Negation, alternatives, and negative polar questions in American English

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Abstract

A longstanding puzzle in the semantics/pragmatics of questions has been the subtle differences between positive (e.g. *Is it ...?*), low negative (*Is it not ...?*), and high negative polar questions (*Isn't it ...?*). While they are intuitively ways of asking "the same question", each has distinct felicity conditions and gives rise to different inferences about the speaker's attitude towards this issue and expectations about the state of the discourse. In contrast to their non-interchangeability, the vacuity of double negation means that most theories predict all three to be semantically identical. In this chapter, we build on the non-vacuity of double negation found in inquisitive semantics (e.g. Groenendijk & Roelofsen (2009), AnderBois (2012), Ciardelli et al. (2013)) to break this symmetry. Specifically, we propose a finer-grained version of inquisitive semantics – what we dub 'two-tiered' inquisitive semantics – which distinguishes the 'main' yes/no issue from secondary 'projected' issues. While the main issue is the same across positive and negative counterparts, we propose an account deriving their distinctive properties from these projected issues together with pragmatic reasoning about the speaker's choice of projected issue.

Keywords: *Bias, Negation, Polar Questions, Potential QUDs, Verum Focus*

1 Introduction

When a speaker wants to ask a polar question in English, they face a choice between a bevy of different possible forms. While some of these differ dramatically in form (e.g. rising declaratives, tag questions), even focusing more narrowly on those which only have interrogative syntax, we find a variety of different forms, as in (1). There is a clear sense in which each of these questions seems to be a different way to ask the same question. And yet, each of them clearly has distinct patterns of usage, potentially giving rise to differing inferences about the speaker's mental attitude towards the question and its prospective answers. For example, while (1a) may at times convey the speaker expect the answer is likely affirmative, (1b) conveys at least that the speaker finds the negative answer to be more likely. (1c), on the other hand, seems to convey a stronger – or at least different – positive bias along with some indication of what the speaker had previously thought to be the case (e.g. Ladd (1981), Romero & Han (2004)).

(1) a. Is John cooking a Mexican dish? PosQ

b.	Is John not cooking a Mexican dish?	LoNegQ
c.	Isn't John cooking a Mexican dish?	HiNegQ
d.	Isn't John not cooking a Mexican dish?	HiLoNegQ

From the perspective of the compositional semantics, these differences pose a longstanding puzzle. Most leading theories of question semantics (e.g. Hamblin (1973), Groenendijk & Stokhof (1984)) predict that all of the questions in (1) should receive the same interpretation. The natural response, then, has been to turn to the pragmatics in the hopes that reasoning about why the speaker would choose one or the other of these questions would explain the mismatch between usage and predicted meaning. While not denying that pragmatics does play an important role (indeed, the account we develop here has a significant pragmatic component), this cannot be the whole story. First, polar questions with fronted or 'high' negation like (1c-1d) are fundamentally different than the others in ways that do not seem to be amenable to a pragmatic explanation. Second, as we will argue in §2.2, polar questions with 'low' negation, (1b), are more restricted than corresponding positive polar questions like (1a) in ways which are only partially attributable to pragmatics.

The mismatch between the various forms in (1) has therefore often been seen at least in part as a puzzle for the semantics of *questions*. There is, however, another culprit to which we might think to assign the blame: the semantics of *negation*. Under a Hamblin-style semantics for questions,[1] a positive polar question will be assigned an interpretation we can schematize as $\{p, \neg p\}$ with the first member of the set representing the question radical and the second added via a question operator. A negative polar question, then, will compositionally yield an alternative set $\{\neg p, \neg\neg p\}$. Since double negation is vacuous in classical logics, however, the interpretation for the negative polar question is equivalent to that of the positive polar question and hence we fail to distinguish positive and negative polar questions.

While the semantics of classical logics validate this equivalence, inquisitive semantics (Ciardelli et al. (2013) and references therein) does not and therefore offers the potential of a way forward. Inquisitive semantics posits that in addition to their *informative* contributions, the semantics of disjunction and existential quantification also have an alternative-evoking or *inquisitive* contribution. To take a simple example, (2a) and (2b) have the same truth-conditional information (setting aside things like sleet or hail for the sake of argument). However, (2a) also makes salient the issue of what kind of precipitation it is by highlighting rain and snow as distinct alternatives, whereas (2b) does not. Negation has been defined in inquisitive semantics as rejecting all of the alternatives to which it applies, the result of which is that while the interpretation of (2c) has the same truth-conditions as the negationless (2a), like (2b), it lacks an inquisitive contribution.

(2) a. It's raining or snowing.
b. It's precipitating.
c. It's not the case that it is not raining or snowing.

Since double negation is not vacuous, we predict that the alternative sets associated with positive and negative polar questions will indeed be potentially distinct: $\{p, \neg p\}$ and

[1] While we focus here on Hamblin semantics for simplicity's sake, the same issue arises for Groenendijk & Stokhof (1984) and other question semantics.

$\{\neg p, \neg\neg p\}$ respectively. Both sets have $\neg p$ as a member, but they differ in that the positive polar question has p where the negative one has $\neg\neg p$. The former is potentially inquisitive in the sense that (2a) is, while the latter is not just as (2c) is not. This difference seems plausible when we consider a minimal pair like (3). A speaker who utters (3a) leaves the issue of who José is bringing to the wedding as a plausible issue for the addressee's reply to address. In contrast, there is an intuition that the speaker of (3b) wants the addressee's reply to only focus on the main issue of whether he is indeed bringing someone at all, or as Romero & Han (2004) put it negative polar questions like (3b) are instances of so-called 'Verum focus', intuitively conveying added emphasis on the truth value of the proposition. We flesh out this conception of Verum focus in HiNegQs in detail below, arguing that it gives an appropriate characterization to the often quite elusory idea of 'emphasis of truth'.

(3) a. Is José bringing a date to the wedding?
b. Isn't José bringing a date to the wedding?

While the non-vacuity of double negation gives hope for a path forward, simply combining the previously proposed inquisitive semantics for negation and indefinites nonetheless has two significant problems. First, as we have seen in (1), there are not simply positive and negative polar questions, but rather a variety of different forms distinguished by the position of negation: 'high' vs. 'low'. As we show in detail below (and as Romero & Han (2004) have already argued), these forms differ in their patterns of usage. Existing inquisitive semantic accounts, then, are not fine-grained enough to capture these various distinctions and in particular offer no account of LoNegQs like (1b). Second, in order to distinguish positive and negative polar questions in this way, existing inquisitive semantics put the alternatives within the question radical (the different potential dates in (3a)) on equal footing with the main yes/no issue. That is to say that there is no longer a member of the alternative set corresponding to the 'yes' answer once positive and negative poalr questions are distinguished in this way.

In this chapter, we propose a finer-grained version of inquisitive semantics which we call **two-tiered inquisitive semantics** which distinguishes two kinds or 'tiers' of issues:

Main issue: A set of alternative(s) whose resolution is expected (roughly, a QUD in the sense of Ginzburg (1996), Roberts (1996), and others)[2]

Projected issue: A set of alternatives which is made salient as a potential or 'safe' QUD, but whose resolution is not necessarily expected.

The various positive and negative polar questions in (1), then, all contribute the same main issue. The projected issue, however will differ across the various kinds of questions in ways which are compositionally determined by the interaction between high and low negation and alternatives inside the question radical.[3]

[2]While the basic conception is, of course, shared, the current account is more like Ginzburg's in that we treat an assertion as introducing a single alternative as QUD (i.e. "Should we accept this proposal?").

[3]While we often illustrate alternative-evoking content inside the question radical with overt indefinites, following AnderBois (2014)'s work on sluicing, we assume that inquisitivity is a feature of existential quantification in natural language generally, including existential quantification over covert arguments such as

While the present account differs in how it treats the interaction between negation and inquisitive elements, the core idea of the projected issue is quite closely related to the notion of *highlighting* in Roelofsen & van Gool (2010), Pruitt & Roelofsen (2013), Roelofsen & Farkas (2015), and others. Both are attempts to provide a more fine-grained inquistive semantics, in part driven by the desire to reflect differences between positive and negative polar questions. The projected issue is perhaps even more similar to Onea (2015)'s *potential questions* (see also Groenendijk (this volume) for related discussion). Despite this notional support, the projected issue differs crucially in that it allows for negated alternatives to be projected, whereas the aforementioned theories do not. Since the empirical foci of these other authors differs, we leave a full comparison to future work. However, we believe there is every reason to expect that the notion of projected issue here is a close cousin with these other theories.

Given this two-tiered semantics distinguishing main and projected issues, we will argue that pragmatic reasoning about why a cooperative speaker would choose to make salient a given projected issue will correctly predict the core properties of positive, low negative, and high negative polar questions in English.

The road map for the remainder of the chapter is as follows: **§2** describes the properties of the three types of polar questions we are focused on, drawing on observations from previous literature along with some novel observations (especially regarding LoNegQs). **§3** develops and motivates a 'two-tiered' inquisitive semantics. **§4** examines the pragmatic reasoning linking §2 and §3. **§5** concludes.

