Wondering hopefully/fearfully: How do desires and inquisitive attitudes interact?*

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Abstract We describe a novel interpretive difference between *x wonders hopefully ?p* and *x wonders fearfully ?p*, where the former is only compatible with *x* hoping *p*, but the latter, with *x* either fearing *p* or *not p*. Extending a goal-based analysis of root polar questions by Tabatowski (2022) to embedding under inquisitive predicates, we argue that this difference arises due to *hopefully* imposing general constraints on an agent's goals, in particular on their attitudes in entertaining questions, that *fearfully* does not.

Keywords: polar questions, clause embedding, inquisitive attitudes, preferential attitudes

1 Introduction

Polar questions typically have symmetric resolution conditions: In most contexts, both ?p and ?$\overline{p}$ are resolved by the propositions in $\{p, \overline{p}\}$.[1] For instance, (1a) and (1b) are resolved by the same set of answers {**left-handed**(**b**), **right-handed**(**b**)}.

(1)   a. Is Billy left-handed?   ($p =$ **left-handed**(**b**))

   b. Is Billy right-handed?   ($\overline{p} =$ **right-handed**(**b**))

Some treatments of polar questions directly encode such symmetric resolution conditions in the denotation of polar questions (e.g., Hamblin 1976). However,

1 The overbar symbol ($\overline{p}$) indicates that a question prejacent may but need not feature overt negation.

this view faces a problem in light of phenomena where polar questions give rise to asymmetric interpretations, where $?p$ and $?\overline{p}$ are not interchangeable. This can be illustrated by the so-called extended Bolinger paradigm, exemplified below:

(2) a. Do you like beer?   *Offer*

     b. # Do you not like beer?

(3) a. Do you have sparkling water?   *Request*

     b. # Do you not have sparkling water?

(4) a. Will you (please) not bother me while I'm working?   *Request*

     b. # Will you (please) bother me while I'm working?

These examples demonstrate that $?p$ and $?\overline{p}$ are not interchangeable when they are taken to have the discourse functions of offers or requests, posing a challenge for the view that assigns symmetric resolution conditions to polar questions.

The literature on the extended Bolinger paradigm focuses on root polar questions (e.g., van Rooij & Šafářová 2003; AnderBois 2011; Biezma & Rawlins 2012; Tabatowski 2022; see Romero 2024 for a recent review). In this paper, we shift our attention to polar questions embedded under inquisitive predicates, as shown in (5):

(5)   World knowledge: Prosecutors typically want their witnesses alive.

     a. The prosecutor wonders hopefully: "Is the witness {alive, #dead}?".

     b. The prosecutor wonders fearfully: "Is the witness {alive, dead}?".

As we will detail in §2, *wonder* embedding a polar question exhibits an interpretive asymmetry when it is modified by *hopefully*, in the sense that, roughly, the attitude holder's hope has to correspond to the question radical, resulting in an infelicity for (5a) with *dead* in a context that aligns with the world knowledge. Interestingly, the same asymmetry is not observed for (5b), where the relevant modifier is *fearfully*.

Examining the (a)symmetric interpretation of polar questions under inquisitive predicates, as exemplified in (5), will lead to two substantial consequences about our understanding of the semantics/pragmatics of polar questions and attitudinal predicates. First, the discourse functions of polar questions, as displayed by their interpretive asymmetry, also manifest themselves in the interpretation of sentences with *embedded* questions, not just in *matrix* questions. Secondly, our analysis of such discourse functions in embedded cases, if correct, will provide further evidence that the notion of *goals* is represented in the grammar (in line with e.g., Tabatowski 2022), in a way that enables it to interact with the interpretations of modifiers.

Besides these main contributions, our observation and analysis has further implications for the semantics and pragmatics of attitude predicates. In particular, our observations, to be detailed in §2, suggest that *hoping $\overline{p}$* and *fearing p* are not

equivalent (cf. Palmqvist 2023). In addition, our analysis suggests that the modal properties of an attitudinal event, such as *wonder ?p*, can be constrained by those of its modifiers, such as *hopefully/fearfully* (cf. Alonso-Ovalle & Menéndez-Benito 2018; Alonso-Ovalle, Menéndez-Benito & Rubinstein 2024).

The rest of the paper is structured as follows. In §2, we present a novel puzzle involving the constructions ⌜*wonder hopefully/fearfully* ?p⌝. We provide a solution using two ingredients. One, in §3, is Tabatowski's (2022) goal-based analysis of matrix polar questions. The other, in §4, is the differences between *hope(fully)* and *fear(fully)* in terms of their relations to goals. §5 is dedicated to further discussion.

2 *Wonder hopefully (fearfully) ?p*: Interpretive Asymmetry (or the lack thereof)

Consider the following context (6), which attributes to Des a desire for Whit to be dead and to Ali, a desire for Whit to be alive.

(6)   **Context**: Des, a hitman, severely injures Whit, the star witness of a criminal case. He flees the scene before confirming Whit's death, as he sees Ali, the prosecutor, arrive with a rescue team. While it's clear that Whit is seriously injured, Des isn't sure whether he's dead. If Whit survives, Des knows he will face severe consequences for failing the assassination attempt.

When *wonder ?p* is modified by *fearfully*, the attitude holder's fear may be towards *p*: both (7b) and (8a) are compatible with the context.[2] The attitude holder's fear can also be towards $\overline{p}$: (7a) and (8b) are also compatible with the context.[3]

(7)   a. Ali wonders fearfully: "Is Whit (still) alive?"   TRUE

b. Ali wonders fearfully: "Is Whit dead?"   TRUE

c. Ali wonders hopefully: "Is Whit (still) alive?"   TRUE

d. Ali wonders hopefully: "Is Whit dead?"   FALSE

(8)   a. Des wonders fearfully: "Is Whit (still) alive?"   TRUE

b. Des wonders fearfully: "Is Whit dead?"   TRUE

c. Des wonders hopefully: "Is Whit (still) alive?"   FALSE

d. Des wonders hopefully: "Is Whit dead?"   TRUE

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2 We checked the pattern reported in (7) and (8) with 5 native speakers of English and an audience in Edinburgh. We use quotes to make a direct connection with root polar questions but note that different speakers have different reactions here to quotation vs. the choice of *whether* or *if* (§5.2).

