Biased Questions[*]

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Abstract

I begin by characterizing the two main kinds of bias in polar questions, *speaker bias* and *evidential bias*. Then I pursue four goals. The first is to introduce the basics of each of the biased question phenomena that have generated the most interest in the literature to date, including high negation questions, low negation questions, polarity/verum focus questions, questions with *even*, outer vs. inner negation, declarative questions, and tag questions. The second is to do this in a way that is comprehensible to interested readers who do not yet have deep familiarity with formal semantics and pragmatics. Third, beyond the basics, I aim to give readers a glimpse of compelling issues at the empirical and theoretical cutting edge. Finally, I hope to leave readers with an array of launch pads for future research.

1   The two main kinds of bias in questions

Like all canonical (matrix) questions, a biased question is used by the speaker to seek an answer from the addressee. What distinguishes biased questions is that they are used to convey the extra inference that at least one specific possible answer is, *in some sense*, more likely to be true than the others. This inference is called a *bias*.

There are two main kinds of bias: *speaker bias*—the speaker thinks that a certain answer is true—and *evidential bias*—there is evidence in the immediate context that supports a certain answer. We begin with a positive polar question (PosPolQ) that lacks these two kinds of bias.

(1)   *Unbiased*
        A knocks on the front door of Moira's house. A doesn't know whether Moira is home or not. Moira's roommate B opens the door. A says:
        Is Moira home?   *PosPolQ*

A has no prior expectations about whether Moira is home or not. Moreover, there's no evidence in the immediate context in favor of Moira being home or not. A merely wants to know whether or not Moira is home, and thinks B is in a position to settle the issue.

Now consider how adding negation to a polar question affects the inferences it conveys, and therefore the contexts that it is felicitous in.

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(2)   *Biased*
       A expects her roommate Moira to be home, but she looks everywhere in the house and
       can't find her. A finds their mutual roommate B in the last room that she checks. A says
       to B:

       a.   Is Moira not home?   *low negation question (LoNegQ)*
       b.   Isn't Moira home?   *high negation question (HiNegQ)*
                                                                  (Goodhue, 2022c, 381)

A has a prior expectation that Moira is home. Moreover, the fact that A can't find her anywhere
is evidence that she isn't home. The negative questions in (2) are felicitous in a context like this.
But neither one of these questions would be felicitous in the context of (1).

    The distributions of the two kinds of negative questions in (2) can be further teased apart.

(3)   *No speaker bias*
       A wants to find Moira, but has no expectations about whether she is home or not. She
       looks everywhere and can't find her. But A does find B, and says:

       a.   Is Moira not home?   *LoNegQ*
       b.   # Isn't Moira home?   *HiNegQ*
                                                                  (Goodhue, 2022c, 381)

In (3), A's prior expectation that Moira is home has been removed and replaced with a complete
lack of expectations for Moira's whereabouts. But the contextual evidence that Moira is not home
is still present. Now the LoNegQ in (3a) is felicitous while the HiNegQ in (3b) is not.

    Many minimal pairs like (2) and (3) have been discussed in the literature. They show that
HiNegQs are subject to a speaker bias condition while LoNegQs are not (Romero & Han, 2004;
Sudo, 2013; Domaneschi et al., 2017; AnderBois, 2019; Frana & Rawlins, 2019; Goodhue, 2022c;
Tabatowski, 2022).

(4)   *Speaker bias condition*
       A HiNegQ with propositional content p below the negation is felicitous only if the speaker
       expects or recently expected p to be true.[1]

    A second contextual manipulation demonstrates a second difference between HiNegQs and
LoNegQs.

(5)   *No evidential bias*
       B tells A that she is going to see the band Radiohead in concert. A previously heard that
       the opening act will be Blur.
       A: Oh yeah, I heard about that show.

       a.   # Is Blur not opening?   *LoNegQ*
       b.   Isn't Blur opening?   *HiNegQ*
                                                                  (Goodhue, 2024, 523)

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[1]The expression "only if" here is intended as material implication, "→". Thus if the condition isn't met, that
entails that the utterance of the HiNegQ is infelicitous. But if the utterance of the HiNegQ is infelicitous, that
doesn't necessarily entail that the bias condition isn't met—the infelicity could have a difference cause.

In (5), A has a prior expectation that Blur is opening, which satisfies the speaker bias condition for HiNegQs in (4). But (5) lacks the contextual evidence supporting the negative answer that was present in (2) and (3). Now the HiNegQ in (5b) is felicitous while the LoNegQ in (5a) is not.

Again, many examples like these lead to the conclusion that LoNegQs are subject to an evidential bias condition. Moreover, LoNegQs and PosPolQs are in complementary distribution (Büring & Gunlogson, 2000; van Rooij & Šafářová, 2003; Sudo, 2013; Northrup, 2014; Trinh, 2014; Krifka, 2015; Roelofsen & Farkas, 2015; Domaneschi et al., 2017; AnderBois, 2019; Tabatowski, 2022; Goodhue, 2024).

(6)   *Evidential bias condition*
        For PosPolQs, let p be the prejacent of the question.
        For LoNegQs, let p be the proposition embedded under negation.

    a.   PosPolQs are felicitous only if there is no contextual evidence against p.

                                              (*neutral or positive evidence*)

    b.   LoNegQs require there to be contextual evidence against p.   (*negative evidence*)

(7) unpacks (6) via a definition of "contextual evidence for/against p" (cf. Büring & Gunlogson, 2000; Goodhue & Wagner, 2018).

(7)   *Contextual evidence for/against p*

    a.   *Contextual evidence*: The evidence is mutually available to the participants in the current discourse situation.

    b.   *for p*: The contextual evidence, considered in isolation, would allow participants to infer p, or it at least increases the likelihood of inferring p.

        (i)   *considered in isolation*: ignoring beliefs not arising from the contextual evidence that conflict with/contradict p.

    c.   *against p*: Equivalent to "for *not-p*".

Some researchers claim that HiNegQs are also subject to the LoNegQ condition in (6b) (Northrup, 2014; Trinh, 2014; Roelofsen & Farkas, 2015; Tabatowski, 2022). This view is seriously challenged by examples like (5), where only the LoNegQ is infelicitous. Trinh argues that the HiNegQ in (5b) may meet the condition in (6b) and therefore be felicitous due to the speaker accommodating evidence for *not-p* as a result of B's failure to mention p. If this were correct, then the LoNegQ in (5a) should also be felicitous, but it isn't. I conclude that HiNegQs are not subject to the LoNegQ evidential condition in (6b). Further discussion of the relationship between HiNegQs and evidential bias is postponed until section 4.

With these empirical demonstrations and generalizations of speaker bias and evidential bias in hand, here is the plan for the rest of this chapter: Sections 2, 3, and 5 discuss empirical facts and accounts of three different kinds of speaker bias. Sections 4 and 7 discuss facts and accounts of two different kinds of evidential bias. Section 6 argues against the existence of an inner negation reading of HiNegQs. Section 8 discusses the interaction of intonation and tag questions, and section 9 concludes by drawing attention to many other kinds of biased question phenomena, and charting one possible path forward for the crosslinguistic investigation of biased questions.

2   Purely pragmatic speaker bias

2.1   Some questions convey speaker bias independent of form

Questions with prosodic focus on the auxiliary, often identified as verum focus, and sometimes identified as polarity focus, frequently convey a bias.

(8)   *Polarity/Verum focus question (PolFocQ)*
        A wakes from a nap and looks for Moira, but can't find her anywhere. A does find B in the last room she checks.
        A: Moira went out, huh?
        B: She's home.
        A: IS she home? / IS she?

The capitalization in (8) conveys that the final pitch accent or stress of the utterance is on *is*. This question would be infelicitous in the unbiased context of (1). A's question implies that A is skeptical of B's claim. Based on such examples, PolFocQs are claimed to convey a speaker bias for the negative answer, *not-p*.

   If this is correct, HiNegQs and PolFocQs share something in common: the speaker bias is for the answer with opposite polarity from the polarity of the question. This leads Romero & Han (2004) to propose a unified account of speaker bias in the two kinds of questions. They assume that both involve verum focus, which they instantiate with a VERUM operator. This has in turn led to other accounts that assume a privileged role for a VERUM operator in questions with speaker bias, and/or a theoretical unification of speaker bias in HiNegQs and PolFocQs (AnderBois, 2011, 2019; Romero, 2015; Samko, 2016; Romero et al., 2017; Taniguchi, 2017; Frana & Rawlins, 2019; Gutzmann et al., 2020; Jeong, 2020; Silk, 2020; Arnhold et al., 2021; Bill & Koev, 2021).

   However, unlike HiNegQs, PolFocQs do not *always* convey a speaker bias.

(9)   A wants to know whether Jill will be at a meeting for members only. But A has no clue whether Jill is a member.
        A: Will Jill be at the meeting?
        B: If she's a member, she will.

        a.   A: #ISN'T she a member?
        b.   A: IS she a member?   (Goodhue, 2022c, 383)

The context specifies that A completely lacks a speaker bias, which clashes with the necessary speaker bias of the HiNegQ in (9a), making it infelicitous. Meanwhile, the PolFocQ in (9b) is felicitous, so it cannot be that PolFocQs necessarily convey speaker bias. Despite the lack of speaker bias, the use of focus in (9b) is felicitous. It appears that the protasis of B's conditional provides the necessary focus antecedent to license the prosodic prominence shift. This empirical asymmetry between PolFocQs and HiNegQs suggests that the speaker biases they convey should not be given a unified analysis.