2 Positive and negative polar questions

We distinguish three primary varieties of polar questions in (4) based on whether or not they contain negation and whether that negation is pronounced in a 'high'/'fronted' position or 'low' in the place where negation canonically appears in English more generally. As we have seen in the introduction, it is of course also possible to pronounce negation both high and low, in what we have called HiLoNegQs. For simplicity's sake, we will omit these from the discussion in most places since as we will see they pattern with HiNegQs in most respects.[4]

(4) a. Is John cooking a Mexican dish? PosQ
b. Is John not cooking a Mexican dish? LoNegQ
c. Isn't John cooking a Mexican dish? HiNegQ

While this categorization may seem obvious, it is important to note that much of the previous literature has in fact not divided up negative polar questions in this way. Instead of the the terms 'low' and 'high', much of the literature instead uses the terms 'inner' and 'outer'. While the latter two terms sound like they could be synonyms for our 'high' and

neo-Davidsonian events, states, degrees, etc. Aside from Verum focus-type constructions, then, question radicals will be inquisitive quite generally. See Onea (2015) for a quite different implementation of a similarly broader notion of the potential QUDs.

[4]There are of course a number of other forms we do not address here: rising declaratives, alternative polar questions with *or not*, tag questions, etc. We leave open the question of what role the tools developed here play in the analysis of these constructions.

'low', most authors do not appear to use them in this way. The 'inner'/'outer' terminology was originally coined by Ladd (1981) to describe a putative ambiguity in the interpretation of HiNegQs. Ladd's intuition is that HiNegQs are systematically ambiguous between an 'outer' reading double-checking p and an 'inner' reading double-checking $\neg p$ ('inner' because the negation is inside the proposition being 'double-checked'). Although many subsequent authors (notably Romero & Han (2004)) have given analyses relying on such an ambiguity, we will argue in §2.4 that there is in fact no such ambiguity.

Setting aside the putative ambiguity of HiNegQs, there remains the issue of how and whether the terms 'inner'/'outer' apply to polar questions with negation in its canonical, non-preposed position, i.e. LoNegQs. Ladd (1981) himself does not actually say whether or not 'inner' or 'outer' also apply to LoNegQs. On the one hand, his analytical intuition is that this difference is due to 'inner' high negation being somehow part of the proposition in question (i.e. the question radical). Following this intuition, one might think that LoNegQs would always be cases of 'inner' negation since negation is not high enough syntactically to ever be interpreted 'outside the question'. On the other hand, he illustrates both 'outer' and 'inner' questions using only examples with high/preposed negation.

In the wake of this unclarity, many subsequent authors have taken the term 'inner' to refer not only to certain readings of HiNegQs, but also to some or all instances of LoNegQs. The application of this term is presumably undertaken on the assumption that 'inner' HiNegQs have the same semantics/pragmatics as LoNegQs despite their different syntax. This reduction, however, is problematic since, as Romero & Han (2004)'s example in (5) demonstrates, there are contexts in which LoNegQs clearly pattern differently from HiNegQs.

(5) **Scenario:** The speaker is organizing a party and she is in charge of supplying all the non-alcoholic beverages for teetotalers. The speaker is going through a list of people that are invited. She has no previous belief or expectation about their drinking habits. A says "Jane and Mary do not drink."

a. S: OK. What about John? Does he not drink (either)?

b. #S: OK. What about John? Doesn't he drink (either)?

While we disagree with their claim that HiNegQs are in fact ambiguous in the first place, we do adopt Romero & Han (2004)'s conclusion that LoNegQs are not reducible to any usage/reading of HiNegQs. Sections §§2.2-2.4 flesh out a detailed characterization of the properties of LoNegQs and HiNegQs respectively, which further supports the relevance of this distinction. Before returning to the different types of negative polar questions, however, we first turn to describe the properties of the PosQ.

2.1 Properties of PosQs

Since at least Bolinger (1978), it has been clear that PosQs often convey that the speaker is biased towards the positive answer in a way that other polar questions do not. For example, consider Büring & Gunlogson (2000)'s examples in (6) and an example with a comparative in (7). The observation is that, in the absence of special intonation, (6a) often conveys the inference that the speaker thinks it more likely that she is left-handed, while disallowing the

opposite inference. The similar example in (6b) allows for the opposite inference, namely that the speaker believes she is right-handed.

(6) a. Is she left-handed?
b. Is she right-handed? Büring & Gunlogson (2000)

(7) a. Is Cutler better than Orton?
b. Is Orton better than Cutler?

While there are many cases in which PosQs convey a positive[5] bias, Büring & Gunlogson (2000) argue, however, that there are other scenarios where PosQs can be used in the absence of any clear bias, as in (8). The context here makes clear that there is no particular reason for the speaker to be biased one way or the other and either question is felicitous. Perhaps even more striking, we can construct a scenario like (9), in which the context not only lacks support for a positive bias, but in fact makes clear the speaker's neutrality. A fair teacher does not seek to convey any sort of bias towards one answer or the other and so, their neutrality here is clearly manifest in the discourse context.

(8) **Scenario:** S and A are talking long distance on the phone.
a. What's the weather like out there? Is it raining?
b. What's the weather like out there? Is it sunny? **Büring & Gunlogson (2000)**

(9) **Scenario:** Questions on a fair exam.
a. Is [b] a fricative?
b. Is [s] a fricative?

We have seen then that the PosQ has a disjunctive distribution: it can be used either to convey weak positive bias or it can be used in contexts where the speaker's neutrality is already evident or unimportant. As we will see below, this distribution is somewhat unlike LoNegQ s and HiNegQs, which have more narrowly proscribed contexts of use. As we discuss in detail in §4.1, we assume that such data are due to the unmarked syntactic form of PosQs relative to other polar question forms in English. Given this, PosQs in essence enjoy a 'default' status that allows them to be used in scenarios like (8-9) where no bias is conveyed.

We have thus far been silent on the question of exactly what the nature of the bias under discussion is. In the examples we have seen so far, this bias can be clearly characterized as either epistemic or doxastic. Along these lines, Büring & Gunlogson (2000) claim that bias in PosQs has to with what they call 'contextual evidence'. While a characterization of this sort seems apt in some cases, van Rooij & Šafářová (2003) argue that this is not sufficiently general (see also Roelofsen et al. (2012) for recent experimental work on this point). Rather than simply being epistemic, they develop the idea that bias in polar questions has to do with the *expected utility* of its answers given the goals of the conversation. While the beliefs of the speaker play an important role in computing the expected utility, so too do the desires of the speaker. For example, they claim that a question like (10) is felicitous in this

[5]As we discuss in §2.3, there are also cases where PosQs exhibit a negative bias when other elements such as NPIs are present.

context not because the doctor believes the positive answer to be more likely, but because it would help the medical staff move closer to their conversational goal of diagnosis more efficiently than the negative response. Similarly, if we consider an example like (11) where the speaker's goal is to find vegetarian food and so the PosQ is felicitous even though the evidence suggests a positive answer is unlikely. We therefore conclude along with van Rooij & Šafářová (2003) that bias here reflects not only the speaker's beliefs, but also goals/desires.

(10) **Context:** Question asked by a doctor in a medical questionaire.
Is your child apathetic?

(11) **Context:** At a BBQ restaurant.
Excuse me, I'm a vegetarian, do you (by any chance) have a veggie burger?

In addition to their potential for speaker bias, there is one further property of PosQs worth noting: they readily allow for elliptical secondary responses as in (12-13). The (b) responses here intuitively serve to better address the speaker's informational request by giving information which plausibly resolves a potential follow-up issue. We leave a detailed account of such fragment responses to future work, but mention them here in order to compare PosQs with negative polar questions below.

(12) **Context:** We are organizing a potluck dinner and want to have cake, cookies, and pie as desserts.
   a. Is John bringing a cake?
   b. Yeah, chocolate.

(13) a. Will José bring a date to the party?
   b. Yeah, Mary.

2.2 Properties of LoNegQs

As we have discussed in the introduction to this section, it is difficult to draw conclusions about LoNegQs from previous literature since most authors either limit their discussion to HiNegQs (e.g. Ladd (1981), Büring & Gunlogson (2000)) or else collapse LoNegQs with HiNegQs (e.g. van Rooij & Šafářová (2003)) or at least some of them (e.g. Reese (2007)). Romero & Han (2004), however, argue convincingly that LoNegQs are different than HiNegQs, offering the contrasts in (5) and (14) as evidence. In both examples, LoNegQs are felicitous in contexts where corresponding HiNegQs are not. This is so in (14) regardless of whether the HiNegQ contains a PPI, an NPI, or no polarity item at all, illustrating that regardless of one's views on the putative 'inner'/'outer' ambiguity, LoNegQs pattern differently.

(14) **Scenario:** S interviews A on TV about Rosa Montero.
A says: Mrs. Rosa Montero's writing career is closely related to the political episodes that Spain has lived through since 1936. There were times when she simultaneously worked on prose and poetry, but there were other times full of journalistic prose and completely devoid of poetry.

a. S: Please tell us more about those poetic gaps, and about what exactly caused them. For example, did she not write poetry in the '70s? And, if she didn't, why not?

b. #S: Didn't she write (some/any) poetry in the '70s? And, if she didn't, why not?

While we follow Romero & Han (2004) in concluding that LoNegQs and HiNegQs are distinct, we make this distinction with one caveat (which they also make): there are certain instances of LoNegQs which have the feel of HiNegQs as in (15a-15c). These uses – which we dub **Gladiator LoNegQs** – typically have an archaic feeling or else seem to reflect a particular oratorical style drawing on that archaic feeling. Indeed, as (15c) illustrates and Romero & Han (2004) discuss at length, questions which would colloquially be rendered as HiNegQs in present-day (American) English instead were realized with low negation *not*, with the potential for high negation *n't* being a relatively recent innovation.

