in Little League, and her team is convinced they are playing the Yankees tomorrow. They are not; and what’s more, their intention is not actually the only thing that matters as to whether they do. I can say (4) truthfully, showing that the presupposition of the exhaustivity of the reason is not necessarily present for the negated sentence.

- (4) a. We’re playing the Yankees tomorrow!
- b. No, you’re not playing the Yankees tomorrow.

This fact is reminiscent of presuppositional exhaustivity (c.f. Bassi, Del Pinal, and Sauerland 2021). Recall that causal exhaustivity in futurates shows up as ability: the ability of whoever holds the intention to get what they intend. So (4) makes it look like the presupposition of ability only occurs with the affirmative, which would mean causal exhaustivity was presuppositional. However, in other cases the presupposition seems to hang around. If the speaker is someone who generally teaches, (5) seems to presuppose that whatever reason they teach (their own intention, an authority’s intention, their contract...), the speaker is not saying that that reason no longer has the ability to get what it “wants”, but rather, that what it “wants” is just that they don’t teach tomorrow. So in this context, the ability presupposition which is the tell-tale sign of causal exhaustivity seems to be present for the negative sentence.

- (5) I’m not teaching tomorrow.

We can account for this split behavior of negative futurates in a simple way. If v introduces the scenario predication $\mathcal{S}(m)$, and the English progressive introduces $\text{REASON}_{\mathcal{S}}(s)$, these meanings are both conjoined. If these are the only introductions of scenario material into the at-issue meaning, then a negation above Voice (but under Pred, in English) will return true if at least one of $\mathcal{S}(m)$ and $\text{REASON}_{\mathcal{S}}(s)$ is false: so, either $\mathcal{S}(m)$ is false, as in (4), or $\mathcal{S}(m)$ is true and $\text{REASON}_{\mathcal{S}}(s)$ is false, as in (5). They could also both be false, but effectively, if $\mathcal{S}(m)$ is false it doesn’t matter whether $\text{REASON}_{\mathcal{S}}(s)$ is true or false, since the scenario is not predicated of the model, so knowing whether $\text{REASON}_{\mathcal{S}}(s) = 1$ or 0 tells us nothing about what will happen.²

5 Alignment with Nadathur and E. Bar-Asher Siegal (2026)

While quite a few details of this proposal are different from Nadathur and E. Bar-Asher Siegal (2026), there is also considerable alignment with their truth conditions, described in (3c) above and repeated here as (6).

- (6) Nadathur and E. Bar-Asher Siegal (2026) truth conditions for Prog(P):
 - a. The reference situation can be partially matched to a culmination procedure associated with P.
 - b. Some fact in this partially-realized culmination procedure has changed in value compared to the situation immediately prior to reference time.
 - c. The facts in s do not already make the culmination false.

²The success of this argument constitutes evidence that the effect and the predication of a theta role to the external argument are only in the model and not introduced into phrase structure; and perhaps when the speaker wants to introduce them into the at-issue meaning, they use focus marking on them. So in a sense, aspectual focusing turns out to use something of the same mechanism as focus marking, and v also always focuses the scenario predication in this sense.

This is what we want, because while they are not focused on futurate readings of progressives, in the proposed framework, the only difference between futurate and non-futurate progressives is the temporal double access of the holding time of the reason, so the current proposal needs to explain everything that Nadathur and E. Bar-Asher Siegal (2026) does.

And it does. For (6a), the causal scenario provides the analogue of their culmination procedure: the process along a causal pathway that goes from the scenario’s reason node to the scenario’s effect node, as in Def 3.2. The speaker commitment to the model, along with the scenario predication $\mathcal{S}(m)$, together ensure that the culmination procedure maps to the situation. Second, as discussed above, (6b) is not relevant to progressive futurates, but we can understand the notion of being *in progress* analogously to how they understand it, that is, $\text{PROCESS}_{\mathcal{S}}$ being true of s , and this is key for the meaning of *être en train de*, or for that matter, *in the process of*. And third, the combination of speaker commitment to the model and the scenario predication give us (6c) with an affirmative sentence. The speaker affirms that the scenario holds of the model under discussion, and that the scenario’s reason holds at the reference time, so it follows that, given speaker commitment to the model, they will take the variable value of the effect node to be the truth value of the effect proposition in s . Since this is the case, it cannot be that the speaker thinks the model makes the effect node have a value of 0 and the effect proposition have a value of 0 in s .