   In Goodhue 2022c, I argue that bias in PolFocQs has nothing to do with focus, and instead depends entirely on the contexts they appear in. In particular, in (8), B asserts a proposition that A then questions, while (9) lacks this conversational context. Consider another empirical fact: questions that are embedded within a similar conversational context, but that *lack* special

markers like negation and focus can nevertheless convey speaker bias.

(10)   A and B are planning a potluck.
         B: Mark made a salad, and Jane baked a pie.
         A: Wait. Is Jane coming?   (Goodhue, 2022c, 386)

In (10), B's utterance implies that Jane is coming to the potluck. Then A questions this, leading to a speaker bias that A thought that Jane wasn't coming.

   These examples show that in some cases speaker bias is a purely contextual phenomenon, not attached to any particular linguistic form. In section 2.2, I summarize the explanation developed in §3 of Goodhue 2022c. Section 2.3 makes a novel observation that goes beyond Goodhue 2022c by showing that even the interrogative form itself is not necessary to generate this kind of speaker bias.

2.2   An account of purely pragmatic speaker bias

Many contexts in which a PolFocQ is asked are such that the addressee has just asserted the proposition p that the speaker is now asking about. For example, in (8), B asserts that Moira is home. Speakers who assert some proposition p aim to add p to the *common ground*, a set of propositions that are mutually believed by the participants in the conversation (Stalnaker, 1978). Given the maxim of Quality (Grice, 1989), B's assertion conveys that B believes p. Thus, if A were to accept p, p would go into the common ground.

   But in (8), A asks a question about p. Parallel to Stalnaker's (1978) informativity principle[2], I assume there is a general pragmatic principle governing the asking of questions (cf. Roberts, 1996/2012; Büring, 2003).

(11)   *Interrogativity principle*:
         Ask a question Q only if the context set c does not entail a complete answer to Q.

p is a complete answer to A's question. Given that B's assertion tells us that B believes p, if A accepted p and added it to the common ground, then the interrogativity principle in (11) wouldn't be met and A's question would be infelicitous. Since A asked the question anyway, we can conclude that (11) must be met. Since B asserted and therefore believes p, we can assume that (11) is met because it's not the case that A believes p.

   Note that this does not yet explain why A's question conveys a speaker bias, since failing to believe p is quite weak, consistent with A either believing *not-p* or having no belief about p either way, for or against. But if A has an opinion about whether or not p is the case, that is, if A either believes p or believes *not-p* (Bartsch, 1973; Sauerland, 2005; Fox, 2007), then we can combine A's

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[2]Recall that from the set of propositions representing the common ground, we can find the *context set*: those possible worlds that are compatible with each of the common ground propositions. On the assumption that a proposition is a function that characterizes a set of worlds, the context set can be found from the common ground by taking the generalized intersection of the common ground. With this definition of the context set in place, here is Stalnaker's informativity principle:

(i)   *Informativity principle*: Assert a proposition p only if the context set c does not entail or contradict p (i.e., p must be true in some but not all worlds in c).

opinionatedness with A's lack of belief in p to conclude that A believes *not-p*. And this is the bias inference arising from A's PolFocQ in (8).[3]

This account predicts that this kind of speaker bias does *not* depend on any of the particular linguistic elements within the polar question, which it makes no reference to, but that it *does* depend entirely on general pragmatic principles combined with the necessary contextul ingredients (Has B implied p? Does A have an opinion about p?). These predictions are borne out by questions with polarity focus that lack bias, like (9), and questions without polarity focus that convey bias, like (10). For a detailed comparison between this approach and the VERUM operator approach to speaker bias, see Goodhue 2022c, §3.

2.3   Even the interrogative is not necessary to generate speaker bias

In fact, even the interrogative clause used to ask the question is not necessary to generate this kind of speaker bias. This is demonstrated by a recent linguistic act of historical significance.

(12)   On July 8, 2024, President Joe Biden wrote a letter to Congressional Democrats that read in part, "I want you to know that despite all the speculation in the press and elsewhere, I am firmly committed to staying in this race, to running this race to the end[.]"

Two days later on July 10, 2024, Former Speaker of the House Nancy Pelosi went on the TV show "Morning Joe".
Journalist: Does [President Biden] have your support to be the head of the Democratic ticket?
Nancy Pelosi: As long as the President has– The President– It's up to the President to decide if he is going to run. We're all encouraging him to make that decision because time is running short. The– uh– I think overwhelming support of the caucus—it's not for me to say, I'm not the head of the caucus anymore—But he's beloved, he's respected, and people want *him* to make that decision, not *me*.
Journalist: He has said he has made the decision. He has said firmly this week he is going to run. Do *you* want him to run?
Nancy Pelosi: I want him to do whatever he decides to do.

(Biden, 2024; Morning Joe, 2024)

Professional political pundits understood Pelosi to have conveyed two inferences in (12) that many viewed as pivotal in Biden's eventual decision to step down from the campaign. First, Pelosi didn't consider the issue to be settled, despite Biden's attempt to settle the matter. Second, Pelosi must have wanted Biden to reach the *opposite* decision from the one he had in fact reached. I will show that these inferences arise in the same way, and via the same mechanisms, as the pragmatic speaker bias we have been discussing.

Linguistically, (12) is different from (8) and (10)—Pelosi doesn't use an interrogative clause. In (8) and (10), interrogatives are used to express that a relevant issue is open (=not settled) despite an interlocutor's attempt to settle it. In (12), Pelosi uses other means for the same ends, namely

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[3]Symbolically, if we use $\mathcal{B}$ to represent A's attitude of belief, we can represent the initial inference that A fails to believe p as $\neg\mathcal{B}p$. Opinionatedness can be represented as $\mathcal{B}p \vee \mathcal{B}\neg p$. These two statements can be combined via disjunctive syllogism to conclude $\mathcal{B}\neg p$, that A believes that p is not the case, which is the stronger speaker bias inference. The reasoning here is parallel to the standard neo-Gricean recipe for quantity implicature as laid out in Sauerland 2005, Fox 2007, and Geurts 2010.

present tense *decides*, urging Biden to make the decision, and the *ever* free relative *whatever*, which conveys that both possibilities (staying in and dropping out) remain live options (Dayal, 1997).

This suggests that the interrogativity principle in (11) can be generalized away from interrogatives and the speech act of asking questions:[4]

(13)   *Issuehood principle*:
         Express that an issue I is open only if the context set c does not entail a complete answer to I.

The speaker bias derivation can now be applied to (12): Biden asserts p (roughly, *that he is staying/should stay in the race*). If Pelosi accepts p, she shouldn't speak as if the issue I that p is meant to settle is still open. But she does. The journalist points out that Biden already has decided. Instead of saying "Oh I see, I accept his decision," Pelosi instead continues to treat the issue as open, saying, "I want him to do whatever he decides to do." Thus we can infer she takes the issue to be open, and since Biden is committed to p, we can infer from (13) that the issue is still open because Pelosi fails to believe p. Moreover, given Speaker Pelosi's political acumen, it is safe to assume that she has an opinion on the matter (she later confirmed this, Klein 2024). Combining this with her failure to believe p, we can infer that she believes *not-p*. Thus, the account of pragmatic speaker bias developed for biased questions can derive the inferences arising from Pelosi's non-interrogative utterances in (12).[5, 6]

This speaker bias inference is divorced from any particular linguistic structure. Polarity focus (or verum focus) is not relevant to the derivation of bias in (8), and there is nothing about the form of (10) that causes speaker bias. The account even predicts similar inferences to arise in the absence of interrogatives, as long as the inputs to the derivation are present, as in (12). What matters for producing this kind of inference is only the pragmatic effect that linguistic utterances have with respect to principles governing the common ground. As a result, this kind of bias is likely to be a crosslinguistic universal. The frequent correlation between this kind of bias and polarity focus, on the other hand, need not be, since the expression of polarity focus may differ across languages (see Gutzmann et al. 2020, and discussion in Goodhue 2022c, §8.2.1)

The approach to speaker bias here is radically different from those that claim that the bias in PolFocQs depends crucially on either focus or VERUM operators. Such accounts have in turn shaped theories of speaker bias in HiNegQs. Therefore, separating out and accounting for pragmatic speaker bias as a distinct phenomenon is a crucial first step to addressing more linguistically-conditioned speaker bias in other kinds of questions like HiNegQs and *even*-PolQs.

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[4]Assume that issues are sets of propositions.

[5]Since Biden and Pelosi were not the only two stakeholders in how this issue was settled, (13) allows for Pelosi to have acted as if the issue were not settled, not because *she* failed to believe p, but because other relevant stakeholders did. But this interpretation is made implausible by world knowledge: if Pelosi had agreed with Biden, she would have endorsed p and used her influence to force others to accept it. So her choice not to must be taken to imply that she *herself* failed to believe p.

[6]The example is relevant to the pragmatics of politeness/face theory. Goodhue (2022c, 407) argues that biased questions provide a less face-threatening means of conveying a message to a social superior than assertion. Pelosi achieves a similar effect by behaving as if no decision had been reached when in fact one had, a move that one pundit said, "in a way didn't make logical sense." (Klein, 2024, @17:29) By indirectly conveying the inferences described above, Pelosi managed to pressure the President to end his re-election campaign without inflicting the indignity of a former Speaker directly asserting as much.

3   Speaker bias in high negation questions

Unlike PolFocQs, HiNegQs necessarily convey speaker bias, as demonstrated by (3) and (9), and articulated in (4). Various accounts have been proposed, including the prominent VERUM operator account of Romero & Han 2004, subsequently revised in Repp 2013; Romero 2015; Frana & Rawlins 2019. Other accounts include van Rooij & Šafářová 2003; Reese 2007; AnderBois 2011, 2019; Krifka 2015, 2021b; Silk 2020; Tabatowski 2022.