(15) a. Scenario: The gladiator protagonist, Maximus, effortlessly kills yet another competitor. The crowd reacts with stunned silence at Maximus' ruthless efficiency, rather than applause.
Maximus: Are you not entertained? Are you not entertained? Is this not why you are here? **Gladiator**

b. Q: Are we not men? A: We are Devo! **Devo**

c. If you prick us, do we not bleed? **Merchant of Venice**

Having dispatched Gladiator LoNegQs to a different register, we now describe the properties of the more colloquial LoNegQs of present day English of the sort in (5) and (14). The first property of LoNegQs is that they display a weak bias towards the negative answer as seen in (16). The speaker in (16a) has at least a hunch that Billy does not like chocolate cake and similarly for the waiter in (16b). As discussed above, we follow van Rooij & Šafářová (2003) in taking this 'weak bias' to refer to the answers expected to have the highest utility value and therefore involve a combination of epistemic and bouletic bias.

(16) a. Does Billy not like chocolate cake?

b. Is that not cooked all the way through?

c. Do you not have any friends? Then click on this button... (van Rooij & Šafářová (2003))

While this sort of bias is intuitively of the same sort as what we have seen for PosQs, there is nonetheless an asymmetry. We saw that PosQs could be felicitously used in scenarios where the speaker was contextually established as being neutral or where the speaker's bias is not relevant. LoNegQs, however, are quite odd in such contexts as seen in (17-18). Since we argued above that the felicity of PosQs in these contexts was due to their default status and not the nature of the bias they convey, the infelicity we see here is expected.

(17) **Scenario:** S and A are talking long distance on the phone.

a. What's the weather like out there? #Is it not raining?

b. What's the weather like out there? #Is it not sunny?

(18) **Scenario:** Questions on a fair exam.

a. #Is [b] not a fricative?

b. #Is [s] not a fricative?

Setting aside the 'default' use of the PosQ, then, the picture we have seen thus far appears fairly symmetrical: weak bias towards whichever alternative is overtly realized in the question's form – towards the positive answer in PosQs and the negative one in LoNegQs. For PosQs, previous literature has sometimes summarized this same distribution slightly differently. For example, Roelofsen & Farkas (2015) follow Büring & Gunlogson (2000) in characterizing PosQs as being felicitous only if there is no compelling contextual evidence agains the positive answer. Roelofsen & Farkas (2015) in fact take this sort of generalization a step further, arguing that LoNegQs similarly are felicitous in neutral contexts. However, the examples they use to motivate this are ones like (19) from van Rooij & Šafářová (2003) where despite the apparent lack of epistemic bias, there again is plausibly a bouletic bias on the part of the speaker. We therefore conclude that there is indeed an asymmetry between PosQs and LoNegQs in neutral contexts.

(19) Have you not been able to receive credit from your financial institution to back up your business activities? Then click this button.

While we do not consider alternative questions with *or not* in this paper, they superficially appear to fit this 'bias to the overt' pattern too since both alternatives are overt, as in (20), and the question intuitively goes out of its way to convey neutrality.[6] Indeed, the fact that a pollster would feel the need to do so highlights the potential for bias that PosQs often have.

(20) **Scenario:** Question from a Gallup poll.

Q: Would you personally like to belong to a labor union at work, or not? Davies (2008-)

This apparent 'bias to the overt' pattern has given rise to several accounts of PosQs and LoNegQs which are purely pragmatic such as Farkas & Bruce (2010) (see also Roelofsen & Farkas (2015) for a further development of this idea and detailed discussion of previous literature in this area).[7] Farkas and Bruce propose a discourse model which, among other

[6] As in the case of LoNegQs, below, alternative questions with *or not* present additional complexities that go beyond 'bias to the overt'. For example, in many contexts, they contribute an additional feeling of impatience or urgency seen in (i), from COCA, what Biezma (2009) calls the 'cornering' effect.

(i) **Scenario:** A man is held at gun point breaking into a room, currently standing in the window.

Q: Calming scorned women was not one of Cal's skills. Especially another guy's scorned women. He had enough trouble keeping his own sex life straight without taking on someone else's. "**Look, can I step down or not?** I'm losing feeling in my legs and my neck is getting stiff." Davies (2008-)

[7] There are earlier accounts with similar ideas regarding bias, such as van Rooij & Šafářová (2003). However, they are not explicit about the syntax/semantics interface and moreover do not distinguish low and high negation. Their account is therefore a bit difficult to assess, though will presumably fall prey to this criticism as well.

components, relies on a construct they term 'the Table'. In addition to managing the Question Under Discussion stack (in the sense of Roberts (1996), Ginzburg (1996), Büring (2003), and others), the Table contains a record of (at least certain aspects of) the syntactic form of preceding utterances. For questions, the Table stores not the entire question, but rather the sentence radical.

For a PosQ, then, the Table will contain the positive sentence radical along with a diacritic indicating that the sentence that it came from was itself syntactically interrogative. Similarly, for a LoNegQ, the Table contains the negative sentence radical since the sentence's syntactic form is negative. Particle responses like 'yes' and 'no' are given accounts in which they confirm, reverse, or otherwise interact with the move that is on the Table. Confirmation moves are formally simpler than reversing moves, thus explaining the 'bias to the overt' pattern we have seen thus far. Were the facts this simple, a form-based pragmatic account of this sort would be quite parsimonious (although the differing behavior of HiNegQs still warrants an explanation, as Farkas & Bruce (2010) point out).

Things are not so simple, however. In particular, there are cases in which the context gives clear support for a weak negative bias on the part of the speaker, and yet the LoNegQ is infelicitous, in (21-23). What is different in these cases, we claim, is that the speaker not only has a negative bias, but also reason to believe that whatever the answer is, the addressee should be able to provide a simple 'yes' or 'no' with no further discussion.

(21) **Scenario:** A strict vegan at a café.
Q: Excuse me, I'm vegan. #Does your veggie burger not have dairy in it?
Q': Excuse me, I'm vegan. Does your veggie burger have dairy in it?

(22) **Scenario:** Question to a librarian with knowledge of the library's major holdings:
Q: # Does the library not have a copy of Shakespeare's first folio?
Q': Does the library have a copy of Shakespeare's first folio?

(23) I didn't see Bill at the party. John, you greeted everyone who was at the party, and you have a perfect memory.
Q: #? Was Bill not there?
Q': Was Bill there?

In these scenarios, the speaker clearly expects a negative response, but also expects that in either case, no protracted discussion will be needed. In contrast, in the felicitous examples above, the speaker has a hunch that the answer will be negative, but also plausibly anticipates more protracted discussion of to what extent or in what cases the negative answer will hold.

Note furthermore that this point holds under van Rooij & Šafářová (2003)'s more complex characterization of bias as involving both epistemic and bouletic components. The vegan speaker in (21) has both a reason to expect the veggie burger to be dairy-free since most veggie burgers are dairy-free and a clear desire for this to be the case since the speaker's goal is presumably to find a suitable product to purchase. Similarly, if we tweak the scenario in (22) to one in which a donor who owns a copy of the first folio is looking for a needy library to which to donate it, the judgments remain the same. Even under this more complex theory of bias, the conclusion remains the same: LoNegQs require not only weak

negative bias but the expectation of protracted discussion[8] as well. This latter component is not expected under a purely pragmatic approach relying directly on the question's syntactic form.

Finally, we observe that this truly is something about low negation itself and not about the content of the question *per se* since PosQs with similar content are licit in the same contexts, (24).[9]

(24) Q: Excuse me, I'm vegan. Is your veggie burger vegan?
Q': Excuse me, I'm vegan. Is your veggie burger dairy-free?

Perhaps related to the infelicity of LoNegQs in these contexts is the relative infelicity of bare particles as responses, as seen in (25). In contrast, responses consisting of a particle followed by a full clause are felicitous, (26), though as first observed by Ginzburg & Sag (2000), show a surprising 'neutralization' relative to their positive counterparts. We leave a detailed account of particle responses to future work, referring the reader to the many recent papers addressing this topic: Kramer & Rawlins (2009), Farkas & Bruce (2010), Brasoveanu et al. (2013), Holmberg (2013), Krifka (2013), and Roelofsen & Farkas (2015).

(25) a. Is Alfonso not coming to the party?
b. ??Yes. // ??Yeah. // ??No.

(26) a. Is Alfonso not coming to the party?
b. Yeah, he isn't coming. // No, he isn't coming.

To summarize, LoNegQs consistently convey a weak bias towards the negative answer when they are uttered. Unlike HiNegQs, they do not impose a condition of prior belief and therefore are felicitous in contexts where HiNegQs are not. However, weak bias alone is not enough to render LoNegQs felicitous, as they are infelicitous in contexts where a simple negative answer is expected. Instead, LoNegQs are most felicitous in contexts where the speaker has a hunch that the negative answer is more likely (and/or more desirable), but expects some sort of extended discussion take place.