3 Some speakers may have a preference for (7b) and (8a) to (7a) and (8b), but they still agree that these sentences are all compatible with the context. This is crucially different from the judgment pattern for *hopefully* discussed below. We will return to the preference later in §4.2

In contrast, when *wonder ?p* is modified by *hopefully*, the attitude holder's hope can only be towards the radical *p*. In the case of *Ali*, since her hope is that the witness is alive, only (7c), but not (7d), is compatible with the context. Likewise, in the case of *Des*, since his hope is that the witness is dead, only (8d), but not (8c), is compatible with the context.

Therefore, when a polar question is embedded under *wonder* and then modified by a preferential adverb, whether or not the resulting interpretation is symmetric, in the sense defined as follows (9), interacts with the modifying adverb (10).

(9)   The interpretation of *x wonders ADV ?p* is *symmetric* iff it is compatible with situations where *x* holds the attitude *A* corresponding to *ADV* towards *p* and is also compatible with those where *x* holds *A* towards $\overline{p}$. The interpretation of *x wonders ADV ?p* is *asymmetric* iff it is compatible with situations where *x* holds *A* towards *p* but incompatible with situations where *x* holds *A* towards *p*, or vice versa.

(10)   **Puzzle:** Interpretive (A-)symmetry interacts with the modifying adverb:

   a. Symmetric interpretation for *wonder fearfully ?p*: compatible with the attitude holder fearing that *p* as well as fearing that $\overline{p}$.

   b. Asymmetric interpretation for *wonder hopefully ?p*: compatible with the attitude holder hoping that *p* and incompatible with them hoping that $\overline{p}$.

Why should the evaluative valence of a modifying adverb affect the (a-)symmetry of an inquisitive attitude? Before introducing the necessary ingredients for our proposal in the next sections, we briefly discuss why it would be challenging to apply two types of the existing analyses of asymmetry in polar questions (proposed to account for other phenomena) to solve our puzzle.

First, some have proposed that the denotation of a polar question is asymmetric. For instance, Biezma & Rawlins (2012) propose that *?p* has a *monopolar* denotation $\{p\}$, instead of the symmetric Hamblin-style *bipolar* denotation $\{p, \overline{p}\}$ (Hamblin 1976). But our puzzle arises regardless of whether the denotation of *?p* is monopolar or bipolar. For the bipolar treatment, the puzzle would be why in the case of *wonder hopefully ?p* the attitude holder's hope can only target the radical *p*. In contrast, the interpretive asymmetry in the case of *wonder hopefully ?p* may seem easy to account for by the monopolar analysis, but the challenge would then be to explain why the interpretation of *wonder fearfully ?p* is nevertheless symmetric.

Second, there is also a challenge for van Rooij & Šafářová's (2003) utility based analysis of polar questions. According to them, *?p* is used when the expected utility of *p* (based on either a goal, in which case *p* is preferred, or informativity, in which case *p* is unlikely) is better than that of $\overline{p}$. However, *x wonders fearfully ?p* can be true when *x* fears *p*, but in this case *p* is not preferred and may well be very likely.

3 Tabatowski's (2022) analysis of root polar questions

We make use of Tabatowski's (2022) attitudinal and goal-based analysis of root polar questions, where $?p$ expresses a *preference to learn p if p is true*. We present the original account for root polar questions first, before adapting it to embedded ones.

Root polar questions Tabatowski argues that root polar questions $?p$ have the expressive content informally stated as *if p, then I want to know that p*: a conditional statement with the polar question prejacent in the antecedent, and the preference to learn that prejacent in the consequent.[4] Questions like (11), then, receive the paraphrases below them.

(11) a. Do you like beer?
          ≈ If you like beer, I want to know that you like beer.

      b. # Do you not like beer?
          ≈ If you don't like beer, I want to know that you don't like beer.

The '#', in (11b), indicates that this question is not a good way of offering beer. It is otherwise acceptable as a request for information. Tabatowski writes: "what is relevant to judgements of polar question felicity is **goal construal**: given a polar question and a context, can we assign a reasonable goal to the speaker that is furthered by the question? Polar questions are infelicitous when we cannot imagine a reason that the speaker would ask the question, and not because of properties of the context per se" (p. 81).

Formally, the content *if p, then I want to know p* is as in (12). The predicate $ctb^v(p)(x)$ is true iff x comes to believe p in v, which we later shorten to $B_x p$.

$$(12) \quad \forall w' \in \text{Dox}_x^w : p(w') \rightarrow \begin{bmatrix} \text{Sim}^{w'}(\lambda v.ctb^v(p)(x)) \\ <_{\text{Goals}^w(x)} \\ \text{Sim}^{w'}(\lambda v.\neg ctb^v(p)(x)) \end{bmatrix}$$

In words, when a speaker x asks $?p$, every p-world w' in their doxastic state must satisfy the following necessary condition on its felicity: The worlds minimally different from w' where x comes to believe p are better (with respect to x's goals at w) than minimally different worlds to w' where x does not come to believe p. The ordering $<_{\text{Goals}^w(x)}$ is derived based on which of x's goals are met in each w' in Dox.

Let us now see why (11a) but not (11b) is a good way of offering beer to someone. We make the following simplifying assumptions:

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4 Tabatowski himself does not commit to a particular proposal about the *denotation* of polar questions, i.e., whether they should denote $\{p\}$ or $\{p, \neg p\}$, and our proposal is independent of this choice as well. The relevant content in (10) is expressive, because root polar questions are not propositions.

- There are only two relevant drinks: Beer and sparkling water. The speaker x considers it possible that the addressee likes both, only one, or neither.

$$\text{Dox}_x^w = \{w_{beer \wedge sparkling},\ w_{beer \wedge \neg sparkling},\ w_{\neg beer \wedge sparkling},\ w_{\neg beer \wedge \neg sparkling}\}$$

- For the first three types of worlds, x also serves the addressee what they like.

