

## Propositional *how* and Implicit Modality

Starr Sandoval and Marcin Morzycki | UBC

The semantics of manner and reason questions—that is to say, of *how* and *why*—is, as is occasionally noted (Sæbø 2016, Schwarz & Simonenko 2018), not well-understood. We examine one puzzling species of *how* question, apparently first examined in Jaworski (2009), that is distinguished by a signature syntax and an interpretation somewhat like a *why* question. Pak (2017) and Jarvis (2022) call it PROPOSITIONAL *how*. Our contribution will be to explicitly articulate the semantic differences between propositional *how* and *why*, as well as the shape of the answers it invites. We assign propositional *how* a semantics on which it resembles *why* in its type and in its overall semantic contribution, but crucially asks not for reasons but for *justifications*, which we take to be a class of answers that can be defined using semantic tools normally associated with modals and propositional attitudes.

Propositional *how* is distinct from manner *how* in several respects. First, it occurs in a higher syntactic position, and it can be unambiguously expressed with *how is it the case that...*:

- (1) a. **propositional:** How is it the case that Howard came to the party? (Isn't he sick?!)  
b. **manner:** How did Howard come to the party? (Did he drive?)

This of course suggests that that this *how* asks about propositions, and not—as is typically assumed for manner *how*—properties of events (or else manners themselves, construed as a type; Szabolcsi & Zwarts 1993, Rett 2013 a.o.). The two *hows* also invite different answers:

- (2) a. {By train. / On foot.} (OK with manner *how*, incongruent with propositional)  
b. He recovered quickly. (incongruent with manner *how*, OK with propositional)

Manner *how* is not normally possible with negated predicates, because it occupies an event-modifying position below negation from which it can't extract without violating a negative island (Szabolcsi & Zwarts 1993). Because propositional *how* targets propositions, it normally occurs above negation and so sidesteps such islands. That often makes this reading the only option in the presence of negation:

- (3) A: How did Howard not come to the party?  
B: He got busy at the last minute. (propositional answer, so OK)  
B': {#By train. / #On foot.} (manner answer, so incongruent)

As observed by Pak (2017), it also robustly occurs with stative predicates, which generally resist manner modifiers (Katz 2003, Ernst 2016). On opening an Amazon package, one might skeptically utter (4a) to express incredulity at the very suggestion that something is wood:

- (4) a. How is this wood? (propositional *how* question; answering #obviously is incongruent)  
b. ?Why is this wood?

The note of incredulity, skepticism, or surprise in (4a) is common with propositional *how*. As (4b) reflects, this context also distinguishes it from *why*, which is baffling here. This is also revealing about possible answers. For (4a), one might reply by providing an explanation of why something might be regarded as wood, such as that it's a wood byproduct. That's not possible for (4b). Other stative predicates behave similarly, and yield similar *how/why* contrasts:

- (5) {How / why} is Howard tall?

Again, *how* invites an explanation of Howard's height, and again carries a note of incredulity. And again, *why* asks a different question, about what caused Howard's tallness. In both (4) and (5), propositional *how* introduces a certain equivocation: they can be construed to invite an explanation of a proposition or merely of *asserting* that proposition.

Philosophical discussion of propositional *how* (Cross 1991, Jaworski 2009) articulates the empirical picture, but the most sustained linguistic analysis is Pak (2017). She treats propositional *how* as an instance of ordinary *how* occurring in a high position, where it modifies a Romero & Han (2004)-style verum operator and yields readings like “how do I reconcile *p* with the rest of my beliefs?”. Her focus is on interface considerations, so no explicit semantics is provided. A standard event-modifying

semantics for *how* would not deliver this effect without further introducing a speech-act ‘reconciling’ event high in the clause. We’re inclined in a similar direction, but our first aim is to articulate the truth-conditional and discourse contribution of propositional *how* explicitly. We build on the ‘reconciling’ intuition with our ‘justifying’ semantics—but either way, the crucial task for us will be to define these notions in an explicit and falsifiable way.