2.3 The 'inner'/'outer' negation ambiguity in HiNegQs

Having given characterizations of both PosQs and LoNegQs, we turn now to the most divergent type of polar question, the HiNegQ. As mentioned above, whereas we have made a distinction in form between low and high negation, previous literature has often focused instead on what has following Ladd (1981) been regarded as an ambiguity between 'inner' and 'outer' uses of HiNegQs, as in (27).[10] As Romero & Han (2004) describe it, the

[8] See Walkow (t.a.) for related observation regarding the role of indeterminacy in the felicity of 'inner negation' polar question (i.e. HiNegQs containing an NPI).

[9] This distinction appears similar to the one discussed by Toosarvandani (2014) and references therein for certain uses of *but*.

[10] Among those who deny such an ambiguity are AnderBois (2011) (a forerunner to the present paper) and Sailor (2013). van Rooij & Šafářová (2003) also explicitly deny the inner/outer ambiguity, although it is not entirely clear how to reconclie their empirical claims with the present paper since they also do not distinguish low and high negation and the section of their paper which most directly addresses this point discusses German examples with negative quantifiers rather than sentential negation of any kind.

intuition is that the speaker of (27a) aims to 'double-check' the proposition p = 'that Jake likes red wine' whereas the speaker of (27b) aims to 'double-check' the proposition $\neg p$ = 'that Jake does not like red wine'.

(27) a. **'Outer' negation HiNegQ**
Doesn't Jake like red wine too?

b. **'Inner' negation HiNegQ**
Doesn't Jake like red wine either?

Since Ladd (1981), this distinction has been consistently regarded as a semantic ambiguity of the HiNegQ itself. The presence of polarity items – the PPI *too* in (27a), the NPI *either* in (27b) – is claimed to provide an additional morphosyntactic diagnostic for this independent ambiguity. While the received wisdom that HiNegQs are ambiguous has become quite ingrained, we will argue here that it is incorrect.

While this alleged ambiguity is taken to be part of the HiNegQ itself, examples in prior literature overwhelmingly are ones which contain an NPI or related scalar term such as *even*. Indeed, if we consider a version of (27) with no polarity item – *Doesn't Jake like red wine?* – it intuitively patterns with (27a) rather than being ambiguous between the two readings as the received wisdom would hold. In fact, surveying previous literature, I can find only a single example claimed to instantiate an 'inner' reading which does not include an NPI or *even*: Ladd (1981)'s original example in (28).

(28) **Situation:** Bob is visiting Kathleen and Jeff in Chicago while attending CLS.

a. Bob: I'd like to take you guys out to dinner while I'm here — we'd have time to go somewhere around here before the evening session tonight, don't you think?

b. Kathleen: I guess, but there's not really any place to go in Hyde Park.

c. Bob: **Oh, really, isn't there a vegetarian restaurant around here?**

d. Kathleen: No, about all we can get is hamburgers and souvlaki.

Following Kathleen's utterance, the context makes clear that the speaker, Bob, does not expect that there will be a vegetarian restaurant in Hyde Park and therefore is claimed to be 'double-checking' $\neg p$. That is to say, the context makes clear that Bob has an epistemic/doxastic bias towards the negative answer. However, it is equally clear in this example that Bob has a strong bouletic bias towards the positive answer – the whole purpose of this discourse, it would seem, is to find a suitable restaurant for the group (which presumably includes a vegetarian) to eat at. Therefore, rather than illustrating the potential for 'inner' negation in the absence of NPIs as Ladd (1981) and other authors have claimed, we take this example to show once again the importance of a pragmatics which, following van Rooij & Šafářová (2003), takes into account both the speaker's beliefs and conversational goals.[11] The impression that one gets in this example is that Bob is still holding out hope that his prior expectation that there is indeed a vegetarian restaurant near the conference site will pan out.

[11] van Rooij & Šafářová (2003) seem to suggest something like this about Ladd's example, though their discussion focuses on German versions of (28), which may or may not have the same properties. See also Asher & Reese (2007) for discussion of deontic/bouletic bias in HiNegQs.

One further important aspect of this example which helps make this possible, noted by Walkow (t.a.), is the presence of *hedges* in the surrounding context: *I guess* and *really*. These hedges give a degree of uncertainty to Kathleen's assertion, making it reasonable for Bob to still believe there to be some chance that there is a vegetarian restaurant nearby despite Kathleen's statement to the contrary. Despite the odds being against there being a vegetarian restaurant, he persists in asking the 'outer' negation question in (28), then, because: (i) there is *some* uncertainty with regards to Kathleen's statement, and (ii) the positive resolution of the issue is the most expedient — and possibly the only — way for the conversation to reach its goals. Put simply, then, our conclusion is that **there are no inner HiNegQs**, there are only HiNegQs which contain NPIs and other scalar items.

We will not attempt to give a detailed account of the interactions between HiNegQs and NPIs here. Since the interaction with polarity items has been taken as strong evidence in favor of the inner/outer ambiguity, however, we will briefly point out several reasons why the NPI landscape in HiNegQs is more complicated than is often assumed. Since it is the most fully fleshed out account out there, we will consider Romero & Han (2004)'s claims regarding NPIs in HiNegQs. Their intuition, following Ladd (1981), is that the 'inner'/'outer' distinction is a scopal ambiguity between a Verum operator (see §2.4 for discussion of Verum focus in HiNegQs) and negation, as in (29). NPIs, then, are claimed to be licensed in 'inner' HiNegQs by sentential negation, licensing which the Verum operator is assumed to block in 'outer' configurations like (29b).[12]

(29) NPI-licensing in Romero & Han (2004):

a. **'Inner' negation HiNegQ**
[Q [Verum [¬ [φ]]]] ⇐ NPIs licensed in φ by ¬

b. **'Outer' negation HiNegQ**
[Q [¬ [Verum [φ]]]] ⇐ NPI-licensing in φ blocked by Verum

It is well known that certain NPIs are licensed even in PosQs (e.g. Krifka (1995), Guerzoni (2004), Guerzoni & Sharvit (2007)) and so the mere presence of NPIs in HiNegQs is not itself telling. Ladd (1981) notes this, but suggests that the range of NPIs which are permitted in 'inner' HiNegQs is different than it is for PosQs, pointing to *either* as such an NPI. However, there are two problems with this empirical generalization revealed by Sailor (2013)'s quantitative investigation (see also Northrup (2014) for further discussion of these points). First, for many speakers of American English, HiNegQs with *either* are in fact fairly marked compared to corresponding LoNegQs (an average of 3.31 on a 7-point scale for the HiNegQ in Sailor (2013)'s survey, versus 6.31 for the LoNegQ). Second, other strong NPIs such as *until*-phrases are more clearly ungrammatical, (30b) (1.67 for HiNegQs vs. 5.94 for LoNegQs).

(30) a. %Can't your father eat peanuts either?
b. *Didn't Christian leave until Sarah arrived?

While the licensing and semantic effect of NPIs in HiNegQs remains a quite thorny issue for future work, these data make clear that this is so even if we assume Romero & Han

[12]The blocking assumption itself may be called in to question as well. See (AnderBois, 2011, pp. 225-227) for discussion of this point.

(2004)'s scopal ambiguity. We have already seen above that there is no evidence for 'inner' HiNegQs outside of HiNegQs with NPIs (or *even*). Taken together, then, we conclude that HiNegQs are not in fact ambiguous in the way hypothesized by Ladd (1981) and Romero & Han (2004). HiNegQs themselves have a semantics/pragmatics more similar to the 'outer' reading these authors discuss with any apparent 'inner' cases being due to the effect of NPIs and scalar items themselves.

2.4 Properties of HiNegQs

Previous literature has identified a set of (arguably) interrelated properties of HiNegQs: **(a)** added emphasis on the truth value of the proposition being questioned (i.e. Verum focus), **(b)** a positive prior expectation or prior speaker bias, **(c)** negative contextual evidence, **(d)** a strong positive bias towards a positive answer. Components (b) and (c) have been discussed in tandem by Romero & Han (2004) and much subsequent literature in terms of an 'epistemic conflict' given the opposing polarity of the two bodies of information.

2.4.1 Verum Focus

Verum Focus is the name given by Höhle (1992) for sentences like (32) which intuitively emphasize the truth-value of the asserted proposition in a way that the ordinary assertion in (31) does not.

(31) Kimiko went to the Himalayas.

(32) a. Kimiko DID$_F$ go to the Himalayas.
b. It is true that Kimiko went to the Himalayas.
c. It is the case that Kimiko went to the Himalayas.

Romero & Han (2004) claim that HiNegQs also exhibit verum focus, i.e. that (33) is better paraphrased by the examples in (34a-34c) than (34d).

(33) Isn't John baking a cake?

(34) a. Is it true that John is baking a cake?
b. Is it the case that John is baking a cake?
c. Is John really baking a cake?
d. Is John baking a cake?

The problem — both for HiNegQs and Verum Focus more generally — is how to capture this distinction while avoiding vacuity. For example, 'It's true that p.' has the same truth conditions as 'p' and attempts to treat Verum as contributing truth-conditional content (e.g. Romero & Han (2004)) fall short for this reason. The approach we propose in §§3-4 builds on Romero & Han (2004)'s insight that HiNegQs involve Verum focus, but develops a different conception of Verum as a lack of inquisitivity which avoids this problem and has the further benefit of deriving Verum compositionally from the inquisitive semantic effect of double negation, rather than positing a silent Verum operator as most previous accounts of Verum have done. One further point on this topic is that while the various

Verum constructions noted here intuitively achieve at least similar effects, there is no clear reason why we ought to expect that they all deserve a unified analysis.