In this section, I summarize my analysis of speaker bias in HiNegQs (Goodhue, 2018, 2019, 2022c,b).

3.1   Empirical tests of high negation

A set of empirical tests in Goodhue 2022c, §4 show that the negation in HiNegQs is not part of the propositional prejacent of the question.[7] Here is one example.

(14)   B knows that A is worried because A's student Lou did not do her first assignment. The second assignment was due today. A gets home from teaching and says, "I don't know what to do about Lou." B replies:

   a.   B: # Did she do the assignment again?
   b.   B: Did she not do the assignment again?
   c.   B: # Didn't she do the assignment again?   (Goodhue, 2022c, 393)

Again presupposes that the proposition denoted by its complement has happened before. In (14a), *again* presupposes that Lou did the assignment before. Since the context specifies that she *didn't* do the assignment before, the PosPolQ is infelicitous. But in (14b), *again* presupposes that Lou didn't do the assignment before, so the LoNegQ is felicitous. If HiNegQs had a reading in which the negation could be interpreted low, in the prejacent of the question, then (14c) should pattern with (14b), but it does not.
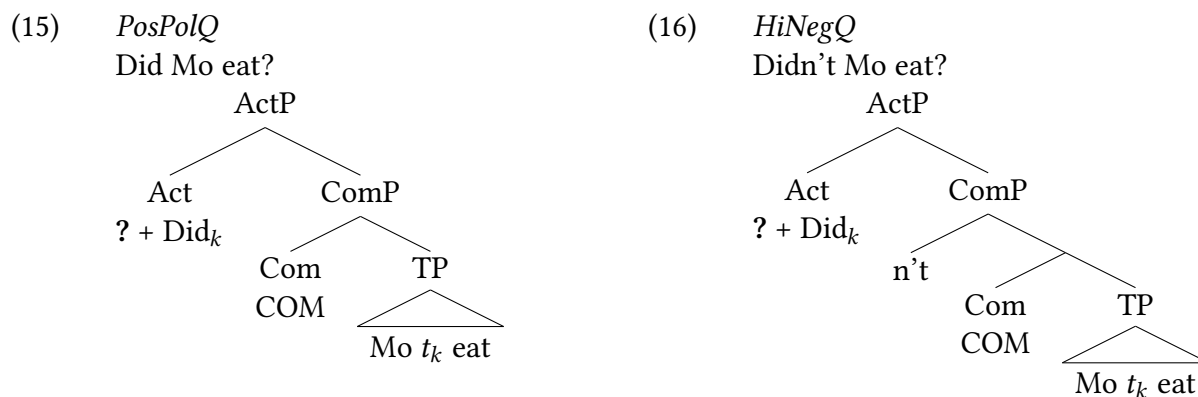
3.2   A syntax and semantics for HiNegQs and PosPolQs

This test and several others strongly suggest that the prejacents of HiNegQs are not negated. At the same time, there is a principled link between high negation and speaker bias. So if high negation is not in the prejacent, where is it and why does it result in a necessary speaker bias? I argue that high negation is in a layer above the TP that encodes speech act information. This produces a semantics that, when combined with pragmatics, reliably results in speaker bias.

Goodhue (2022b) proposes the following structures for PosPolQs and HiNegQs.[8] Building on Krifka 2021b, above the TP is a commitment phrase (ComP) that houses a commitment operator COM, and a speech act phrase (ActP) that houses a speech act operator, which in questions is the question operator ?.

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[7]The propositional prejacent is the proposition denoted by the TP of the question.

[8]Goodhue 2022b goes beyond Goodhue 2022c, offering my most complete treatment of the syntax/semantics of HiNegQs.

(15) *PosPolQ*
      Did Mo eat?

                    ActP
                   /   \
               Act   ComP
            ? + Did$_k$ /   \
                        Com   TP
                        COM   / \
                              Mo t_k eat

(16) *HiNegQ*
      Didn't Mo eat?

                    ActP
                   /   \
               Act   ComP
            ? + Did$_k$ /   \
                       n't   \
                             Com   TP
                             COM   / \
                                   Mo t_k eat

I abstract away from the full technical details of my compositional commitment space semantics (Goodhue, 2022b, §2&3), aiming for a digestible but still relatively complete presentation of the account. First, the commitment operator COM encodes an agent's commitment to a proposition, which is to be understood as follows:

(17) An agent a is committed to a proposition p iff a claims that p is true and promises to defend p if it is challenged (MacFarlane, 2011; Krifka, 2021a)

Second, my account follows the spirit of Hamblin 1973, which proposes that the meaning of a polar question is represented by a set containing the positive and negative answers, $\{p, \neg p\}$. But in my account, this answer set is produced at the speech act layer. Roughly, the **?** operator takes a commitment and projects two opposing future continuations of the conversation. In one the addressee makes the commitment in the ComP; in the other they make an opposing commitment. The semantics is paraphrased by the answer sets in (18) and (19) (where p = *that Mo ate*).

(18) $[\![(15)/\text{PosPolQ}]\!] \approx \{\text{Addressee is committed to } p, \text{Addressee is committed to } \neg p\}$

(19) $[\![(16)/\text{HiNegQ}]\!] \approx \{\text{Addressee is committed to } p, \neg\text{Addressee is committed to } p\}$

In (18), the addressee's options are to commit to p or to its negation, similarly to the standard view in Hamblin semantics except with the added explicit representation of addressee commitments. But in (19) the negation scopes *above* the addressee commitment because it scopes above the commitment operator in (16). As a result, the negative answer in (18) unilaterally entails the negative answer in (19), while the positive answers are identical. Thus, each answer in (18) entails an answer in (19), but the reverse is not true. In Goodhue 2022c, I argue that this makes the PosPolQ a more informative question in a certain sense. Goodhue 2022b goes further by establishing a classical entailment relationship: PosPolQs and HiNegQs are officially represented as sets of commitment states, and the set representing (15) is a proper subset of the one representing (16), thus the PosPolQ *logically* entails the HiNegQ, making PosPolQs more informative than HiNegQs in a strict sense.

3.3 The pragmatics of speaker bias in HiNegQs

This asymmetrical entailment relationship enables the necessary speaker bias of HiNegQs to be derived pragmatically (see §7 of Goodhue 2022c for the most detailed account). First, I assume that if a speaker is ignorant of whether or not a relevant proposition p is true, then a more

informative question about p is more useful than a weaker one. Combined with the semantics above, the PosPolQ about p will be preferred to its corresponding HiNegQ. This can be written as a conditional:

(20)   If S is ignorant of whether p or $\neg p$, then the PosPolQ with prejacent p is more useful than the HiNegQ with prejacent p.

Now suppose that we are in a context in which p is relevant, and the speaker chooses to utter the HiNegQ instead of the PosPolQ. Since the speaker made this choice, we can be sure that:

(21)   The PosPolQ is *not* more useful than the HiNegQ.

(21) is the negation of the consequent of the conditional in (20). Thus, combining (20) with (21) entails that the antecedent of (20) is also false (via *modus tollens*):

(22)   S is *not* ignorant of whether p or $\neg p$.

(22) entails that the speaker is biased for one of the answers,[9] but it leaves open which one—bias for p or for $\neg p$. I argue that the bias must be for p because the meaning in (19) will only reveal whether or not the speaker and addressee agree about p if that is the speaker's bias. This is best appreciated by entertaining a counterfactual situation in which the speaker has a $\neg p$ bias while using (19). If the addressee were to choose the negative answer—¬Addressee is committed to p—the speaker wouldn't know whether that is due to commitment to $\neg p$, putting them in alignment on whether p, or a simple lack of commitment either way, putting them into disalignment on whether p. But if the speaker's bias is for p, then if the addressee chooses the positive answer—Addressee is committed to p—the speaker learns they are in alignment, and if the addressee chooses the negative answer—¬Addressee is committed to p—the speaker learns they are in disalignment.

To summarize, bias in HiNegQs is derived in a two step process: First, given the conditional in (20), if a speaker chooses to use the HiNegQ, they convey that they have some bias or other. Second, given the proposed semantics in (19), HiNegQs are only well-placed to determine speaker-addressee agreement if the speaker's bias is for p.

In Goodhue 2022c, I argue that this bias derivation parallels a standard quantity implicature. But one difference is that HiNegQ speaker bias is uncancellable. The reason that quantity implicatures are defeasible is that in some contexts, the stronger alternative is not relevant. As for polar questions, both the HiNegQ and its corresponding PosPolQ are questions about the same proposition. So, whenever the HiNegQ is relevant enough to utter, its corresponding PosPolQ is also relevant. This is why the HiNegQ bias implicature is not defeasible.

Unlike purely pragmatic speaker bias in section 2, HiNegQ bias depends on their particular structure, their unique semantics, and competition between them and PosPolQs. The advantage of this account over many others is that the height of negation in (16) plays a crucial role. So the account offers a principled explanation for the link between structurally high negation and speaker bias.

While there has already been crosslinguistic work on HiNegQs, I believe the state of the art can be advanced by further research. We need a better handle on crosslinguistic asymmetries,

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[9]In Goodhue 2022b I explore how this account could produce a stronger or weaker speaker bias.

including asymmetries across languages that have HiNegQs, but also, in those that lack HiNegQs, asymmetries in the forms used to express speaker bias. Such investigations may cause us to revise certain claims. For example, Romero & Han (2004) claim that preposed vs. non-preposed negation in Greek polar interrogatives exhibits the high vs. low negation distinction. But Tsiakmakis (2024) has convincingly shown that this is in fact incorrect—neither form necessarily conveys speaker bias. Moreover, Greek provides a third, cleft-like construction which does seem to necessarily convey speaker bias. As yet, it is not understood how this latter structure produces speaker bias. More careful work like this is needed, with an eye toward the following questions: What is the set of languages that exhibits the strong correlation between high negation and speaker bias vs. low negation and evidential bias? Why do only some languages exhibit this distinction? Within the languages that *do* exhibit it, what variation is there and can it be accounted for by a single theory? For the languages that do not exhibit it, do they have some other dedicated form for expressing speaker bias for the prejacent?