- $\text{Goals}^w(x) = \{G_0 :\ x$ serves the addressee something they like,
  $G_1 :\ x$ knows something that the addressee likes$\}$

To derive the felicity of (11a) as an offer, we check that it satisfies (12).[5]

(13)   these worlds are better wrt $\text{Goals}^w(x)$
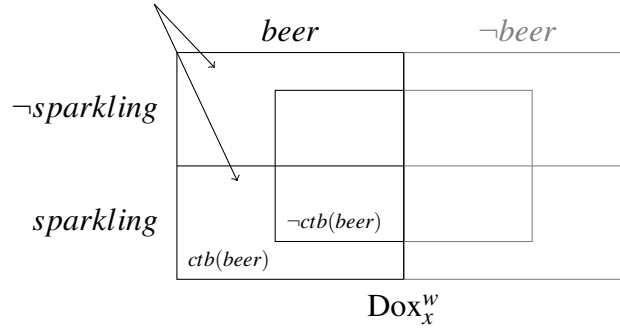
In (13), consider any w' in the speaker x's doxastic state where the radical p is true, i.e., the addressee likes beer. Now compare worlds minimally different to w' where x comes to believe p to one where she doesn't, with respect to G_0 and G_1. Goal G_0 (x serves the addressee something they like) does not distinguish between the two types of worlds, but goal G_1 (x knows something that the addressee likes) is met only in $ctb(beer)$ worlds. Then, requirement (12) is met and (11a) is felicitous.

To derive the infelicity of (11b) as an offer, we check that it does not satisfy (12).

(14)

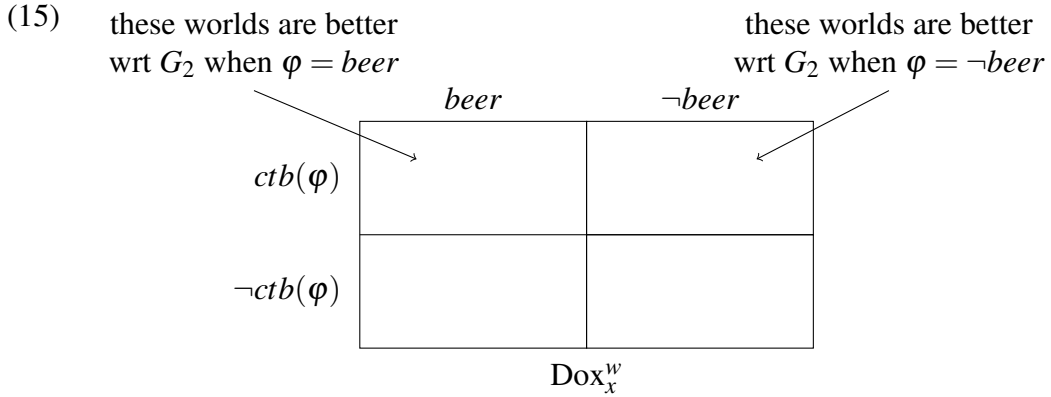these worlds are no better
wrt $\text{Goals}^w(x)$ than each other

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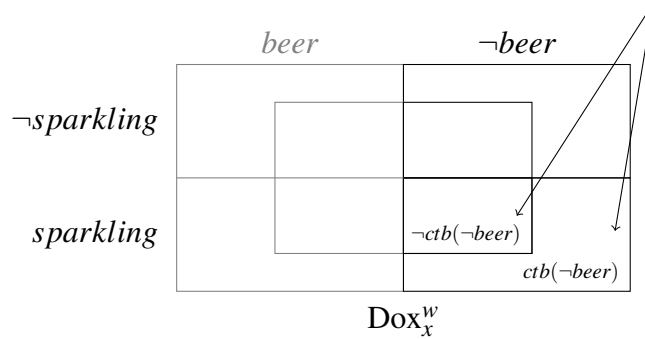
5 More accurately, what is derived is that these questions are not rendered infelicitous by (12).

In (14), consider a world w' in the speaker's doxastic state where the addressee likes sparkling water but not beer. Now compare worlds minimally different to w' where x comes to believe p to one where she doesn't, with respect to G_0 and G_1. Neither goal G_0 nor goal G_1 distinguishes between the two types of worlds: the former is true in both and the latter, in neither. Then, worlds where x learns that the adressee doesn't like beer are no better with respect to x's goals than worlds where she doesn't learn this. Therefore, (11b) is infelicitous as an offer (i.e., with the goals assumed).

For completeness, we turn to a case where the speaker's goal in uttering a polar question is not to make an offer, but to know which of the polar question prejacent or its negation is true, i.e., a purely epistemic goal. In this case, both questions of the form $?p$ and $?\overline{p}$ satisfy the requirement in (12) and are expected to be felicitous.

To see this, take the questions $?p =$"Do you like beer?" and $\overline{p} =$"Do you not like beer?" Consider the new set of Goals$^w(x) = \{G_2 : (p \wedge B_x p) \vee (\neg p \wedge B_x \neg p)\}$, where x's goal is to know whether p ($K?p$ for short), and the four types of worlds in (15).[6]

(15)

these worlds are better
wrt G_2 when $\varphi = beer$

these worlds are better
wrt G_2 when $\varphi = \neg beer$

	beer	*¬beer*
$ctb(\varphi)$		
$\neg ctb(\varphi)$		

Dox_x^w

For the question, "Do you like beer?", we take $ctb(\varphi) = ctb(beer)$ and look at the left two quadrants. For "Do you not like beer?", we take $ctb(\varphi) = ctb(\neg beer)$ and look at the right two quadrants. In both cases, the upper (left or right) quadrant corresponds to a better set of worlds with respect to G_2 than the lower one. Thus, given an epistemic goal of knowing $?p$, asking $?p$ or asking $?\overline{p}$ both symmetrically satisfy the condition in (12) and are expected to be felicitous.

Embedded polar questions   With this in mind, what is required to derive the Interpretive Asymmetry between *wonder hopefully ?p* and *wonder fearfully ?p*, are assumptions about the semantics of such sentences and about how the inference in (12) is incorporated into these embedded cases.