2.4.2 Positive prior speaker bias

One of the insights of Ladd (1981) is that HiNegQs convey the speaker's prior bias towards the positive[13] answer was true, as indicated in (35). In most cases, this prior bias is a private one on the part of the speaker and not previously known publicly.

(35) a. A: Ok, now that Stephan has come, we are all here. Let's go!
b. S: Isn't Jane coming?
c. **Prior speaker bias:** Jane is coming.

This speaker bias has gone by several different names with similar characterizations in previous literature. Romero & Han (2004) discuss it as a ' positive epistemic implicature', by which they presumably mean something more like a conventional implicature than a conversational one since they claim it to arise obligatorily in HiNegQs. Along the same lines, Sudo (2013) calls it an 'epistemic bias' and Northrup (2014) simply calls it 'speaker bias'. While some of these labels suggest that this prior speaker bias is purely epistemic, many authors have made the point that (as discussed above for Ladd's Moosewood example), this bias reflects some combination of epistemic and bouletic factors, as the following examples from Huddleston & Pullum (2002) illustrate (see also Reese (2007) for further discussion of these examples).

(36) a. Aren't you ashamed of yourself?
b. Don't you like it?

Setting aside the question exactly what combination of these various kinds of bias is relevant, we can make the generalization in (37).

(37) **Prior speaker bias:** HiNegQs regularly convey that the questioner was previously biased towards the positive answer being true, likely privately.

2.4.3 Negative compelling contextual evidence

This positive prior speaker bias conflicts[14] with a negative bias of a different sort first discussed in detail by Büring & Gunlogson (2000): what they call compelling contextual evidence (Sudo (2013) calls this 'evidential bias', Northrup (2014) 'contextual bias').

(38) Compelling contextual evidence (adapted from Büring & Gunlogson (2000))

[13]Polar questions with both high and low negation (e.g. *Isn't Jane not coming?*) are a clear exception, instead showing a negative prior bias.

[14]Romero & Han (2004) talk about HiNegQs in terms of an 'epistemic conflict'. For them, the conflict we see here between prior speaker bias and compelling contextual evidence is but one kind of 'epistemic conflict'. We discuss this in detail below.

a. **Contextual evidence:** Evidence that has just become mutually available to the participants in the current discourse situation.

b. **Compelling:** Evidence against p is compelling if, considered in isolation, it would allow the participants to assume $\neg p$ (i.e. the evidence could reasonably be considered to justify the inference that $\neg p$).

Unlike the prior speaker bias above, this negative contextual bias is available not only to the speaker, but to the addressee as well and hence part of the shared context in a way that speaker bias need not be. It also differs temporally, having arisen more recently that the prior speaker bias. Returning to the example from (35), the following biases can be identified:

(39) a. A: Ok, now that Stephan has come, we are all here. Let's go!

b. S: Isn't Jane coming?

c. **Prior speaker bias:** Jane is coming.

d. **Compelling contextual evidence:** Speaker has said that everyone who is coming is all there and Jane is not there.

Based on such examples, then, Northrup (2014) makes the following empirical claims (terminology adapted to the present context):

(40) **Northrup (2014)'s generalizations of bias in HiNegQs:**

a. HiNegQs require a conflict between positive prior speaker bias and negative compelling contextual evidence for the anchor proposition.

b. The source of conflicting contextual evidence must be recoverable by the addressee.

However, while this is certainly a typical scenario in which to use a HiNegQ, we claim that there are other cases that do not fit this characterization.[15] The first such case, discussed at length by Romero & Han (2004), are *suggestions* like (41). Here, the question conveys that the speaker has a previous belief that Frege has reviewed for the journal (indeed, it would be quite odd to *suggest* a resolution to the issue in this way if this were not so). However, there does not need to be any contextual evidence which has called this prior belief into question in order for such uses to be felicitous.

(41) **Scenario:** Dialog between two editors of a journal in 1900.

a. A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody who has experience with our regulations.

b. S: **Hasn't Frege already reviewed for us?** He'd be a good one.

[15] Some of the discussion and data in Romero & Han (2004) suggests a similar conclusion. For example, in their footnote 6, they state that "contextual evidence seems to be a valid reason to ask a yn-question in a particular way, but it is not the only one." They, however, nonetheless refer to 'epistemic conflict' as a necessary feature of felicitous uses of HiNegQs and therefore their characterization differs somewhat from the one we give here.

While there is no compelling contextual evidence in such scenarios, Romero & Han (2004) claim that such scenarios nonetheless involve an epistemic conflict, but of a different sort. Rather than having evidence against the prior belief, they claim, the speaker in such cases lacks sufficient grounds in order to felicitously assert the prior belief. While this is plausibly true of (41) and of the other examples they discuss, there are other examples for which this is not the case. One such class of cases where HiNegQs are licensed in the absence of negative compelling contextual evidence are with *perspectivally rich predicates* such as predicates of personal taste. In these cases, the speaker's prior bias need not be in any doubt. The mother in (42a) presumably is quite confident in the baby's beauty, enough so to make the assertion 'My baby is beautiful'. Even if the addressee is publicly known to find the baby beautiful, the question still remains felicitous. Similarly, (42c) can be uttered felicitously in a context where both speaker and addressee are already clearly enjoying the pie in question.[16]

(42) a. Isn't my baby beautiful?
b. Don't you love the smell of jasmine?
c. Isn't this pie delicious?

A third case in which HiNegQs are licensed in the absence of compelling contextual evidence is in rhetorical uses like (43). Here, the speaker, A, can utter the questions in (43) in order to point out to the addressee, B, what follows from two premises, neither of which need be in doubt. The effect of the HiNegQ here is to get the addressee to publicly commit to the premises in order to explain that the addressee ought to believe the conclusions that follow from it.

(43) **Context:** The speaker is trying to convince the addressee that Hesperus is Phosphorus based upon two premises which are presumed to be shared.
a. A: Isn't Hesperus the same star as the Evening Star?
b. B: Yes.
c. A: Isn't Phosphorus the same star as the Evening Star?
d. B: Yes.
e. Therefore, you must believe that Hesperus is the same star as Phosphorus.

Rather than requiring compelling contextual evidence, then, we claim that HiNegQs are subject to the condition in (44):

(44) **Bias generalization in HiNegQs:** HiNegQs are felicitous only if:
a. the speaker has a positive prior speaker bias, and
b. the speaker has a plausible conversational purpose for wanting the addressee to assert some version of p or $\neg p$.

[16] How exactly to interpret these data depends, of course, on one's semantics for predicates of personal taste. However, given that they are felicitous even when it seems clear the addressee finds the pie tasty, for example, the conclusion we draw here seems secure regardless of the semantics one gives such predicates.

In order to see how this generalization captures both the conflicting bias cases like (39) and these various other cases, it is useful to think about the nature of assertion and the various effects assertions have. Following the ideas of Stalnaker (e.g. Stalnaker (1978), Stalnaker (2002)), we take the primary or *essential effect* of assertion to be to (propose to) "reduce the context set in a particular way". However, Stalnaker and other subsequent authors have identified various *secondary effects* which assertions may have in addition to their essential effect. In particular, we follow Hamblin (1971), Gunlogson (2001) and other recent works in taking one important secondary effect of assertion to be adding the informational content of the sentence to the speaker's list of *public commitments*. Aside from whatever update to the context set the addressee's answer may produce, their reply also adds to their individual slate of public discourse commitments in the discourse.

The conflicting bias cases like (39), then, are cases where the speaker is asking the HiNegQ primarily to elicit the essential effect of the addressee's assertion. In the face of contextual evidence which conflicts with the speaker's prior bias, the speaker seeks to verify whether the proposition in question belongs in the common ground. In the suggestion, perspectival and rhetorical cases, (41-43), however, it is this secondary effect which the speaker seeks. In the suggestion and rhetorical cases, the speaker is trying to get buy-in for a joint action or conclusion and so having the speaker affirm the truth of p is in and of itself useful to the speaker, even though the speaker was not faced with any reason to doubt his or her positive prior bias. The predicate of personal taste cases are perhaps somewhat different, but can also be thought of as examples in which the addressee's public commitment to the proposition in question is itself the speaker's goal, rather than any informational gain in the common ground/context set. The HiNegQ is particularly useful for this purpose since in addition to soliciting the addressee's assertion, it serves to make public the speaker's otherwise private prior bias, which in the absence of contextual evidence against it, serves to highlight these secondary effects of assertion.

2.4.4 Positive preferred resolution

The final piece of the puzzle is the observation that HiNegQs typically convey that the speaker presently has a strong bias towards the addressee providing a positive answer. This bias is intuitively 'stronger' than what we have seen for PosQs and LoNegQs, but we also would like to suggest that it is qualitatively different. As discussed above, HiNegQs are typically used in contexts in which the speaker's prior bias conflicts with some piece of negative compelling contextual evidence. Faced with such a conflict, a speaker has a choice between discourse futures in which **(i)** they are able to retain their prior belief or **(ii)** they revise their previous belief in light of the compelling contextual evidence.[17]

(45) a. Doesn't Jake like red wine?
b. **Prior speaker bias:** Jake likes red wine.
c. **Preferred Resolution:** Jake likes red wine.