4   Evidential bias in negative polar questions

4.1   Removing HiNegQs from the picture

In example (6), I characterized evidential bias in PosPolQs and LoNegQs as being in complementary distribution. Whether HiNegQs are sensitive to evidential bias is more contentious. While some researchers claim that HiNegQs are subject to the LoNegQ evidential condition in (6b), I showed that they are not via (5).

   Other researchers argue that HiNegQs are subject to their own evidential bias condition (Büring & Gunlogson, 2000):

(23)   *Evidential bias condition for HiNegQs*
       Let p be the proposition embedded under negation.
       HiNegQs require there to be no contextual evidence for p.   (*neutral or negative evidence*)

Combining (6) with (23), Büring & Gunlogson discuss a possible explanation for evidential bias across the three question types, but ultimately reject their own idea for being non-compositional and counterintuitive. Sudo (2013) endorses Büring & Gunlogson's empirical picture, but doesn't offer an account.

   In Goodhue 2024, I challenge the empirical claim in (23), instead arguing that HiNegQs are not subject to *any* evidential condition. First I show that when HiNegQs appear to be infelicitous in contexts with positive evidence for p, there is always a better explanation for the infelicity: either the speaker bias condition in (4) isn't met, or else there is no motivation to ask the question. Then I argue that carefully constructed examples demonstrate that HiNegQs in fact can be felicitous with positive evidence for p:

(24)   A and B are two enlightened villagers in colonial Salem, Massachusetts, and they're trying to save their friends from being denounced as witches. The most popular means of identifying witches at this time is left-handedness. Most villagers are illiterate, so people's handedness isn't always so clear. A and B are observing their various friends from a corner of the communal kitchen, trying to figure out who seems to be left-handed so

they can protect them (*contextually relevant question: Who is left handed?*). A isn't sure, but thinks and worries that Mo might be left-handed (*weak speaker bias that Mo is left handed*). Then, as Mo is cutting some bread with her left hand (*weak evidential bias that Mo is left handed*), A points at her while leaning in toward B, and says:

a.   A: Isn't MO left handed?
b.   A: Is MO left handed?
c.   A: # Is MO not left handed?   (Goodhue, 2024, 527)

The felicity judgments depend on keeping in mind the weak speaker bias and the contextual relevance of the question "Who is left handed?". Focus prominence on *Mo* for question-answer congruence helps with the latter. The felicity of (24a) shows that HiNegQs are compatible with positive contextual evidence in some cases. Thus the HiNegQ evidential condition in (23) cannot be correct, and I conclude that (6) characterizes the full relationship between evidential bias and polarity in polar questions (Goodhue, 2024, §3).

4.2   Accounting for evidential bias and the semantics of polar questions

To account for the characterization of evidential bias in (6), a polar question semantics is needed. There are two key choice points that I refer to as *symmetry* and *weight*. I borrow the term symmetry from Tabatowski (2022) with the following meaning:

(25)   *Symmetry*
        a.   A *symmetrical* polar question semantics is one in which PosPolQs and LoNegQs have identical denotations, e.g. PosPolQ = LoNegQ = $\{p, \neg p\}$
        b.   In an *asymmetrical* semantics, they have different denotations,
              e.g. PosPolQ = $\{p\} \neq$ LoNegQ = $\{\neg p\}$

Weight refers to whether an account assumes pragmatic speech act operators in the semantics:

(26)   *Weight*
        a.   A *heavy* semantics includes semantically encoded pragmatic operators, resulting in a denotation that cannot embed under a responsive predicate like *know*, e.g. speech act operators, conversational/doxastic modals, attitude predicates
        b.   A *light* semantics lacks such operators and so can embed under a responsive like *know*, e.g. sets of propositions, partitions, functions from answers to truth values

Krifka (2015, 2021b) and Tabatowski (2022) propose very different accounts, but they share in common the view that a heavy asymmetrical semantics is required to account for evidential bias in polar questions.

   Goodhue 2024 pursues a light symmetrical $\{p, \neg p\}$ semantics that treats evidential bias as an information structural phenomenon. In evidentially neutral contexts, PosPolQs are preferred because they are structurally simpler (cf. Trinh 2014 and Roelofsen & Farkas 2015 who make this same claim, and also pursue accounts that are light and symmetrical, but not information structural).

   To explain what happens in evidentially non-neutral contexts, I assume an information structural principle that requires speakers to maximize relations between linguistic form and the con-

text (cf. Büring, 2016, §2.3):

(27)   *Maximize contextual relations*
       Given two utterances u and u' that are informationally equivalent and that are both felicitous in the context of utterance, if u is felicitous in a smaller set of input contexts than u', use u.

(27) supplies pressure that leads speakers to replace full referring expressions with pronouns, to maximize presuppositions, and to use the strongest focus markings possible. In each case, the uttered expression is preferred to an alternative expression that is informationally equivalent, but less related to the context (e.g. when it is common ground that Mo sings, *Jane knows Mo sings* is preferred to *Jane thinks Mo sings* because *know* presupposes that its complement is true while *think* does not). The purpose of using the more contextually related expression, and therefore the purpose of (27), is to make sure that interlocutors continue to share a common understanding of the context. That is, utterances don't just share and request new information, they also send signals about the already shared information, in order to maintain it.

The contextual evidence condition on polar questions in (6) is also due to (27). When contextual evidence for one of the answers is present, it makes that answer more salient than the other answer. To maximize contextual relations, the polar question must be formed from the prejacent that matches the contextually salient answer.

The formal analysis is inspired by Rooth's (1992) $\sim$ operator for focus. An operator O and a variable v adjoin to the TP of the polar question, as in (28). v picks up propositional content from the contextual evidence, and O requires that v entails the denotation of the question's TP, as in (29). If O's requirement is met, then the TP proposition is passed along to the question formation operator Q in (30), which produces a light symmetrical Hamblin semantics for polar questions as in (31) for PosPolQs and (32) for LoNegQs.[10]

(28)   CP

       C   TP   O   v
       Q ϕ
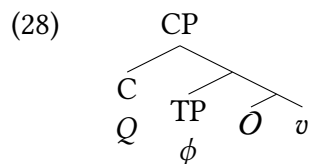
(29) $[\![\phi\ O\ v]\!]^c$ is felicitous only if v entails $[\![\phi]\!]^c$

(30) $[\![Q]\!] = \lambda r_{\langle s,t\rangle}.\lambda q_{\langle s,t\rangle}.[q = r \vee q = \neg r]$

(31) $[\![Q\phi]\!] = [\![Q]\!]([\![\phi]\!]) =$
       $\lambda r_{\langle s,t\rangle}.\lambda q_{\langle s,t\rangle}.[q = r \vee q = \neg r]\ (p) =$
       $\lambda q_{\langle s,t\rangle}.[q = p \vee q = \neg p] =$
       $\{p, \neg p\}$

(32) $[\![Q\neg\phi]\!] = [\![Q]\!]([\![\neg\phi]\!]) =$
       $\lambda r_{\langle s,t\rangle}.\lambda q_{\langle s,t\rangle}.[q = r \vee q = \neg r]\ (\neg p) =$
       $\lambda q_{\langle s,t\rangle}.[q = \neg p \vee q = \neg\neg p] =$
       $\{\neg p, \neg\neg p\} = \{p, \neg p\}$

Thus, on this view, PosPolQs and LoNegQs share an informationally identical semantics, which is a set of the two possible answers, $\{p, \neg p\}$. O simply enforces the entailment relationship between the contextual evidence and the prejacent of the question. The maximize contextual relations principle in (27) makes it so that a question that successfully makes reference to the

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[10]For readers not deeply familiar with lambda notation, the final step of the calculations in (31) and (32) may be opaque. The second to last line of each contains a function from propositions to truth values: an input proposition q will be mapped to true just in case it makes the disjunctive statement true, that is, just in case it is equivalent to p or to $\neg p$. All functions to truth values characterize a set: the set of possible inputs that the function maps to true. So we can rewrite the penultimate functions in (31) and (32) as the set of propositions they characterize, $\{p, \neg p\}$.

contextual evidence via $O\,v$ is preferred to an informationally equivalent question that is parsed without $O\,v$. So, combining the greater structural simplicity of PosPolQs with the requirement to maximize the relatedness of a question to contextual evidence, the evidential condition in (6) is explained.

One piece of evidence in support of taking an information structural approach is that the process is sensitive to the givenness of the individual predicates in the question. This is similar to how givenness constrains focus in some accounts (Büring, 2019; Kratzer & Selkirk, 2020; Goodhue, 2022a), thus making the information structural analysis of the evidential condition all the more fitting. For example, evidence for winning is identical to evidence for not losing, so (33a) and (33b) each meet the requirement imposed by O. (33b) is dispreferred due to the maxim of manner because it is structurally more complex than (33a).

(33)   B has just come home after playing a tennis match. Neither A nor B had strong expectations beforehand about whether B would win or lose. B looks happy, which provides contextual evidence for the proposition that *that B won*. A says:

   a.   Did you win?
   b.   #Did you not lose?