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6 We set aside issues having to do with question bias arising in particular because of the position of syntactic negation. See, a.o., Ladd (1981), Büring & Gunlogson (2000), Romero & Han (2004).

We assume, first, that *x wonders ?p* is translated as (16a), and that the contribution of *hopefully/fearfully* is added in as a conjoined predicate, as in (16b).

(16) a. $\exists e \, [\, Ag(e) = x \wedge wonder(e) \wedge content(e) = ?p \,]$

   b. $\exists e \, [\, Ag(e) = x \wedge wonder(e) \wedge content(e) = ?p \wedge hopeful/fearful(e) \,]$

We assume, further, that for any *x* and *p*, *x wonders ?p* (and any restriction of it by, e.g., *hopefully* or *fearfully*) gives rise to the requirement in (17).

(17) $\exists e \, [\, Ag(e) = x \wedge wonder(e) \wedge content(e) = ?p]$
   $\Rightarrow$

$$\forall w' \in \mathrm{Dox}_x^w : p(w') \rightarrow \begin{bmatrix} \mathrm{Sim}^{w'}(\lambda v.ctb^v(p)(x)) \\ <_{\mathrm{Goals}^w(x)} \\ \mathrm{Sim}^{w'}(\lambda v.\neg ctb^v(p)(x)) \end{bmatrix}$$

When *x wonders (hopefully/fearfully) ?p* is uttered against a context in which one can identify Goals for the attitude holder that help meet this requirement, the result is felicitous. Else, we assume that the result is semantic/pragmatic deviance. We now move on to address the following questions: What differences exist between hoping/hopeful and fearing/fearful events, and how do they factor into identifying the goals relevant to whether the requirement in (17) holds?

4 *Hopefully/fearfully* and the goals of the modified events

The second ingredient of our analysis is a crucial difference between *hopefully* and *fearfully* in terms of whether they generally identify the goal of the event that they modify (which is not limited to a wondering event). In a nutshell, by comparing the interpretations of (18a) and (18b), we will observe that only *hopefully*, but not *fearfully*, in general identifies the goal(s) of the event it modifies. We will then provide formal analyses of these empirical observations and use them, together with Tabatowski's analysis of polar questions (applied to cases of embedded inquisitive attitudes), to derive the interpretive asymmetry for *hopefully* when it modifies a wondering event and the interpretive symmetry for *fearfully*.

(18) a. Mary knocked hopefully on the door.
   $\approx$ She knocked in order to obtain what she hoped for.

   b. Mary knocked fearfully on the door.
   Need not mean: She knocked on the door in order to avoid what she feared.
   Can mean: She knocked on the door (to achieve whatever goal she had), fearing an undesirable outcome.

4.1 Interpretive Asymmetry for *wonder hopefully ?p*

First, we consider cases where an event is modified by *hopefully*. We observe that *Mary knocked hopefully on the door* (18a) is most naturally interpreted to be expressing that the goal of Mary's knocking on the door is to obtain what she hoped for. Concretely, both contexts below are compatible with the sentence. In (19a), Mary's relevant hope φ is that Bob would let her in, which is precisely the goal of her knocking on the door. In (19b), Mary's relevant hope φ is that Bob was home (and therefore safe). The goal of her knocking on the door is not φ itself, but rather $B\varphi$. That is, Mary knocked on the door so that she could come to believe that Bob was home.

(19)   a. Goal= φ: Mary forgot to bring her key. She thought that her roommate Bob might be home. She knocked on the door, hoping that <u>Bob would let her in</u> (φ).

   b. Goal= $B\varphi$: Mary just learned that there was an explosion at the gas station where her roommate Bob works. She remembered that Bob told her that he would take a sick leave today and stay in bed. So she knocked on Bob's door, hoping that <u>he was home</u> (φ).

Therefore, a hopeful event with φ as its relevant hope most naturally has φ or $B\varphi$ as its goal. Formalizing this empirical observation, we propose (20) as a general interpretation principle (for now, at the descriptive level) that identifies the goal(s) of a hopeful event.

(20) $\forall e \forall \varphi \,[(hopeful(e) \wedge (\exists e'.(hope(e') \wedge e' \sim_R e \wedge Ag(e') = Ag(e) \wedge content(e') = \varphi))$
   $\rightsquigarrow (\varphi \in \text{Goals}(e) \vee B_{Ag(e)}(\varphi) \in \text{Goals}(e))]$
   (If e is a hopeful event and φ is the content of its agent's relevant hoping event e', it is highly plausible/natural to infer that e has φ or $B\varphi$ as a/the goal.[7])

Now we are ready to derive Interpretive Asymmetry for *wonder hopefully ?p*, repeated from (10b).

(21)   *Wonder hopefully ?p* is compatible with the attitude holder hoping that p and incompatible with the attitude holder hoping that $\overline{p}$.

We start with the first half of (21). In order to show that *wonder hopefully ?p* is compatible with contexts where the attitude holder hopes that p, we need to show

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7 For simplicity, in this paper we use agent in a broad sense (roughly corresponding to the notion used by philosophers and computer scientists), abstracting away from the agent/experiencer distinction. We will also often shorten $\text{Goals}^w(Ag(e))$ to $\text{Goals}(e)$ (and similarly $\text{Dox}^w_{Ag(e)}$ to $\text{Dox}(e)$, etc.).

that in such contexts one can reasonably identify a goal for the wondering event that satisfies Tabatowski's requirement (17). This is indeed possible. According to (20), in contexts where the attitude holder hopes that p and their wondering event is hopeful, one can plausibly infer that Bp is the/a goal of the wondering event. It is also straightforward to check that Bp indeed satisfies Tabatowski's requirement (17). Crucially, what we need to show is that (22) holds when $\mathrm{Goals}^w(x) = \{Bp\}$, which is clearly true because the worlds on the left-hand side of $<_{\mathrm{Goals}^w(x)}$ satisfy Bp while those on the right-hand side do not.