[17] In principle, of course, there are discourse futures in which the speaker's conflict remains unresolved. However, since the speaker was already in such a state, it's hard to see why a rational speaker would go to the trouble of uttering the HiNegQ if s/he did not aim to resolve it, especially given the Verum-like nature of HiNegQs.

The strong positive bias we see in HiNegQs like (45a), then, can be thought of as the speaker's bias towards retaining her prior belief in spite of whatever publicly available evidence there may be to the contrary. In the example in (27a), this means continuing the conversation with the proposition 'Jake likes red wine' in the common ground, as the speaker had previously believed (though likely privately). This is the default case, and with good reason. As rational speakers, we strive to maintain our prior beliefs unless they are proven wrong. Especially since the speaker of a HiNegQ goes out of her way to indicate a prior belief, it makes sense that she would, in general, strive to keep that belief. That is, addressees assume that the principle in (46) holds.

(46) **Default bias principle for HiNegQs:** A speaker who utters a HiNegQ conveying a prior speaker bias (i.e expectation) for p is taken by default to have a (strong) bias towards resolving the issue in favor of p.

While the data in this area are somewhat unclear and perhaps subject to dialectal or other variation, 'inner' HiNegQs like (47), then, are cases where this default preference against belief revision is overridden by the inclusion of an overt linguistic marker of bias such as NPIs or *even*. The speaker in an example like (47) conveys that the contextual evidence is so persuasive that she seeks to abandon her prior bias towards p and instead proceed with $\neg p$ in the common ground. Again, we leave exploration of the data and analysis of the semantics/pragmatics of NPIs to future work, but for now simply note that their role in HiNegQs is simply to override this default bias which is otherwise present.

(47) a. Doesn't Jake like red wine either?
b. **Prior speaker bias:** Jake likes red wine.
c. **Preferred resolution:** Jake doesn't like red wine.

To summarize, in this subsection we have discussed four major properties of HiNegQs: verum focus, positive prior speaker belief, negative compelling contextual evidence (or some other reason for the speaker to want the addressee to assert an answer), and a positive preferred resolution that we attributed to a general bias against belief revision.

More generally, we hope to have shown in this section that the landscape of polar questions is quite variable in ways that are somewhat more complicated than some prior descriptions suggest. In particular, beyond the well-known exceptional nature of HiNegQs we have seen that bias usage patterns seen in PosQs and LoNegQs are more complicated than a simple bias towards whatever alternative is overtly realized. We have argued that the broader distribution of PosQs – specifically, their felicity in cases where the speaker's bias is clearly established or irrelevant – can be captured by appeal to their 'unmarked' status relative to negative polar questions. For LoNegQs, however, we have argued that they have a more limited distribution than 'bias to the overt' would predict, being relatively infelicitous in contexts where a straightforward yes/no answer is expected.

To summarize, the bias an other inferences associated with positive and negative polar questions are as follows:

(48) **Summary of properties of polar questions:**

PosQs	May convey weak positive speaker bias. 'Default' use with no bias conveyed also possible.
LoNegQs	Always convey weak negative bias plus possibility of extended discussion.
HiNegQs	Always emphasize truth value of main issue, convey positive prior expectation/belief. Default bias against revising prior expectation/belief.

In the remaining sections, we develop an account capturing the similarities and differences between each three types of polar questions which relies on a combination of semantics, §3, and pragmatic reasoning about the speaker's choice to utter a particular one of these, §4.

3 Semantically distinguishing main and projected issues

Previous literature examining different varieties of polar questions has, for most part, either focused on a single subtype of polar question such as HiNegQs, or else has focused primarily on differences in bias between different types. While we have seen bias is certainly one key element distinguishing different positive and negative polar questions, we have also seen that things are a good deal more complicated than this. One of the central observations in §2 was that beyond their biases, PosQs, LoNegQs, and HiNegQs also differ in a related way: what secondary issues they steer the immediate conversation towards (or away from). PosQs promote discussion of certain sub-issues within the positive answer. Beyond just privileging the negative answer, LoNegQs promote protracted discussion of even partial evidence for the negative answer. Finally, HiNegQs emphasize the truth/falsity of the main issue, i.e. they discourage discussion of all issues beyond the main issue.

The central idea we pursue here is that these secondary issues – which we will call *projected issues* – are rooted in the compositional semantics. The various speaker attitudes and biases we find, then, arise from pragmatic reasoning about why the speaker would choose to highlight one projected issue or another (or not in the case of the HiNegQ). To do this, then, we need a compositional semantics for not only the primary yes/no issue – what we will call the *main issues* – but also for issues inside of the question radical itself. Furthermore, to get at the differences between positive and negative polar questions in a compositional way, we need semantics which captures the effect of high and low negation on these projected issues.

Inquisitive semantics (Ciardelli et al. (2013) and references therein) gives the beginning of just such a set of tools. In particular, it develops an issue-rich notion of sentence meaning in which disjunctions and indefinites introduce sets of alternatives into the composition. These alternatives can interact compositionally with other elements to produce alternative-rich meanings for questions and assertions alike. The result is that we predict straightforwardly a difference between positive and negative polar questions.[18] While this distinction is on the right track, it falls short for a couple reasons, most obviously that it

[18]Unsurprisingly given its aims, prior work in inquisitive semantics does not distinguish between high and low negation. As we will see in the 'two-tiered' inquisitive semantics we develop below, the negation in 'flat' inquisitive semantics is most like the account we give for high negation rather than low.

fails to distinguish LoNegQs from HiNegQs. We will therefore develop a 'two-tiered' inquisitive semantics in which sentence meaning consist not just of a single set of alternatives, but rather a *pair* of such alternative sets: one for the main issue and one for the projected issue. Beyond providing a semantic basis for the pragmatic account of polar questions in §4, we believe that the resulting system allows for clear statements of the discourse status of inquisitive alternatives while maintaining the central insights of the framework.

3.1 A flat inquisitive semantics

Inquisitive semantics is built around two (related) core ideas: (i) that indefinites and disjunctions have an alternative-evoking semantics not unlike that of questions, and (ii) that top-level sentence meanings need to be rich enough to reflect this inquisitive contribution. The former idea, (i), predates inquisitive semantics, being found in various works in what has been called 'Hamblin' or 'alternative' semantics (e.g. Kratzer & Shimoyama (2002), Simons (2005), Alonso-Ovalle (2006)). In these works, however, the alternative-rich contribution of these elements is only a feature of subsentential composition, with existential or other closure operators applying to return classical sentence meanings, i.e. a set of possible worlds. Inquisitive semantics, however, holds that this inquisitive contribution is reflected in the top-level meaning (or rather can be depending on the rest of the semantic composition).

One simple way to do this – what we will call a 'flat' inquisitive semantics – is to assign assertions the same sort of meaning as questions, sets of sets of possible worlds as in Groenendijk & Roelofsen (2009) *et seq.* (intuitively, sets of alternatives).[19] Hamblin (1973) himself makes this move in a technical sense, but uniformly assigns an assertion a meaning which is a singleton set. In contrast, a (flat) inquisitive semantics defines disjunction as in (49)[20], resulting in a denotation consisting of two alternative propositions, as in (50). One helpful way to think of these meanings is visually, as in (50b), where circles represent possible worlds, numbers indicate the truth-values of the two propositions in a given world, and boxes representing alternative sets of possible worlds:

(49) $[\![\varphi \vee \psi]\!]^{\mathcal{M},g,w} = \textsc{Alt}\{\alpha \subseteq \mathrm{W} \mid \exists \beta \in [\![\varphi]\!]^{\mathcal{M},g,w} : \alpha \subseteq \beta \textit{ or } \exists \gamma \in [\![\psi]\!]^{\mathcal{M},g,w} : \alpha \subseteq \gamma\}$

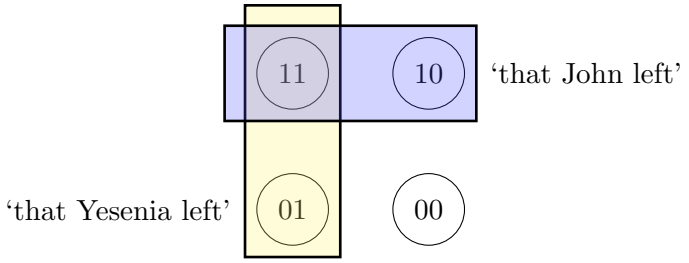
(50) John or Yesenia left.

a. {'that John left', 'that Yesenia left'}

[19] As an anonymous reviewer points out, Roelofsen (2013) and several more recent works has made use of a narrower definition in which inquisitive meanings are downward closed sets of alternatives (e.g. Roelofsen & Farkas (2015), Onea (2015), Ciardelli et al. (2015)). Roelofsen (2013)'s argument for this is theoretical: it allows for operators like disjunction and negation to be defined in ways that are mathematically parallel to their definitions in classical logic. Other works have given more empirical arguments for such a restriction. For example, Ciardelli et al. (2015) argue that downward closure allows for a principled solution to the problems first posed by Shan (2004) for using alternative semantics in subsentential composition. Since subsentential composition is not crucial here, we leave it to future work to determine whether such a move is compatible with the current account. One particular challenge for such an integration, as we discuss in §3.5, is that the necessary definition for negation cannot be straightforwardly recast in this alternative framework.