But (34) reveals that if the predicate *lose* is contextually given, the maxim of manner is obviated, allowing the more complex form with the complementary predicate *lose* in (34b) to be used.

(34)   B has just come home after playing a tennis match. B told A beforehand that it was all but certain that B would lose. B looks happy, which provides contextual evidence for the proposition that *that B won*. A says:

   a.   Did you win?
   b.   Did you not lose?

Thus givenness regulates which question prejacents will satisfy O, parallel to other information structural phenomena like focus.[11]

Looking to future work, the phenomenon of evidential bias in PosPolQs and LoNegQs appears likely to be universal, which may be worth exploring. We can also ask about the existence of evidential bias in embedded contexts. The account given here allows for a uniform polar question semantics in both embedded and non-embedded contexts, and is therefore capable of accounting for evidential bias in embedded contexts, unlike that of Krifka 2021b and Tabatowski 2022. Some initial evidence for embedded evidential bias is explored in Goodhue 2024, §5. If a more robust investigation establishes that evidential bias is embeddable, then evidential bias cannot be claimed as a motivation for a heavy matrix semantics for polar questions.

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[11]In fact, further data interestingly suggests that the phenomenon is slightly more complex than standard givenness (Goodhue, 2024, §4.3).

5   *Even*-PolQs and high negation

5.1   Speaker bias in *even*-PolQs

Polar questions containing *even* can trigger a negative speaker bias (*even*-PolQ). Whether or not *even* triggers a bias depends on whether it associates with a high or low endpoint on a scale. (35) features a scale of quiz question difficulty:

(35)   A and B are teaching assistants in a math class who are grading student quizzes. They are discussing Mo's performance on the quiz.
   a.   B: Did Mo even solve the HARDEST problem?
   b.   B: Did Mo even solve the EASIEST problem?

(35a) calls to mind a context in which Mo is performing very well, and B is checking just how well Mo did. This is called the *hardP* reading, with "P" for "proposition", since the prejacent proposition *that Mo solved the hardest problem* is the hardest/least likely to be true among the relevant alternatives to it. The relevant alternatives are generated by replacing the focused constituent *hardest* with alternatives, e.g. *that Mo solved the second hardest problem*, *that Mo solved the third hardest problem*, and so on down the difficulty scale to *that Mo solved the easiest problem*. (35b) calls to mind a context in which Mo is performing very poorly, and B is checking just how poorly Mo did (the *easyP* reading, where the prejacent is easiest/the most likely to be true among the alternatives).

   EasyP even-PolQ like (35b) are widely agreed to exhibit a kind of negative speaker bias, though that bias has been characterized in two ways:

(36)   a.   B expects the negative answer to the question to be true.   (cf. Guerzoni, 2004)
   b.   B thinks that all alternative questions are settled in the negative.   (cf. Jeong, 2020)

Guerzoni (2004) offers an explanation for the strong negative bias in (36a). First, assume that *even* combines with a prejacent proposition p and presupposes that p is the least likely among its relevant alternatives. Consider *even*'s presupposition in the two possible answers to the *easyP even*-PolQ in (35b). The *yes* answer is *that Mo even solved the easiest problem. Even* presupposes that Mo solving the easiest problem is least likely. But since it is the easiest problem, it is the *most* likely problem to solve, so this presupposition is not satisfied. In *easyP* readings, the positive answer will always lead to presupposition failure, so it is unavailable.

   What is the *no* answer? Recall Hamblin's view that polar questions denote a set of two answers $\{q, \neg q\}$, where q is the prejacent of the question. So one possible structure for the no answer is:

(37)   ¬ [*even* [*that Mo solved the easiest problem*]]

Since *even* combines with the same proposition in (37) as in the *yes* answer, it produces the same presupposition, which projects through negation and leads to the same presupposition failure. But since (35b) is felicitous, this can't be right, there must be a way for at least one of the answers to not lead to presupposition failure.

   One way to satisfy *even*'s presupposition in an *easyP* reading is to reverse entailment relations among the alternatives. Negation can do this if it scopes below *even*. Guerzoni (2004) provides a

compositional semantics in which the polar question formation operator *Q/whether* is generated beneath *even* and then scopes out, leaving behind a trace. The computation results in negation scoping below *even* in the *no* answer:

(38)   *even* [¬ [*that Mo solved the easiest problem*]]

Now *even* presupposes that *not* solving the easiest problem is least likely. This presupposition is obviously satisfied.

The result is that *easyP even*-PolQs presuppose that only the negative answer is possible. This is said to be the source of negative bias in these questions, corresponding to the bias as described in (36a).

5.2   Adding high negation to *even*-PolQs

Interestingly, *even*-PolQs can be combined with high negation, and the result exhibits both kinds of speaker bias simultaneously, as observed by Jeong (2020):

(39)   A: I think Mo got a zero.
         B: Didn't she even solve the EASIEST problem?

B conveys a prior expectation that Mo would solve the easiest problem, the positive speaker bias familiar from HiNegQs. But B also conveys an *even*-PolQ negative bias. Jeong argues that Guerzoni's analysis of *even*-PolQs cannot explain this effect. In order to derive the negative bias associated with *even*-PolQs, the positive answer must exhibit a presupposition failure, but in order to derive positive bias in VERUM accounts of HiNegQs (Romero & Han, 2004; Frana & Rawlins, 2019), both answers need to be live possibilities that reflect epistemic conflict between the negative answer (the addressee's proposition) and the positive answer (the speaker's proposition). I add that, given the compositional assumptions in the alternative view of HiNegQs in Goodhue 2022b, there is no means of locating negation between *even* and its prejacent like in the LF in (38), and thus no way of deriving *even*-PolQ bias in the Guerzonian fashion for an example like (39).

Jeong pursues an updated version of van Rooij's (2003) analysis of *even*-PolQs. On this account, *even* conventionally implicates that all alternative questions to the *even*-PolQ are settled with either a negative or a positive answer. If the *even*-PolQ has an *easyP* reading, then the alternative questions all necessarily contain contextually stronger prejacents. Thus, if any of those questions were answered in the affirmative, then there would be no reason to ask the *even*-PolQ since it would already be answered in the affirmative as well. For example, if it were pragmatically presupposed that Mo had solved several harder problems, that would contextually entail that she solved the easiest problem, and so it wouldn't make sense for B to ask the *easyP even*-PolQ in (35b). Since the speaker asks the question, the alternatives must have all been answered in the negative. Thus the weak negative bias described in (36b) is derived.

Recharacterizing negative speaker bias in *easyP even*-PolQs as (36b) has a few interesting consequences. First, it can account for (39): since Jeong's account of bias does not depend on the positive answer exhibiting a presupposition failure, it is completely compatible with existing derivations of positive speaker bias in HiNegQs. Second, it may fit intuitions better: in many *even*-PolQs, the speaker seems to genuinely want an answer (cf. Jeong, 2020, ex. (56)). Third, Jeong's account, but not Guerzoni's, also seems to predict a positive bias in *hardP even*-PolQs.

The alternatives to such questions all necessarily contain contextually weaker prejacents. Thus, if any of those questions were answered in the negative, then there would be no reason to ask the *even*-PolQ since it would already be answered in the negative as well. This suggests that the speaker asking the *hardP* question takes the alternative questions to all have positive answers. In fact, this matches intuitions. So it may be that *even*-PolQs express a weaker kind of speaker bias than HiNegQs and PolFocQs, and that *easyP* readings have a negative bias while *hardP* readings have a positive bias.

On the other hand, one advantage of Guerzoni's (2004) account is that it relies on a unified semantics for *even* across declaratives and interrogatives, while it is less clear how Jeong's (2021) account of *even*-PolQs relates to non-interrogative *even*. Also for future work is an exploration of the relationship between *even* in constituent questions (Iatridou & Tatevosov, 2016) and the present account. Jeong (2020, §4.5) offers preliminary remarks on each of these points.

Even-PQs and Jeong's theory of them will be discussed further in section 6.2.

6   On the purported ambiguity between outer and inner negation in HiNegQs

Ladd (1981) argues that HiNegQs are ambiguous between outer and inner negation readings. Outer negation is said to be outside of the propositional prejacent of the question, and the question is said to ask about the positive answer p. Inner negation is said to be in the prejacent of the question, and the question is said to ask about the negative answer $\neg p$. Crucially, both the outer and inner negation readings are supposed to necessarily convey the positive speaker bias articulated in (4). Thus inner negation HiNegQs are distinct from LoNegQs, since LoNegQs do not necessarily convey speaker bias. Romero & Han (2004) use polarity item pairs like *too*/*either* and *already*/*yet* to disambiguate between the two readings. Table 1 summarizes the purported distinction.[12]

Negation type	Logical form	Example with polarity item
Outer negation HiNegQ	$[_{CP} \ Q \ [_{?P} \ \neg \ Op \ [_{TP} \quad$ Em ate $] \ ] \ ]$	Didn't Em eat too?
Inner negation HiNegQ	$[_{CP} \ Q \ [_{?P} \quad (Op) \ [_{TP} \neg$ Em ate $] \ ] \ ]$	Didn't Em eat either?
Low negation question	$[_{CP} \ Q \qquad\qquad [_{TP} \neg$ Em ate $] \ ]$	Did Em not eat either?