(22) $\forall w' \in \mathrm{Dox}_x^w\,[p(w') \to (\mathrm{Sim}^{w'}(\lambda v.\mathbf{ctb}^v(p)(x)) <_{\mathrm{Goals}^w(x)} \mathrm{Sim}^{w'}(\lambda v.\neg\mathbf{ctb}^v(p)(x)))]]$

Therefore, after hearing *x wonders hopefully ?p* in contexts where x hopes that p, listeners can readily identify a plausible goal, i.e., Bp, that satisfies Tabatowski's requirement. This accounts for why *x wonders hopefully ?p* is compatible with x hoping p.

Now we turn to the second half of (21). In contexts where the attitude holder hopes that $\overline{p}$, according to (20), the most plausible or natural goal one can infer for the wondering event is $\overline{p}$ or $B\overline{p}$. However, regardless of which goal(s) we choose, we can see that Tabatowski's requirement (17) is not met. Crucially, in (22), the worlds on both sides of $<_{\mathrm{Goals}(e)}$ are p-worlds, and therefore $\overline{p}$ is not satisfied on either side. Furthermore, the worlds on the left-hand side all satisfy Bp, and therefore $B\overline{p}$ will not prefer such worlds.[8] Therefore, no matter whether we use $\overline{p}$ or $B\overline{p}$ as the goal or use both, worlds on the left-hand side will never come out better than those on the right-hand side. This means that we cannot (easily) identify a plausible goal that satisfies Tabatowski's requirement.[9] This accounts for why *x wonder hopefully ?p* is incompatible with x hoping $\overline{p}$.

The discussion above shows how the Interpretive Asymmetry for *wonder hopefully ?p* can be derived from the general relation (20) between the goal(s) of a hopeful event and its relevant hope. It is natural to then ask why this relation (20) should hold in the first place. We suggest that (20) follows from the close conceptual connection between the bouletic ordering source of *hope(ful)* and the goals of the modified event. Concretely, we assume that every hopeful event e is associated with a relevant hoping event e' (23).

(23) $\forall e\,[hopeful(e) \Rightarrow \exists e'.(hope(e') \wedge e' \sim_R e \wedge Ag(e') = Ag(e))]$
       (For any hopeful event e there is a relevant hoping event e')

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8 In fact, given that *wonder* entails ignorance, assuming negative introspection, worlds on the right-hand side of $<_{\mathrm{Goals}(e)}$ do not satisfy $B\overline{p}$, either. That is, $B\overline{p}$ is not satisfied on either side.

9 In §5.1, we will discuss the less plausible but in principle possible reading of *ask/wonder hopefully ?p* based on the neutral epistemic goal of resolving the question *?p*.

According to the canonical analysis of *hope*, it is associated with a doxastic modal base Dox and a bouletic ordering source Bou, the latter of which represents things the attitude holder desires or prefers (regardless of whether they can act upon it or not). By extension, then, we can say that a hopeful event e is associated with these two parameters $\text{Dox}(e')$ and $\text{Bou}(e')$, where e' is the corresponding hoping event. Meanwhile, according to Tabatowski (2022), the goals of a wondering event e represent the agent's *effective preference* (in the sense of Condoravdi & Lauer 2011) that structures their choices of behavior. Crucially, from this perspective, goals are a particular kind of preferences. Consequently, when interpreting *hopefully*$_{[\text{Dox}(e'),\text{Bou}(e')]}$ $VP_{\text{Goals}(e)}$, it is possible and indeed most natural (given the relevance of e' to e) to assume that $\text{Goals}(e) \subseteq \text{Bou}(e')$. Finally, our hopes about what to believe/learn are typically in line with our hopes. Therefore, if e is a hopeful event and φ is the relevant hope (in the associated hoping event e'), it is natural to assume that φ or $B\varphi$ is a/the goal of e.

4.2 Interpretive Symmetry for *wonder fearfully ?p*

We now turn to cases where an event is modified by *fearfully*, e.g., (24), repeated from (18b).

(24)   Mary knocked fearfully on the door.

Given that *x fears* φ entails that *x hopes* $\overline{\varphi}$, one might expect that the goal of the event modified by *fearfully* would be similarly constrained by the attitude holder's fear. Specifically, the goal of the modified event in this case would be $\overline{\varphi}$ or $B\overline{\varphi}$. However, we observe that (24) is in fact compatible with a wider range of goals.

For instance, the context below (25) is compatible with (24). In this case, Mary's fear φ is that she would be scolded (and therefore she hoped that she would not be scolded). Crucially, however, it is not the case that the goal of Mary's knocking on the door is $\overline{\varphi}$ (i.e., to avoid being scolded) or $B\overline{\varphi}$. Rather, the goal is simply for her to be let in, which is a goal generally associated with an event of knocking on a door.

(25)   Mary forgot to bring her key. Her roommate Bob was home, but it was early in the morning, so he was still asleep. Mary knew that Bob could get very grumpy after waking up, but she was running late and really needed her key, so she had no choice. She knocked on the door, fearing that <u>Bob would scold her for waking him up so early</u> (φ).

Therefore, (24) can be roughly interpreted as follows: Mary knocked on the door to achieve whatever goal she had and she was in a fearful state while doing it. Crucially, as shown by the sentence's compatibility with (25), the goal of the event

modified by *fearful* can be one that is generally associated with this type of event and need not be to avoid the relevant fear.

Based on the empirical observation above, we can now account for the Interpretive Symmetry for *wonder fearfully ?p*, repeated below from (10a).

(26)   *Wonder fearfully ?p* is compatible with the attitude holder fearing that *p* as well as fearing that $\overline{p}$.

In both cases, given that a wondering event whose content is *?p* is generally associated with *K?p* (i.e., to know whether p is true) as a potential/candidate goal, and that this goal indeed satisfies Tabatowski's requirement, as we have seen before in §3, the listener can reasonably assign *K?p* as the goal of the wondering event. Crucially, this can be done regardless of whether the attitude holder fears *p* or $\overline{p}$. Therefore, *x wonders fearfully ?p* can be true regardless of whether *x* fears *p* or $\overline{p}$. This accounts for the Interpretive Symmetry for *wonder fearfully ?p*.

We now discuss a further empirical detail regarding small preferences some speakers have for using *x wonders fearfully ?p* in contexts where *x* fears *p*. For instance, (27a) can seem better than (27b).