[20] Alt is Groenendijk & Roelofsen (2009)'s 'alternative closure' operator, which ensures that we get the *maximal* alternative meeting the stated condition. That is to say, Alt ensures we get sets of possible worlds which are truly *alternatives* rather than different *possibilities*.

b.



Extending such a semantics to indefinites and other forms of existential quantification is fairly straightforward at an intuitive level (e.g. Ciardelli (2009), AnderBois (2012)).[21] Whereas a disjunction specifies alternatives one by one, an indefinite produces a set containing one alternative per individual in the restrictor set. While in principle diagrams like (50b) could be given for such cases, in practice they become quite cumbersome once we move from 4 possible worlds to 8. For this reason, we will stick here to existential quantification with only two elements in the domain (and, similarly, to disjunction with only two disjuncts). Given this expository restriction, then, the diagram of meaning of (51) is the same as in (50b).

(51) ⟦ Someone left ⟧ = { 'that John left', 'that Yesenia left', 'that José left', . . . }

Beyond intuitions, several empirical arguments have emerged for a semantics along these lines. First, there are various arguments from the Hamblin semantics literature that argues for the necessity of alternatives within sentences, i.e., core idea (i) above. For example, Alonso-Ovalle (2009) argues that sentences with disjunctive counterfactual antecedents such as (52) require worlds in both the disjunctive alternatives in the antecedent to be counterfactually entertained in order for the sentence to be judged true.

(52) If we had had good weather this summer or the sun had grown cold, we would have had a bumper crop. Nute (1975)

Second, in many languages, alternative and *wh*-questions are compositionally derived from disjunctions and *wh*-words which receive existential interpretations in other syntactic environments respectively. For example, AnderBois (2012) gives a compositional semantics in which the inquisitivity of a question like (53) in Yucatec Maya is compositionally contributed by the indefinite *wh*-word, *máax* 'who' (see also Haida (2010) for a related account in a dynamic framework).

(53) [Máax]$_F$ uk' le sa'-o'
someone drink.Agent.Focus Def atole-Distal
'Who drank the atole (a Mesoamerican corn beverage).'

Finally, AnderBois (2014) argues that the semantic identity condition on sluicing must make reference not only to truth-conditional *information*, but also to inquisitive semantics issues. For example, inquisitive elements like disjunction and indefinites license sluicing, while truth-conditionally equivalent elements do not.

[21] Formally, it has been argued that this extension is in fact somewhat more fraught in the case of models with non-finite domains. See Ciardelli (2009) for detailed discussion.

(54) a. Someone left, but I don't know who.
b. #It's not the case that no one left, but I don't know who.

Thus far, we have seen examples of inquisitivity in overt disjunctions and indefinites, however AnderBois (2014) further argues on the basis of examples like (55a) that inquisitivity of this sort is part of existential quantification in natural language (or at least in English) generally, including also covert existential quantification over implicit arguments including Neo-Davidsonian event arguments. The antecedent clause 'Someone left.' in (54a) licensing sluicing in part because it makes salient a set of alternatives 'x left' (unlike 'It's not the case that no one left.' in (54b)). 'John left' in (55a) similarly licenses sluicing in part because it makes salient a set of alternatives of the form 'e is an event of leaving of which John is the agent.'.

(55) a. John left, but I don't know when.
b. $[\![\text{John left}]\!] = \exists e.\text{leave}'(e) \wedge \textsc{Agent}(e, \text{j})$

We refer the reader to these works for detailed discussion of the analyses discussed here. The relevant conclusion here is that there is independent evidence for an inquisitive semantics for disjunction and existential quantification. Since this extends to covert existential quantification, the result is that assertions quite generally will highlight issues as natural directions for future elaboration. For polar questions, then, question radicals will typically have an inquisitive contribution of some kind.

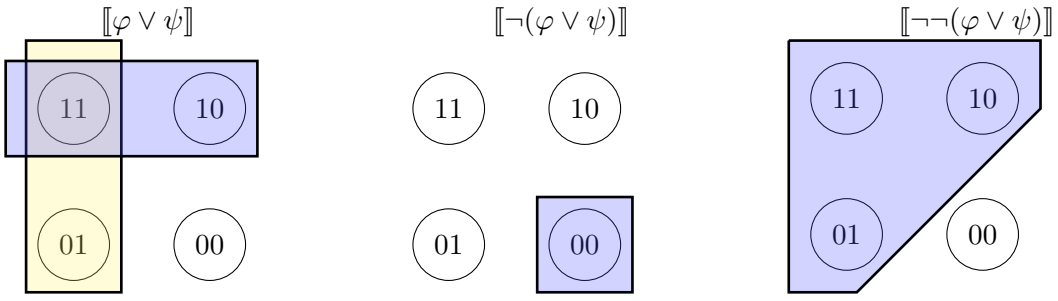
3.2 Negation and polar questions in a flat inquisitive semantics

Since sentence meanings are sets of alternatives, sentential negation in flat inquisitive semantics is defined as rejecting each alternative, as in (56).

(56) $[\![\neg\varphi]\!]^{\mathcal{M},g,w} = \textsc{Alt}\{\alpha \subseteq \text{W} \mid \textit{every } \beta \in [\![\varphi]\!]^{\mathcal{M},g,w} \textit{ is such that } \alpha \cap \beta = \emptyset\}$

It follows from this definition that *double* negation is no longer vacuous, as in (57). While it preserves truth-conditions, double negation eliminates inquisitive content, returning a set consisting of a single alternative in place of many.

(57)



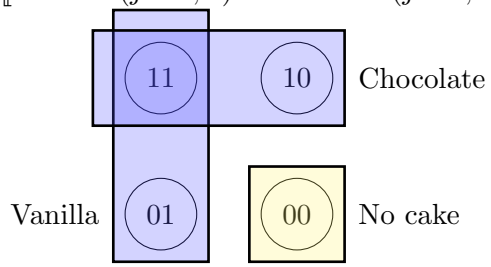
Beyond the contrast in (54), the non-vacuity of double negation makes the prediction we noted at the outset: that positive and negative polar questions will have subtly different semantics. To see this, we first need to discuss the semantics of polar questions and how it differs from that of alternative-rich assertions we have seen. Under Hamblin (1973)'s

semantics for questions, questions and assertions differ in the cardinality of the set they denote: singleton sets for assertions and non-singleton sets for questions. Later refinements of Hamblin such as Lahiri (2002) (as well as Groenendijk & Stokhof (1984)) make this distinction in semantic type: st for assertions, st, t for question (s, st for Groenendijk & Stokhof (1984)). Having posited alternative-rich meanings of type st, t for assertions, neither of these options is available in the current context.[22]

Instead, flat inquisitive semantics has distinguished questions and assertions by whether or not they are *potentially informative*.[23] Two different approaches to uninformativity have been taken in prior literature: absolute (e.g. Groenendijk & Roelofsen (2009)) and relative to semantic presuppositions (e.g. AnderBois (2012)). For *wh*- and alternative questions, the choice in part depends on whether or not one thinks these have existential presuppositions. While this issue remains quite unresolved, it does not even arise for polar questions in English which clearly do not have any systematic presuppositions. Therefore, we adopt an absolute uninformativity approach, positing a question operator of the form $p \vee \neg p$ which adds in the 'elsewhere' alternative following Groenendijk & Roelofsen (2009). The result, then, is that our flat inquisitive semantics delivers the alternative set in (58) for a positive polar question.

(58) a. Is John baking a cake? (PosQ)

b. $[\![\exists x.\text{bake}'(john, x) \vee \neg\exists x.\text{bake}'(john, x)]\!]$ PosQ



Since double negation is no longer vacuous as we have seen, we predict a subtly different meaning for the corresponding negative polar questions as in (59).

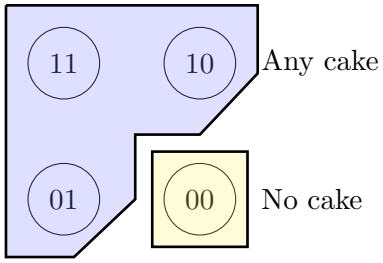
(59) a. Isn't John baking a cake? (HiNegQ)

b. $[\![\neg\exists x.\text{bake}'(john, x) \vee \neg\neg\exists x.\text{bake}'(john, x)]\!]$ HiNegQ

[22] Under the two-tiered inquisitive semantics we develop in §3.3, this complication does not arise as questions can be distinguished from alternative-rich assertions by which tier their alternatives are located.

[23] Given the existence of tautological assertions like (i), defining potential informativity is a bit more fraught than it would appear. See AnderBois (2012) for discussion and a solution appealing to Gajewski (2009)'s notion of L-triviality.

(i) *Either a ham has a bone or it doesn't have a bone.* Where'd they get a name like 'semi-boneless' from? Ward & Hirschberg (1991)



Comparing the two meanings, we see that the one for the PosQ retains the alternatives introduced by the indefinite *a cake* in the question radical, while the double negation of the HiNegQ eliminates this alternative-rich structure. While this seems to be in line with the intuitions outlined above regarding the secondary issues of the PosQ and HiNegQ, two significant problems remain. First, there is no clear way to capture LoNegQs under this semantics and in particular to distinguish them from HiNegQs. Second, while the flat inquisitive semantics here does distinguish PosQs and HiNegQs, it does so by giving a meaning for the PosQ which contains alternatives for the different cakes and one for no cake, but does not include an alternative for 'some cake or other'. This is an undesirable result since we no longer capture the difference between a PosQ with an indefinite, like (58a), and a corresponding *wh-question* like (60).