Table 1: Outer and inner negation in HiNegQs, compared with a LoNegQ

All of the evidence that has ever been produced in favor of a covert inner negation parse of HiNegQs is extremely weak. Take the primary polarity item evidence: experimental evidence shows that *either* in HiNegQs as in Table 1 is severely degraded, so we can't rely on that data (Hartung, 2006; Sailor, 2013). And while *already* and *yet are* acceptable in HiNegQs, it is difficult to see what they might show, since both are acceptable in PosPolQs as well. Moreover, since the

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[12]Outer negation in Table 1 is above an unknown operator Op in an unknown projection labeled "?P". Other analyses are available. The point is simply that negation is outside of the TP, possibly within the CP or a higher speech act projection. I gave one concrete proposal in (16) above.

polarity items *themselves* are not without meaning, they could be responsible for any contrast in speakers' intuitions about the HiNegQs containing them that has been attributed to outer vs. inner negation.

Meanwhile, there is strong evidence that HiNegQs cannot be parsed with an inner negation. In Goodhue 2022c, §4, I collect a battery of tests that probe HiNegQs for an inner negation. Presupposition projection via *again* in (14) above is one such test, and just like (14), all of these tests reveal the *complete absence* of inner negation in HiNegQs. Therefore, I conclude that the purported inner negation reading of HiNegQs doesn't exist.

Romero (2024, §3.1) reviews some of the arguments against inner negation in HiNegQs, then discusses experimental evidence that has been argued to speak in favor of inner negation (Arnhold et al. 2021, Romero et al. 2017, and Jeong 2020). Romero concludes that the current empirical evidence is mixed, leading to no consensus on the issue.

These experiments again provide at best extremely weak evidence. Below, I show why they do not stand up to scrutiny, and I again employ a test that shows that an inner negation parse of HiNegQs is nowhere to be found.

6.1   Arnhold et al. 2021

Arnhold et al. (2021) give participants contexts, then ask them to choose whether to say a HiNegQ or a LoNegQ in the context, and record them producing the chosen sentence. In all contexts, the participant's character has a p speaker bias and is confronted with contextual evidence for $\neg p$. Contexts are manipulated so that the participant's character either continues to believe p and wants to check it (the questioning p condition), or is starting to believe $\neg p$ and wants to check it (the questioning $\neg p$ condition). The experiment was run in German and English.

The idea behind this experiment is that the acceptability of questions in questioning p vs. questioning $\neg p$ contexts will reveal the underlying structural height of negation at LF.

(40)   *Linking experimental results to theoretical conclusions*:
    a.   If a question is acceptable in the questioning p condition, it has a structurally high, outer negation that does not modify the question prejacent at LF.
    b.   If a question is acceptable in the questioning $\neg p$ condition, it has a structurally low, inner negation modifying the question prejacent at LF.

The authors hypothesize that English HiNegQs are covertly ambiguous between outer and inner negation as in Table 1, and so predict them to be acceptable in both conditions. In contrast, they hypothesize that German HiNegQs can only exhibit outer negation, and so predict them to be acceptable only in the questioning p condition. They further hypothesize that German LoNegQs can only exhibit inner negation, and so predict them to be acceptable only in the questioning $\neg p$ condition. Finally, they don't directly make a prediction for English LoNegQs, but given the preceding assumptions, it is clear that English LoNegQs are predicted to pattern like German LoNegQs, only acceptable in the questioning $\neg p$ condition.

Results: The German results roughly match predictions: the questioning p contexts overwhelming led to HiNegQ choices, while the questioning $\neg p$ contexts overwhelming led to LoNegQ choices. In English, the contextual manipulation had no effect on participants' choices: they chose HiNegQs about 60% of the time across conditions. In line with (40), Arnhold et al. conclude that

since HiNegQs are acceptable in both questioning p and questioning $\neg p$ contexts, HiNegQs must be structurally ambiguous between outer and inner negation readings.[13]

The challenge for this interpretation of the results is that English LoNegQs did not behave as expected. If all of the authors' assumptions were correct, the contextual manipulation should have had an effect on English, with fewer LoNegQs chosen in the questioning p condition than in the questioning $\neg p$ condition. Instead, LoNegQs were *also* equally and highly acceptable in both context types (chosen about 40%). There are two options to explain this. One is to revise the hypothesis about LoNegQs and conclude that they are structurally ambiguous between outer and inner negation readings just like HiNegQs. This seems unlikely (and indeed, the authors decline to even discuss this). The other option is more likely: we need to rethink the assumptions in (40), that the experimental manipulation between questioning p and questioning $\neg p$ reveals anything about the structural height of negation at LF, in either HiNegQs or LoNegQs. This undermines the foundation of this experimental design, and this approach to probing outer vs. inner negation more generally: the questioning p vs. questioning $\neg p$ paraphrase of the outer-inner negation ambiguity is somewhat vague and so unable to produce strong evidence for a structural ambiguity. This is why I prefer the clearer diagnostics presented in §4 of Goodhue 2022c.[14]

6.2 Jeong 2020

Jeong (2020) also reports on several experiments probing subtle meaning effects in *even*-PolQs with high negation like (39) (these include HiNegQs with *even* plus low scalar items, minimizers, and strong/focused NPIs; I abbreviate these as *even*-HiNegQs). In experiment 3, the shape of the question was manipulated (*even*-PolQs vs. *even*-HiNegQs), as were contexts—I focus here on negative evidence contexts vs. suggestion contexts (contexts in which HiNegQ speaker bias suggests an answer to an explicit QUD, e.g. (41)). Participants read a context and a single target sentence, then rated how natural the sentence is using a continuous sliding bar that ranges from 0% to 100%. Participant responses hovered in the 50% to 70% range overall. The experiment found an interaction effect: In suggestion contexts, *even*-HiNegQs were rated at 50% while *even*-PolQs were rated significantly higher at 60%. In negative evidence contexts, there is no difference, with both rated around 70%.

To explain this result, Jeong observes that suggestion contexts lack contextual evidence for the negative answer, and argues that *even*-HiNegQs, but not *even*-PolQs, require negative contextual

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[13]Arnhold et al. did find an intonational effect in English. In Goodhue 2022c, 392, I challenge their interpretation of this result, and offer my own.

[14]Romero et al. (2017) report a nearly identical experiment on English, except the speaker bias is for $\neg p$, the contextual evidence is for p, and the question options are the negative HiNegQ *Didn't John not drink?* and the PolFocQ *DID John drink?*. Romero (2024) claims that the PolFocQ exhibits inner negation, and therefore accounts like Goodhue 2022c that reject the existence of inner negation incorrectly predict participants to only choose the negative HiNegQ in the experiment. This claim doesn't follow. First, Goodhue 2022c treats PolFocQs and HiNegQs as orthogonal phenomena that do not belong in a unified theory, so my claim that inner negation HiNegQs don't exist has no bearing on the use of PolFocQs in any context or experiment. In fact, my independent account of PolFocQs is perfectly consistent with their use in this experiment. Second, inner negation requires the presence of negation in the prejacent of the question (cf. Table 1); the positive PolFocQ lacks negation, so can't correspond to inner negation. This calls into question Romero et al.'s interpretation of their experiment, undermining its support for the existence of inner negation in HiNegQs.

evidence, much like LoNegQs as in (6b). To explain this asymmetrical requirement between *even*-HiNegQs and *even*-PolQs, she assumes that HiNegQs can be parsed with inner negation, that when they are, they require negative contextual evidence like LoNegQs, and that *even*-HiNegQs *must* be parsed with inner negation.[15]

I will argue against this conclusion. The argument follows a few twists: I will show that (i) there is a confound in experiment 3, (ii) the effect is nevertheless real, but (iii) the effect does *not* prove that HiNegQs have an inner negation reading, and in fact there is evidence against it.

Why are both *even*-PolQs and *even*-HiNegQs rated lower overall in suggestion contexts than in negative evidence contexts in this experiment? I believe there is a confound in the suggestion context stimuli that reduces their naturalness and raises questions about the overall results: five of the twelve items unintentionally introduce subject focus, which leads to unwanted *hardP* readings. For example:

(41)   A: I wonder which kids thought of apologizing.

    a.   B: Didn't JIM show a hint of remorse?
    b.   B: # Didn't JIM even show a hint of remorse?
    c.   B: # Did JIM even show a hint of remorse?

The stimuli were not presented aurally, so there were no prosodic cues to focus structure.[16] A introduces a subject-*wh* QUD "Which kids thought of apologizing?". To establish congruence to the QUD, subject focus (marked with capitalization of *Jim* in (41)) is most natural in B's questions, thus at least some participants likely assumed it. (41a) shows how the positive speaker bias of a HiNegQ suggests an answer to the QUD (hence the label "suggestion context"). The subject focus generates subject alternatives ("Did(n't) Ali show a hint of remorse?", "Did(n't) Maria show a hint of remorse?", etc.), which correspond to other possible answers to the QUD. In (41b) and (41c), *even* associates with these alternatives. This results in a *hardP* reading—"Jim is the least likely kid to show remorse"—instead of the desired *easyP* reading—"showing a hint of remorse (as opposed to more remorse) is the most likely thing Jim could do." But then, as Jeong's theoretical account predicts, both (41b) and (41c) are infelicitous, because *even* requires the alternative questions to be settled, but they are not settled in (41). As proof, consider how both questions improve drastically when the context satisfies Jeong's conventional implicature for *even*:[17]

(42)   A: I wonder which kids thought of apologizing.
      B: I think Ali and Maria apologized.
      C: Yeah. And...

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[15]It remains unclear *why even*-HiNegQs must be parsed with inner negation on this view. Jeong 2019 contains theoretical assumptions about the interaction of *even*-PolQs and high negation that require inner negation, but those assumptions are dropped in Jeong 2020.

[16]Four items featured stressed NPIs marked via all caps, "Does(n't) Sally have ANY time to spare?" I assume participants got the correct focus structure here, so I don't include these in the five out of twelve problematic items.