(27)   a. Des wonders fearfully whether Whit is still alive.   (=8a)

          b. Des wonders fearfully whether Whit is dead.   (=8b)

The preference can be accounted as follows. In order for *x wonders fearfully ?p* to be true, it must also be the case that the wondering event is a fearful event. This means that there should be a relevant fearing event.

(28) $\forall e\,[fearful(e) \Rightarrow \exists e'.(fear(e') \wedge e' \sim_R e \wedge Ag(e') = Ag(e))]$
          (For any fearful event *e* there is a relevant fearing event *e'*)

Under the common assumption that the radical *p* of a polar question *?p* is the more salient, easily accessible alternative than $\overline{p}$ (e.g., Roelofsen & Farkas 2015; Theiler 2021), when the attitude holder *x* fears *p*, it would be easier to identify the relevant fearing event (than when *x* fears $\overline{p}$). This accounts for the preference for (27a) over (27b).

Above, we have derived Interpretive Symmetry for *wonder fearfully ?p* based on the empirical observation that when an event is modified by *fearfully*, its goal need not be constrained by the relevant fear. This is in contrast with the earlier cases where the goal of the event modified by *hopefully* is constrained by the content of the relevant hope. What accounts for this contrast?

We suggest that the contrast is due to *fear* having a different kind of ordering source. First, we note that even though *fear p* entails *hope ¬p*, the two are not equivalent to each other. For instance, the following context shows that *hope ¬p* does not entail *fear p* (See also Palmqvist 2023 for examples along similar lines).

(29)   Context: I spend a dollar to participate in a lottery. My goal is to win the prize, and I know that it is highly likely that I will lose and get nothing, but I am perfectly fine with losing just a dollar.

a. I hope that I will not get nothing.   (TRUE)

b. I fear that I will get nothing.   (FALSE[10])

Let p be the proposition that I will get nothing. The contrast above shows that when *hope* $\neg p$ is true, *fear* p can still be false. Intuitively, a desire/goal/preference for $\neg p$ need not count as a fear for p. Rather, *fear* p requires not only that $\neg p$ be preferable, but that p be a bad enough prospect so that it induces fear, which we may call *threats*.

We formalize this intuition by assuming that *fear* is associated with an *anti-bouletic* ordering source AntiBou, which represents threats, i.e., things the attitude holder considers bad enough and is averse to (regardless of whether they can act upon it or not). When interpreting *fearfully*$_{[\text{Dox}(e'),\text{AntiBou}(e')]}$ $VP_{\text{Goals}(e)}$ (where e' is the relevant fearing event to the fearful event e denoted by the VP), clearly $\text{Goals}(e)$ cannot be a subset of $\text{AntiBou}(e')$, since the former includes things the attitude holder prefers, which are opposite to what they consider threats. Therefore, the interpreter has to identify the goal(s) of the modified event elsewhere and they now have a wider range of possibilities to consider. One plausible goal is for the agent to avoid what they fear, but there can be other contextually plausible goals, especially when such goals are generally associated with the event, as we have seen in (25) and (27) above.

5   Discussion

5.1   *Hopefully* revisited: Cases where goals do not come from the relevant hope

There are exceptions to the principle (20) about the interpretation of *hopefully VP*.[11]

(30)   Context: After a job interview, Al was told that she left a good impression, although the final decision would not be made until a few weeks later.

a. Al sat hopefully on the bench outside the department (?%to rest her feet).

b. ??%Al hopefully took a taxi to the airport (to fly back home).

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10 There is a bleached understanding of "I fear p", possibly also with non-first person subjects and in other tense/aspect combinations, that roughly means "I suspect p (and don't necessarily like it)." We thank Chris Cummins (p.c.) for bringing up this point but we note that the sense of *fear* relevant to *fearful(ly)* is arguably the original, non-bleached one.

11 We thank Dan Lassiter for bringing such examples to our attention.

In the context above, 4 out of the 5 speakers we consulted found (30a) perfectly acceptable without the adjunct. In this case, the relevant hope is that Al would get the job, which is clearly not the goal of her sitting on the bench. Interestingly, some consultants found the sentence degraded with the goal of sitting explicitly stated. Also, the consultants all found (30b) worse (to varying extents) than (30a), intuitively because the event of taking a taxi feels less linked to the hope than the event of sitting outside. While we do not have a full account that measures the relevance of the modified event and predicts the extent to which it would affect the perceived felicity of the modification with *hopefully*, we take the above examples to suggest that the goal(s) of the modified event need not always be directly from the content of the relevant *hope*, as long as the two are sufficiently related to each other. This is why we take (20) to be merely a general principle, rather than an inviolable rule.

Besides the constraint that the modified event be sufficiently related to the hope, there are further constraints. For instance, in the example below, the goal of searching for the killer is to find the killer, but the attitude holder Johnny hoped that he would not find the killer. The infelicity of the critical sentence in this context shows that the goal of the modified event cannot directly contradict the hope.

(31)   **Context**: Johnny, a police detective, was supposed to search and arrest a psychopathic serial killer. The killer was likely hiding in an abandoned barn in the woods. So, Johnny went to the barn to search for him, a gun in his hand. That was his job, after all. But, secretly, he hoped that he wouldn't find the guy there, because the encounter would be extremely dangerous and might cost him his life.
       Critical sentence: #Johnny searched hopefully for the killer.

However, in the case of *wonder hopefully ?p*, neither constraint discussed above will (clearly) rule out the possibility of using the neutral, epistemic goal $K?p$ as the goal of the wondering event, even in cases where the attitude holder hopes for $\overline{p}$. This is because $K?p$ does not contradict a hope for $\overline{p}$, and the wondering event can be intuitively related to the hope.

In fact, in the related case of *x asks hopefully ?p*, we can indeed come up with such a context where *x* hopes for $\overline{p}$: (32a) can be felicitously used when Mary hopes that John does not have dietary restrictions (so that the restaurant she has in mind would be appropriate to recommend).[12] This suggests that the neutral goal $K?p$ can serve as the goal of a hopefully asking event even when the attitude holder

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12 Of course, (32a) can also be felicitously used when Mary hopes that John has dietary restrictions. For instance, it may be that Mary has in mind a vegan restaurant and she is not sure whether this would be what John is looking for. For our purposes, we can suppress this interpretation by assuming that restaurants in the place John is going to visit do not usually accommodate dietary restrictions and that Mary herself does not have any dietary restrictions.

hopes for $\overline{p}$. Given this, one might expect that such a context would similarly be compatible with a hopefully wondering event. However, this is not what we observe: our consultants find (32b) much worse than (32a).