Our strategy will be to focus on this *justification* component and the incredulity or skepticism inferences that typically accompany propositional *how*. We take these to be related. Whenever one asks for a justification for something, it’s natural to take it as an expression of skepticism. This inference could, of course, be straightforwardly represented as a distinct presupposition hard-wired into the denotation of  $how_{\text{PROPOSITIONAL}}$ , but that seems less explanatory. The crucial issue, then, is what constitutes a justification. We don’t intend this in the sense familiar from epistemology, where one considers whether a believer is justified in their beliefs, though these notions may be connected. We will take justification to be a relation between propositions:

$$(6) \quad \text{justifies}_{w,f,g}(q,p) \stackrel{\text{def}}{=} 1 \text{ iff } \forall w' : w' \in \mathbf{Best}(f(w), g(w)) \wedge w' \in q [w' \in p]$$

**Best** yields worlds via the modal base  $f$  and ordering source  $g$  (Kratzer 1977, 1981)

The reading at issue seems to require an epistemic modal base (suppressing some interesting complications), so  $q$  is a justification of  $p$  iff, given what is known, if  $q$  is true,  $p$  would normally also be (with a stereotypical ordering source) or  $p$  must also be (with an empty one). Propositional *how* can now apply to a proposition and yield a question denotation that consists of the set of alternative true propositions that justify its prejacent:

$$(7) \quad \llbracket how_{\text{PROPOSITIONAL}} \rrbracket^{f,g} = \lambda p_{\langle s,t \rangle} \lambda w . \{q_{\langle s,t \rangle} \mid w \in q \wedge \text{justifies}_{w,f,g}(q,p)\}$$

Again, the proposition-modifying denotation will ensure that propositional *how* can occur above negation and thereby escape islands. That also ensures that it is naturally compatible with stative predicates. Thus the party example, (1), asks for a fact from which, given what is known and how things normally go (stereotypical ordering source), one could conclude that Howard came to the party:

$$(8) \quad \llbracket How \text{ is it the case that Howard came to the party} \rrbracket^{f,g} \\ = \lambda w . \{q_{\langle s,t \rangle} \mid w \in q \wedge \text{justifies}_{w,f,g}(q, \llbracket Howard \text{ came to the party} \rrbracket^{f,g})\}$$

The justification strategy correctly gives rise to some indeterminacy around whether an answer should explain how the prejacent is true or how one might come to assert it. It’s most natural to ask that a proposition be justified if it has been asserted. For comparison, we take *why* to ask more straightforwardly for reasons (sidestepping here the thorny question of what constitutes a reason):

$$(9) \quad \llbracket why \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w . \{q_{\langle s,t \rangle} \mid q \text{ is a reason for } p \text{ in } w\}$$

As for manner *how*, it is interpreted lower, at the properties-of-event level, and can be taken to yield a question that involves alternative properties that hold of the modified event:

$$(10) \quad \llbracket how_{\text{MANNER}} \rrbracket = \lambda P_{\langle v,t \rangle} \lambda e \lambda w . \{Q_{\langle v,t \rangle} \mid P(e)(w) \wedge Q(e)(w)\}$$

We suppress compositional details, and, as is typical, the requirement that a manner answer actually involve a manner rather than e.g. a temporal property.

To summarize, we characterize a particular use of *how* that differs from its more familiar manner cousin in that it targets propositions rather than event descriptions, and is answerable not with manners but with justifications. This often gives rise to a skepticism inference, and it often suggests that the proposition to be justified has been asserted. This use of *how* is not universal across languages, naturally, but it appears to be widespread, suggesting that it may be a short step from manner or method to justification. *How* often asks specifically for a method by which something is accomplished (*how did it come to be that...*), which parallels the method by which something can be justified. The conception we advance may also help make it a linguistic question where the boundaries between reasons and justifications lie.

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