We can note as well that the global necessity of the intention for the culmination (for us, the effect) follows from the fact that intentions are reasons, and causal scenarios select their reason as exhaustive causes. So, since the culmination procedure is in fact the process on the pathway between the reason to the effect (which in turn is the set of nodes causally reachable from the reason, and which the effect is causally reachable from), the intention is in fact necessary for everything on that path, and also for the effect. It is not necessary for the background and normal conditions, but in this framework, these are not on the pathway anyway.

6 Simple futurates

Simple futurates (*The Red Sox play the Yankees tomorrow*) are proposed to bind a timeless REASONS to the present situation; a temporal adverbial obligatorily binds the time k in $\text{EFFECT}_{\mathcal{S}}^k$. This account works for simple futurates, including for natural futurates (*The sun rises/?is rising tomorrow *(at 6:14)*), where the simple futurate version feels more natural than the progressive futurate version. Why? It’s because it’s more natural for the reason to be a timeless proposition, instead of a timed proposition. Whatever the reason is that the sun rises at that time tomorrow, it is best understood as individual-level, and, following Kratzer (1995), individual-level predications are timeless.

References

- Baglini, Rebekah and Elitzur A. Bar-Asher Siegal (2019). *Direct causation: A new approach to an old question*.
- Baglini, Rebekah and Itamar Francez (2015). “The implications of managing”. In: *Journal of Semantics* 33.3, pp. 541–560.
- Bassi, Itai, Guillermo Del Pinal, and Uli Sauerland (Aug. 2021). “Presuppositional exhaustification”. In: *Semantics and Pragmatics* 14.11, pp. 1–48. DOI: 10.3765/sp.14.11.
- Copley, Bridget (2008). “The Plan’s the Thing: Deconstructing Futurate Meaning”. In: *Linguistic Inquiry* 39.2, pp. 261–274.
- (2018). “Dispositional Causation”. In: *Glossa: A Journal of General Linguistics* 3.1. DOI: 10.5334/gjgl.507.

- Copley, Bridget and Alda Mari (2022). “*Forbid is not order not*”. In: *Proceedings of NELS 52*. UMass Amherst.
- Halpern, Joseph Y (2000). “Axiomatizing causal reasoning”. In: *Journal of Artificial Intelligence Research* 12, pp. 317–337.
- Harley, Heidi (2005). “How do verbs get their names? Denominal verbs, manner incorporation, and the ontology of verb roots in English”. In: *The syntax of aspect: Deriving thematic and aspectual interpretation*. Ed. by N. Erteschik-Shir and T. Rapoport. Oxford University Press, pp. 42–64.
- Karawani, Hadil and Hedde Zeijlstra (2026). “Past and Present Futurates: The Role of Tense and Modality”. Manuscript submitted for publication.
- Kaufmann, Stefan (2005a). “Conditional truth and future reference”. In: *Journal of Semantics* 22.3, pp. 231–280.
- (2005b). “Conditional truth and future reference”. In: *Journal of Semantics* 22, pp. 231–280.
- Kratzer, Angelika (1995). “Stage-level and individual-level predicates”. In: *The generic book*, pp. 125–175.
- Nadathur, Prerna and Elitzur Bar-Asher Siegal (2026). *Modeling progress: causal models and the imperfective paradox*. The Ohio State University and Hebrew University of Jerusalem ms.
- Nadathur, Prerna and Sven Lauer (2020). “Causal necessity, causal sufficiency, and the implications of causative verbs”. In: *Glossa: a journal of general linguistics* 5.1.
- Pearl, Judea (2000). *Causality: Models, reasoning and inference*. Cambridge University Press.
- Ramchand, G. (2008). *Verb meaning and the lexicon: A first-phase syntax*. Cambridge Univ Pr. ISBN: 0521842409.
- Schulz, Katrin (2011). “If you’d wiggled A, then B would’ve changed”. In: *Synthese* 179.2, pp. 239–251.