(32)   John is going to visit a place for the first time next week. He knows that Mary (his new colleague) has been there recently. So he asks her for restaurant recommendations.

Mary says: "Sure! I know a great place there." But she pauses before telling him the name of the restaurant.

a.   "Do you have any dietary restrictions?" Mary asks hopefully.

b. ?? "Does he have any dietary restrictions?" Mary wonders hopefully.

We do not have a fully satisfactory account for the contrast between *ask* and *wonder*, but we tentatively provide the following speculation. As discussed before, when interpreting $\textit{hopefully}_{[\text{Dox}(e'),\text{Bou}(e')]}\ VP_{\text{Goals}(e)}$, the strong default is to assume that $\text{Goals}(e) \subseteq \text{Bou}(e')$. This means that, in the case of *x wonders/asks hopefully ?p*, the default inference is that *x* hopes for *p*. As a result, if *x* in fact hopes for $\overline{p}$, even though technically *K?p* can serve as the goal of the wondering/asking event, the interpreter of the question is likely to be misled by the default goal assignment and makes the opposite inference. Such a default can only be overridden with enough contextual support. Therefore, for such uses to be felicitous, there should be enough independent justification for the speaker to choose *p* as the radical (even when they hope for $\overline{p}$). In the case of *ask*, one common and plausible reason is that *?p* is the canonical way to (explicitly) ask the question. This is precisely the case for (32a): It is standard to ask *Do you have any dietary restrictions?* even when the questioner prefers the negative answer.[13] In contrast, since *wonder* is an internal, more spontaneous mental act, it is harder to come up with reasons to justify overriding the default goal assignment. Consequently, it is harder for interpreters to find *x wonders hopefully ?p* felicitous when *x* hopes for $\overline{p}$.

5.2   *Wondering hopefully whether/if*

The Interpretive Asymmetry reported for *x wonders hopefully ?p* in general also applies to *x wonders hopefully whether/if p*. That is, all our consultants agreed that *x wonders hopefully whether/if p* is incompatible with contexts where *x* hopes for $\overline{p}$, and that *x wonders hopefully if p* is (only) compatible with contexts where *x* hopes

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13 We leave as an open problem exactly how this can be derived. One possibility along the lines of van Rooij & Šafářová (2003) is that the questioner acts as if they believed that the radical, i.e., the addressee has dietary restrictions, is unlikely (regardless of whether they in fact believe so). Therefore, this way of asking the question can feel polite. But many other analyses are conceivable.

for *p*. However, judgments vary for *x wonders hopefully whether p* in contexts where *x* hopes for *p*. Some consultants found the sentence perfectly felicitous, while others found it less ideal (to various extents) and preferred the embedded *if*-interrogative.

In principle, our analysis of Interpretive Asymmetry for embedded quoted questions can also be applied to cases of embedded *whether/if*-interrogatives, under the auxiliary assumption that the radical of the latter matches that of the original question. However, we will leave for future research how to account for the variation in the acceptability of embedded *whether*-interrogatives and the potential preference for *if*-interrogatives in contexts where the attitude holder hopes that the radical of the embedded question is true.

5.3 Other loose ends

Our proposed analysis of the interpretive patterns of *x wonders hopefully/fearfully ?p* is based on two main ingredients: Tabatowski's goal-based analysis of root questions (extended to embedded interrogatives under inquisitive attitudes) and the difference between *hopefully* and *fearfully* in terms of whether they constrain the goals of the modified events. To highlight the main ideas behind our proposal, in the previous sections we only provided formal details that are most relevant to our proposal, without providing a fully compositional derivation of the critical sentences. For concreteness, we provide a possible implementation of such a full analysis in the Appendix, but we note that it makes a few analytical choices that are not crucial for our main purposes. For instance, in §3, we assume that the expressive content Tabatowski assumes for root polar questions must also hold when they are embedded under inquisitive attitudes (17). However, it is not entirely clear what the exact status of this inference is. In (39) and (40), we treat this as an entailment for simplicity.

In §4.1, we assume that every hopeful event *e* is associated with a relevant hoping event *e'* (23), without providing a concrete semantics for *hopeful*. A most minimal implementation would be to also assume the inverse of (23). That is, an event *e* is hopeful iff it is associated with a relevant hoping event *e'*, as in (37). However, this treatment of *hopeful* might be over-simplistic. Kwong (2020) argues that *hopeful*, unlike (the verb) *hope*, not only requires that the attitude holder have a preference towards the content (and believes that it is possible but not certain), but also that the attitude holder feel 'upbeat' about the chance of the desired outcome, which can explain the felicity of *I hope that p, but I am not hopeful that it will come about*.

A more sophisticated treatment of *hopeful(ly)* may help us analyze cases of *wonder hopefully* taking constituent questions such as (33). Intuitively, (33) not only requires that Coen have a preference regarding what tomorrow will bring, but also that he feel upbeat about the chance of something good happening tomorrow. But we will have to leave a detailed analysis of such cases for future research.

(33)   Gradually, Coen emerges from his bed – and his blue feelings – to wonder hopefully what tomorrow will bring.[14]

Finally, there are details of Tabatowski's original analysis that we do not necessarily need to commit to for our purposes. For instance, it is not crucial that the expressive content (12) is formulated in terms of a conditional, or that the relevant notion of goals in a wondering event is as strong as an effective preference (e.g., it could be a weaker one such as *appetitive desires* as argued by Deigan (2025)). What we minimally need is just that a wondering event involves a type of preference so that it can naturally come from the bouletic ordering source associated with *hopefully*.