[17]On the other hand, Jeong's intended focus structure—"Did Jim even show a HINT of remorse?"—would be felicitous despite that the context doesn't explicitly settle the alternatives (e.g. "Did Jim show a lot of remorse?"). This is because it is easier to accommodate *even*'s requirement here, that A and B know that Jim doesn't generally show a lot of remorse, while it is hard to accommodate that A and B know the answers to all of the subject-based alternatives. The latter accommodation isn't possible because A has just explicitly raised the subject-*wh* question, suggesting that A doesn't know who thought of apologizing.

    a.   C: Didn't JIM even show a hint of remorse?
    b.   C: Did JIM even show a hint of remorse?

So, lack of control of the focus structure likely reduced the naturalness ratings in the suggestion condition overall.

Despite these challenges, I believe that the empirical asymmetry between *even*-PolQs and *even*-HiNegQs claimed by Jeong is real, and can be demonstrated with the following two examples:

(43)   A, B, and Jane are movers. B is the boss, and Jane is known to be the laziest employee. B calls A to find out how the move is going. B asks: What has Jane done so far? ...
    a.   B: Did she even move one BOX?
    b.   B: # Didn't she even move one BOX?

(43) is a suggestion context that remedies the issue with (41): the constituent that we want *even* to associate with, the whole VP *move one box*, is focussed (with the final accent on *box*), which also makes the utterance congruent to the QUD. Since *move one box* is a low scalar item, we get the desired *easyP* reading ("moving one box" is easier/more likely than "moving two boxes", "moving a couch", etc.). And there is a clear asymmetry between the *even*-PolQ in (43a) and the *even*-HiNegQ in (43b). But when we add negative evidence to the context, the asymmetry goes away:

(44)   A, B, and Jane are moving. B goes out to get more supplies, but first B instructs A to pack the kitchen and Jane to move the boxes from the bedroom into the truck. B returns to find that A has packed the kitchen, but Jane is reading a novel, and the bedroom boxes appear to be untouched. B says to A:
    a.   B: Did she even move one BOX?
    b.   B: Didn't she even move one BOX?

Both questions are perfectly felicitous in (44). The asymmetry between (43) and (44) is exactly the effect Jeong reported in experiment 3. Recall that Jeong's explanation is that *even*-HiNegQs are parsed with inner negation, and therefore require negative contextual evidence. This would explain why (44b) is felicitous while (43b) is odd.

But as I point out in Goodhue 2022c, this explanation faces a challenge: If *even*-HiNegQs necessarily have inner negation, then my tests should find a negation in them. But this is not the case. Here is just one example, minimally different from (44), and comparable to the first use of the *again* test in (14):

(45)   A, B, and Jane are moving. This morning, B instructed both A and Jane to move some boxes, but only A did; Jane didn't move a single box. Now it is afternoon, and B goes out to get more supplies, but first instructs A to pack the kitchen and Jane to move the boxes from the bedroom into the truck. B returns to find that A has packed the kitchen, but Jane is reading a novel and the bedroom boxes appear to be untouched. B says to A:
    a.   B: # Did she even move one BOX again?   *even-PosPolQ*
    b.   B: # Didn't she even move one BOX again?   *even-HiNegQ*
    c.   B: Did she not even move one BOX again?   *even-LoNegQ*

Since *again* can scope over the low negation in the *even*-LoNegQ in (45c), *again*'s presupposition is *that Jane didn't move one box before*. The context satisfies this presupposition. Meanwhile the *even*-PosPolQ in (45a) presupposes *that Jane moved one box before*, which isn't satisfied in the context, so the utterance is infelicitous. If *even*-HiNegQs were necessarily parsed with inner negation, as claimed by Jeong, then (45b) should pattern with (45c), but instead it clearly patterns with (45a). I present further evidence in §4.3 of Goodhue 2022c that shows that there is no inner negation in *even*-HiNegQs. Thus, even though the contrast between (43) and (44) suggests that *even*-HiNegQs require negative contextual evidence, it cannot be caused by the presence of an inner negation.

In conclusion, as of yet there is no clear evidence that HiNegQs ever contain an inner negation. In fact, the evidence suggests that HiNegQs *can't* be parsed with inner negation. In the future, it may be useful to cast a wider net, using the tests in Goodhue 2022c, §4 for a judgment task on any language with HiNegQs (including various dialects of English). If any language exhibits inner negation relative to those tests, then the next step would be to test whether or not HiNegQs on those readings *necessarily* convey positive speaker bias. If they do, that would mean that the dialect has a true inner negation HiNegQ reading as it has been conceived since Ladd 1981 and Romero & Han 2004. If they do not, that would mean that polar questions with preposed negation in that language are in fact ambiguous between being HiNegQs and LoNegQs. Another open question is why do *even*-HiNegQs require negative contextual evidence even though they lack an inner negation?

7 Rising Declarative Questions

7.1 Rising Declarative Questions and bias

Another biased question phenomenon is the rising declarative question (RiseDecQ).

(46)   *Rising declarative question*
         A: It's raining. Bring an umbrella.
         B: It's raining? (I didn't realize.)

In (46), A's assertions provide evidence that it is raining. B replies by uttering a declarative clause with a rising intonation similar to the one assumed for all prior examples, which I'll call a *polar question rise*.[18] This RiseDecQ is felicitous in (46), but would not be in an evidentially neutral context. So RiseDecQs seem to be subject to an evidential bias condition similar to (6), where RiseDecQs require contextual evidence for the proposition denoted by the declarative clause.

Meanwhile, we can specify that B has no prior speaker bias in (46), and the RiseDecQ is perfectly felicitous. Thus RiseDecQs don't require speaker bias. Rudin (2018) further shows that RiseDecQs are compatible with both positive and negative speaker bias, which suggests that the presence of either speaker bias is contextually conditioned.

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[18]In both the semantics/pragmatics literature and the intonational phonology literature, English polar question rises are usually transcribed in the Tones and Break Indices (ToBI) system as L* H-H% (Pierrehumbert & Hirschberg, 1990). In Goodhue forthcoming, I argue that the English polar question rise may also include shallower rises, often transcribed as H* H-H%.

Recall that in section 4, I argued that LoNegQs are infelicitous in evidentially neutral contexts because PosPolQs are structurally simpler. But RiseDecQs seem to be structurally no more complex than their PosPolQ counterparts. So why are RiseDecQs infelicitous in neutral contexts? Here is one explanation (Rudin, 2018, 2022; Westera, 2017, 2018; Goodhue, 2021, forthcoming): Suppose that all declarative clauses whether rising or falling intonationally denote a simple proposition p, while the semantic denotation of polar interrogative clauses is a set of two answers, $\{p, \neg p\}$. Using a declarative that denotes p to ask a question is more restrictive than using an interrogative that denotes $\{p, \neg p\}$. The speaker must have some reason to raise p and ask the addressee for confirmation of that single proposition instead of using the linguistic structure that presents both p and $\neg p$ equally. The reason is that there is some contextual evidence in favor p. Without contextual evidence, the motivation for using a RiseDecQ is lacking, and the RiseDecQ is judged infelicitous.

7.2   RiseDecQs and the semantics-pragmatics interface

Beyond their expression of evidential bias, RiseDecQs have attracted attention in the literature because they provide fertile ground for an exploration of the interface between grammar and extra-grammatical meaning. They raise questions about the semantics of fundamental clause types, how those semantic objects are used to update contexts (i.e. how they achieve their illocutionary forces and what those forces do), what formal machinery is needed to model context update, and what role intonation plays at this interface.

To explain how rising declaratives are used as questions, the idea of every researcher who has worked on RiseDecQs (Gunlogson, 2003, 2008; Nilsenovà, 2006; Trinh & Crnič, 2011; Truckenbrodt, 2012; Trinh, 2014; Malamud & Stephenson, 2015; Farkas & Roelofsen, 2017; Jeong, 2018; Westera, 2017, 2018; Rudin, 2018, 2022; Krifka, 2021b; Goodhue, 2021, forthcoming; Dayal, 2023) is to say that while utterances of falling declaratives are interpreted as assertions by the speaker, the rising intonation of RiseDecQs, which I'll represent here as ↗, in some way or other calls off the speaker's assertiveness. For example, Farkas & Roelofsen (2017) argue that ↗ instantiates the Q operator, and so actually produces a genuine question semantics for RiseDecQs, $\{p, \neg p\}$. Gunlogson (2003) and Rudin (2018, 2022), on the other hand, leave the propositional semantics of the declarative clause untouched, and Gunlogson argues that ↗ attributes the assertion of p to the addressee, while Rudin argues that ↗ merely calls off the speaker's commitment to p. These three accounts, along with almost all of the others cited above, predict that the two grammatical elements involved, clause type and intonation, have meanings that together *jointly determine* the speech act uttered (assertion vs. question).

There are two empirical facts that contradict all such accounts. The first is that rising declaratives are not always questions, but are instead sometimes used to assert p.

(47)   *Rising declarative assertion (RiseDecA)*
         A: Why are you bringing an umbrella?
         B: It's raining ↗

In (47), B is not asking A whether it is raining, but is asserting this proposition. The rise does still seem to raise some kind of question—not a question about the propositional content of the declarative, i.e. whether or not it is raining, but a question about why A would ask about bringing

an umbrella. That is, B's ↗ conveys roughly, "How could you not know it's raining?" or "Given that you know it's raining, why would you question my bringing an umbrella?".

The second empirical fact is about the inverse of RiseDecAs: falling declarative questions (FallDecQs; cf. Bartels 1999; Gunlogson 2008; Goodhue forthcoming; (48) is a naturally occurring example).