6   Conclusion

In this paper, we have reported on a novel empirical puzzle concerning the interpretations of *wonder* reports, when this predicate is modified by the preferential adverbs *hopefully* and *fearfully*: *x wonders fearfully ?p* has symmetric interpretations, compatible with the attitude holder fearing that p as well as fearing that $\overline{p}$, whereas *x wonders hopefully ?p* has asymmetric interpretations, only compatible with the attitude holder hoping that p and incompatible with them hoping that $\overline{p}$.

We have derived these two different interpretive patterns, by extending Tabatowski's (2022) attitudinal and goal-oriented analysis of root polar questions to embedded cases, and by making use of differences between *hopefully* and *fearfully* in terms of whether they can directly contribute to the identification of the goals of the modified event. While the goals of the modified wondering event most naturally come from the bouletic ordering source associated with hopeful events, which lead to asymmetric interpretations, they are incompatible with the anti-bouletic ordering source associated with fearful events. The latter fact forces the addressee to consider a broader range of possible goals, including the symmetric, purely information seeking goal $K?p$, which allows for symmetric interpretations.

Appendix

Below we show that the truth conditions of (34a), with the structure in (34b), can be derived compositionally. Existential closure ($\exists$) closes off *wonder*'s event variable. Our lexical entries are given in (35–38). In (37) and (38), '$\sim_R$' relates a hoping/fearing event e' and the main predicate event (wondering) in an appropriate way, such as identity or mereological sum.

(34)   a. Ann wonders {hopefully / fearfully} whether q.

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14 https://www.washingtonfamily.com/books-to-deal-with-hard-feelings/

b. LF: [∃ hopefully/fearfully [Ann wonders [whether q]]]

(35)　$[\![wonders]\!]$ =
$\lambda Q_{\langle v,\langle w,\langle st,t\rangle\rangle\rangle}.\lambda x.\lambda e.\lambda w.\ wonder^w(e) \wedge Ag^w(e) = x \wedge content^w(e) = Q(e)(w)$

(36)　$[\![Q_{morpheme}/whether/if_{interr}]\!]$ =
a. Entailed content: $\lambda q_{\langle s,t\rangle}.\lambda e.\lambda w.\ \{q, \neg q\}$
b. Expressive content:

$$\lambda q.\lambda e.\lambda w.\ \forall w' \in \mathrm{Dox}^w_{Ag(e)} \left[q(w') \rightarrow \begin{array}{c} \mathrm{Sim}^{w'}(\lambda v.ctb^v(Ag(e),q)) \\ <_{\mathbf{Goals}^w_{Ag(e))}} \\ \mathrm{Sim}^{w'}(\lambda v.\neg ctb^v(Ag(e),q)) \end{array} \right]$$

(37)　$[\![hopefully]\!] = \lambda e.\lambda w.\ \exists e'\ [\ hope_w(e') \wedge e' \sim_R e \wedge Ag_w(e') = Ag_w(e) \wedge$
$\exists p \forall w' \in \mathrm{Dox}^w_{Ag(e')}[\mathrm{Sim}^{w'}(p) <_{\mathbf{Bou}^w_{Ag(e')}} \mathrm{Sim}^{w'}(\neg p)]\ ]$

(38)　$[\![fearfully]\!] = \lambda e.\lambda w.\ \exists e'\ [\ fear(e') \wedge e' \sim_R e \wedge Ag_w(e') = Ag_w(e) \wedge$
$\exists p \forall w' \in \mathrm{Dox}^w_{Ag(e')}[\mathrm{Sim}^{w'}(p) <_{\mathbf{AntiBou}^w_{Ag(e')}} \mathrm{Sim}^{w'}(\neg p)]\ ]$

Wonder and *hopefully/fearfully* compose via Predicate Modification, *wonder* and its subject as well as *whether* and the question compose via Functional Application. For simplicity, the entailed and expressive content of *whether* are conjoined.

(39)　$[\![\exists\ hopefully\ [Ann\ wonders\ [whether\ q\ ]]\!]$ =
$\lambda w.\ \exists e, e'\ [\ e' \sim_R e \wedge Ag^w(e) = Ag^w(e') = a \wedge wonder^w(e) \wedge hope^w(e')$

$$\wedge\, content^w(e) = \{q, \neg q\} \wedge \forall w' \in \mathrm{Dox}^w_a \left[q(w') \rightarrow \begin{array}{c} \mathrm{Sim}^{w'}(\lambda v.ctb^v(a,q)) \\ <_{\mathbf{Goals}^w_a} \\ \mathrm{Sim}^{w'}(\lambda v.\neg ctb^v(a,q)) \end{array} \right]$$

$\wedge\ \exists p \forall w' \in \mathrm{Dox}^w_a[\mathrm{Sim}^{w'}(p) <_{\mathbf{Bou}^w_a} \mathrm{Sim}^{w'}(\neg p)]\ ]$

↦ It is natural to assume that $\mathbf{Goals}^w_a \subseteq \mathbf{Bou}^w_a$ and, thus, the goals of wondering and the content of hoping align (see §4.1).

(40)　$[\![\exists\ fearfully\ [Ann\ wonders\ [whether\ q\ ]]\!]$ =
$\lambda w.\ \exists e, e'\ [\ e' \sim_R e \ \wedge Ag^w(e) = Ag^w(e') = a \wedge wonder^w(e) \wedge fear^w(e')$

$$\wedge\, content^w(e) = \{q, \neg q\} \wedge \forall w' \in \mathrm{Dox}^w_a \left[q(w') \rightarrow \begin{array}{c} \mathrm{Sim}^{w'}(\lambda v.ctb^v(a,q)) \\ <_{\mathbf{Goals}^w_a} \\ \mathrm{Sim}^{w'}(\lambda v.\neg ctb^v(a,q)) \end{array} \right]$$

$\wedge\ \exists p \forall w' \in \mathrm{Dox}^w_a[\mathrm{Sim}^{w'}(p) <_{\mathbf{AntiBou}^w_a} \mathrm{Sim}^{w'}(\neg p)]\ ]$

↦ Since $\mathbf{Goals}^w_a \not\subseteq \mathbf{AntiBou}^w_a$, no alignment between the goal of wondering and the content of fearing is enforced (see §4.2).

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