(48)   A and B are looking for examples of metafiction in novels. The Neverending Story is both
        a novel and a film.
        A: How about The Neverending Story?
        B: That was a book too↘
        A: Yeah.
        B: Question mark.   (Kern et al., 2024, @39:18)

In (48), B's first utterance is a question, but intonationally and syntactically, the utterance is indistinguishable from a typical assertion via a falling declarative. A understands it as a question, thus responds to B by answering "Yeah." But B simultaneously realizes that his utterance might be mistaken for an assertion and quickly verbalizes the intended punctuation via "Question mark."

To summarize, falling declaratives are typically used to make assertions, but they can be used to ask questions as in (48), while rising declaratives are typically used to ask questions, but they can be used to make assertions as in (47). As a result, any account that strictly predicts declarative + ↗ to entail questionhood and declarative + ↘ to entail assertionhood will fail to capture examples like (47) and (48).

There are two possible directions to go here: One is to claim that the intonational facts are more complicated than I have suggested so far. The idea is that there are two different rises: a steeper rise to a very high final boundary tone which has a semantics that when combined with a declarative results in a question; and a shallower rise to a less high final boundary tone with a semantics that combined with declaratives results in assertions (cf. Truckenbrodt, 2012; Jeong, 2018). For several arguments against this view, see Goodhue forthcoming. In particular, I argue that whatever intonational distinction there might be, it does not track the distinction between assertions and questions, but instead tracks the speaker's level of surprise or incredulousness. Moreover, the purported two rises view doesn't yet have anything to say about FallDecQs like (48) (though FallDecQs could be handled separately in principle).

The other option is to bite the bullet and accept that the grammar of clause type and intonation does *not* determine speech act, but merely constrains it. In Goodhue 2021, forthcoming, I argue that ↗ has a fixed semantics that requires the speaker to lack commitment to a relevant proposition, but it is flexible in what proposition this lack of commitment meaning targets. The default assumption is that the relevant proposition is p, the one denoted by the declarative clause, but this default assumption can be canceled when it is obvious from the context that the speaker wouldn't lack commitment to p. In that case, the audience must infer what proposition ↗ is targeting, a process guided by relevance to resolving the question under discussion. Meanwhile, Goodhue forthcoming gives several reasons to assume that ↘ is a meaningless default contour, and argues that the speech act associated with a falling declarative must be pragmatically derived.

On this view, linguistic structure does not always tell us what speech act is being performed. Rather, the semantics of linguistic objects *constrains* the possible speech act interpretations available, and the audience must use what they know about the language and the context to pragmat-

ically infer the speaker's intended global meaning.

If it is correct that speech act interpretation sometimes depends on pragmatic derivation, one question for future work is how does this interact with the burgeoning literature on the syntax and semantics of speech act related operators (Krifka, 2015; Woods, 2016; Wiltschko, 2021; Miyagawa, 2022; Dayal, 2023)? Is it directly in conflict with the view that such grammatical operators exist? Or could the two views coexist? The idea here would be that grammar includes speech act structure that is in some cases signaled overtly, but in other cases covert. In the latter cases, there is a greater role for pragmatic inference in uncovering illocutionary force.

8   English tag questions thwart a fully compositional analysis

Tag questions are another widely studied biased question phenomenon (Ladd, 1981; Reese, 2007; Malamud & Stephenson, 2015; Northrup, 2014; Farkas & Roelofsen, 2017; Jamieson, 2018; Wiltschko, 2021; Bill & Koev, forthcoming; Roberts & Rudin, 2024). Negative tag questions in particular pattern closely with HiNegQs. For example, "Moira's home, isn't she?" would be infelicitous in the context of (3), just like the corresponding HiNegQ, while "Blur is opening, aren't they?" would be felicitous in the context of (5), again, just like the HiNegQ. Thus a first pass on negative tag questions is to say that the tag itself is a HiNegQ, subject to the speaker bias condition in (4), but not the evidential bias condition in (6).

Intonation has also been observed to have an effect on meaning in tag questions. For example, see Ladd 1981 and subsequent literature on the nuclear vs. post-nuclear distinction. Another claim is that tags with falling intonation $\searrow$ convey a stronger bias for the proposition denoted by the preceding declarative clause (the "anchor proposition") than those with rising intonation $\nearrow$ (Reese, 2007; Malamud & Stephenson, 2015). This may well be true. But I think there is a more fundamental fact: While rising tag questions convey a HiNegQ-like speaker bias for the anchor proposition, falling tag questions *don't* necessarily convey speaker bias, but instead suggest that the *addressee* should be committed to the anchor. In (49) and (50), examples inspired by Malamud & Stephenson 2015, the predicate of personal taste *attractive* helps to bring this out (cf. Jamieson, 2018, who makes a similar observation).

(49)   A and B are gossiping about A's neighbor, whom they both know. B says:
   a.   He's attractive, isn't he$\nearrow$
   b.   He's attractive, isn't he$\searrow$

(50)   A blushes and says, "You've GOT to see this picture of my new neighbor!" Without yet seeing the picture, B says:
   a.   #He's attractive, isn't he$\nearrow$
   b.   He's attractive, isn't he$\searrow$

The rising tag questions in (49a) and (50a) convey a HiNegQ-like speaker bias. Since the bias is for a proposition that includes the predicate of personal taste *attractive*, B's bias conveys B's own judgment that the neighbor is attractive. This bias is fine in (49a), but since B has not yet seen the neighbor in (50a), it is infelicitous.

It is difficult to detect a difference in meaning between (49a) and (49b), but the asymmetry between (50a) and (50b) is stark: B's lack of speaker bias in (50) is no problem for the use of the falling tag. Intuitively, (50b) is used by B to guess A's judgement that the neighbor is attractive.

These facts are relevant in the construction of a theory of tag questions. At first glance, we might hope to combine our theories of biased polar questions—including pragmatic bias in section 2 and HiNegQ bias in section 3—with our theories of rising and falling intonation in section 7 to produce a compositional explanation for the range of effects we see in positive and negative tag questions. But the asymmetries across (49) and (50) pose a serious challenge to the viability of this approach. In particular, it seems that while rising negative tags are elliptical HiNegQs, falling negative tags cannot be. After all, while (49a) can be replaced by the rising HiNegQ "Isn't he attractive↗" and preserve meaning, (50b) cannot be replaced by the falling HiNegQ "Isn't he attractive↘"—this would be infelicitous in (50).[19] Instead, falling tags seem to be similar to the FallDecQs discussed in section 7. E.g. (50b) is roughly equivalent to "(Let me guess:) He's attractive↘".

This suggests that the interaction of intonation with tags is partly idiomatic. A fully compositional analysis of rising tags may be available. I.e. independently motivated accounts of ↗, PosPolQs, and HiNegQs might be combined to explain rising tags. But it's unlikely that independently motivated accounts of ↘, PosPolQs, and HiNegQs can be combined to explain falling tags. In the latter case, it seems that the tag is not simply an elliptical polar interrogative. Future work might explore why this is, expanding on the facts discussed above.

9 Other kinds of biased questions and conclusion

This chapter has demonstrated and characterized the two main kinds of question bias discussed in the literature, speaker bias and evidential bias. It has also demonstrated which forms of questions are linked to which kinds of bias. Phenomena covered included high negation questions, low negation questions, polarity/verum focus questions, *even*-questions, rising declarative questions, falling declarative questions, and negative tag questions. We also considered the state of the art in the dispute over whether high negation questions have an inner negation reading, and concluded that they do not. At the end of each section, I concluded with questions that might be fruitful for future research.

There is an incredibly rich literature on biased question phenomena beyond those discussed above that I omitted only for reasons of space. This includes interrogative flip in languages that grammatically encode evidentiality (Bhadra, 2020), discourse particles in many languages (Sudo, 2013; Yang, 2020; Deo, 2022; Korotkova, 2023; Law et al., 2024; Repp & Geist, forthcoming; Trinh, forthcoming), *really*-questions (Romero & Han, 2004; Bill & Koev, 2022; Goodhue, 2022c), *the hell*-questions (Ippolito, 2022), A-not-A questions (Wang, 2024), *=to* in Hindi-Urdu (Deo, 2022), the interaction of intonation and bias (Orrico & D'Imperio, 2020), the interaction of NPIs and evidential bias (Trinh, 2024), and the acquisition of biased questions (Goodhue et al., 2021; Woods & Roeper, 2021).

As more researchers explore the expression of speaker bias in particular, I expect many language-specific constructions to emerge. In some cases, the construction in question may well deserve a *sui generis* account. But we can reasonably hope that speaker bias phenomena will fall into crosslinguistic classes that are amenable to unified theories. For example, setting aside the purely pragmatic speaker bias of section 2, English expresses speaker bias via HiNegQs, the possibly related phenomenon of tag questions, *even*-PolQs, and also *really*-Qs. Many other languages also

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[19]Falling HiNegQs like this are in fact not HiNegQs at all but are negative exclamatives (Wood, 2014).

have tag questions, *even*-PolQs, some have HiNegQs, and we might also expect the use of intensifying adverbs like *really* in other languages too. And many languages express bias via discourse particles and evidential morphemes. While theories of HiNegQ bias, *even*-PolQ bias, *really*-Q bias, discourse particle bias, and evidential morpheme bias seem likely to be wholly distinct from one another, we may nevertheless hope to have a distinct theory for each kind that is flexible enough to explain crosslinguistic similarities and differences within each phenomenon. Ideally, as crosslinguistic theories for each class of biased question emerge, we can hope that they might be synthesized to produce unique insights into the nature of the semantics-pragmatics interface.

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