(60) What if anything is John baking?

While (58a) facilitates a response which provides the kind of cake, the speaker of (60) clearly *expects* the addressee to give such a response if she is sufficiently informed to do so. Furthermore, though we do not give an account of 'yes' and 'no' here (though see Roelofsen & Farkas (2015) for a recent account in an inquisitive framework), it seems difficult at best to give an adequate account of a 'yes' response to the question in (58) under this approach. As the moniker 'flat' we have been using suggests, the kind of inquisitive semantics under discussion thus far does not allow for any differentiation between the main issue alternatives (from the Q-operator) and the secondary issues (from disjunction and existential quantification inside the question radical).

3.3 Distinguishing two kinds of 'issues'

We have seen that while flat inquisitive semantics does distinguish PosQs and HiNegQs, it is insufficiently rich to (i) differentiate LoNegQs from HiNegQs, and (ii) differentiate main issue alternatives from alternatives arising within the question radical. Both of these problems, we argue, can be resolved given a semantics which distinguishes two different kinds of issues: *main* issues and *projected* issues. Concretely, we posit 'two-tiered' sentence meanings, $\langle\!\langle \varphi \rangle\!\rangle$, which consist of an ordered pair $\langle \mathcal{M}, \mathcal{P} \rangle$ where both $\mathcal{M}$ and $\mathcal{P}$ are sets of (flat) alternatives. We deal with the pragmatics of these two tiers in detail in §4, but for now note that these two kinds of issues have different characteristic effects on the discourse as in (61).

(61) **Characteristic pragmatics of the two tiers:**

a. The *main issue* presents an issue whose resolution the speaker expects/requests if possible (i.e. introduces a Question Under Discussion (QUD) in the sense of Ginzburg (1996), Roberts (1996), and others).

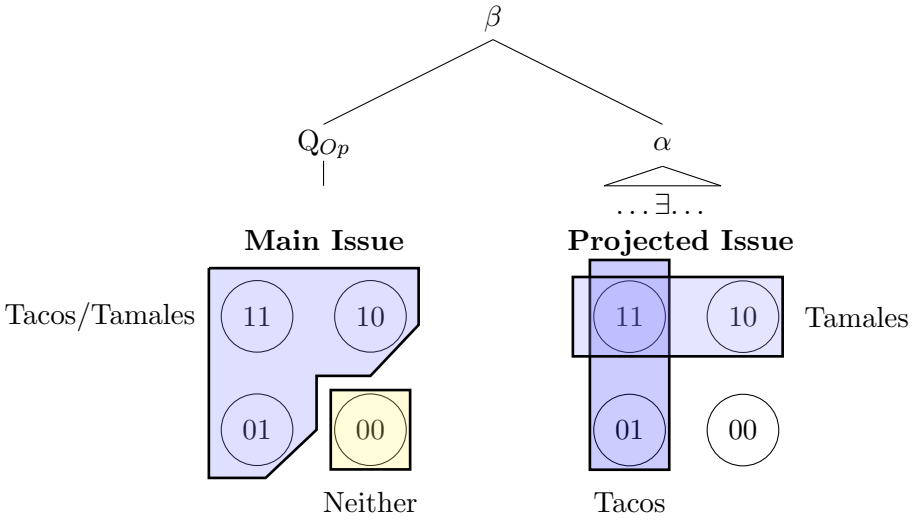
b. The *projected issue* makes salient a potential QUD, but produces no obligation for the addressee to respond.

While the main issue can be related to the QUD straightforwardly, the notion of potential QUD requires a bit more discussion. It is in many ways similar to the notion of potential QUD developed in detail in Onea (2015), but the details differ in at least two ways (see also van Kuppevelt (1995), Wisniewski (1995) for related ideas). First, as discussed below in some detail, in the case of negation, the present system crucially allows for projected issues which do not further refine a any alternative in the main issue. Second, for Onea (2015), it is the informativity of assertions which licenses potential QUDs and so polar questions like the ones we consider here would not license potential QUDs. In this way, the present may be seen as extending the leading idea of Onea (2015), even though the formal approaches are somewhat different.

Returning to English polar questions, then, these two issues arise from different sources as follows:

(62) a. Did Amelia bring a Mexican dish?

b.



c. $\langle\!\langle (62a) \rangle\!\rangle =$

$$\frac{\{\{w : \text{A brought tacos and/or tamales in } w\}, \{w : \text{Amelia brought no Mexican dish in } w\}\}}{\{\{w : \text{Amelia brought tacos in } w\}, \{w : \text{Amelia brought tamales in } w\}, \dots\}}$$

The meaning of the PosQ in (62a), then, is an ordered pair with each member of the pair being a set of alternative sets of possible worlds, which we will write in a fraction notation $\langle\!\langle \varphi \rangle\!\rangle = \frac{\mathcal{M}}{\mathcal{P}}$ as in (62c) for readability's sake. We provide the compositional details in subsequent sections below, but for now simply highlight that the top level meaning, in line with (61), distinguishes the essential main issue, which the questioner expects addressed, and the projected issue, which is made salient as a potential issue for the addressee to reply

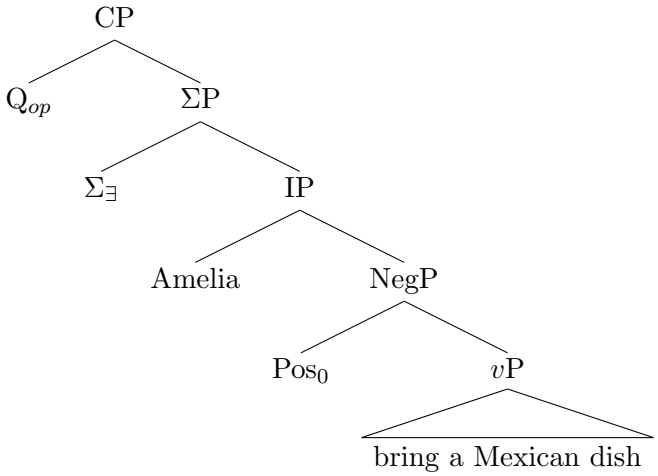
to, but which felicitous replies need not address.[24] As we will see in detail in subsequent sections, LoNegQs and HiNegQs have the same main issue as the corresponding PosQ, but differ in their projected issues.

3.4 Positive polar questions

In this section, we present a step by step computation of the two-tiered semantic representation of a PosQ, taking (63a) as an example. We assume the syntactic structure schematized in (63b). Aside from the obvious elements, there are three operators present in the logical form: the polar question operator Q_{op} and two polarity operators, $\Sigma_{\exists}$ and Pos_0. This multi stage approach to polarity will be justified below when we discuss negative polar questions, but it is *prima facie* reasonable to posit high and low polarity heads given that negation in polar questions is pronounced in high and low positions.

(63) a. Did Amelia bring a Mexican dish?

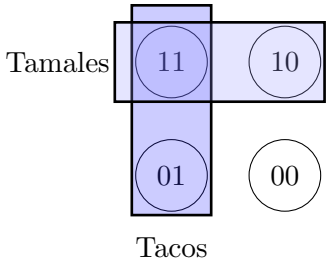
b.



Semantically, we assign a flat inquisitive semantics of the sort laid out above and in the works cited to the question radical IP. The one exception is the Neg_0 head in certain negated sentences, which as we will see in later sections when we deal with LoNegQs. The corresponding Pos_0 head is semantically vacuous here (i.e. is the identity function) and hence this complication does not arise in any significant way for PosQs. Throughout the semantics we develop here, we will gloss over the subsentential compositional details as these issues have been resolved in various ways in previous literature and are orthogonal to our concerns here. In the IP here, the indefinite *a Mexican dish* introduces a set of alternatives which combines in pseudo-pointwise fashion to produce a main issue consisting of a set of propositional alternatives of the form 'Amelia brought x' where x is a Mexican dish, as in (63c) (we limit ourselves here to two such dishes: tamales and tacos).

(63) c. $[\![\text{IP}]\!] =$

[24] While the canonical replies are ones which are partial or complete answer to the question, there are of course less anticipated answers which nonetheless are felicitous such as 'best guess' responses with *Well*, explicitly refusals like *I don't know*, etc. We set aside such responses here.



Whereas the IP itself is assigned a flat interpretation, Σ_0 takes this interpretation as its argument and returns a two-tiered meaning distinguishing main and projected issues.[25] In this case, we define a polarity head, $\Sigma_\exists$, in (64) which takes this flat alternative set and returns a pair consisting of a single-alternative main issue and a projected issue retaining the alternatives from $[\![\text{IP}]\!]$. In terms of its main issue, then, $\Sigma_\exists$ has the same effect as Kratzer & Shimoyama (2002) existential closure operator. Where it differs, however, is that the additional structure of the projected issue allows these alternatives to nonetheless be passed up the tree, capable of becoming part of the top-level meaning.

(64) **Existential alt-closure ($\Sigma_\exists$) defined:**
$$\langle\!\langle \Sigma_\exists(\text{IP}) \rangle\!\rangle^{\mathcal{M},g,w} = \frac{\{\, \{w' : \textit{ there is some } \alpha \in [\![\text{IP}]\!] \textit{ s.t. } w' \in \alpha\} \,\}}{[\![\text{IP}]\!]}$$

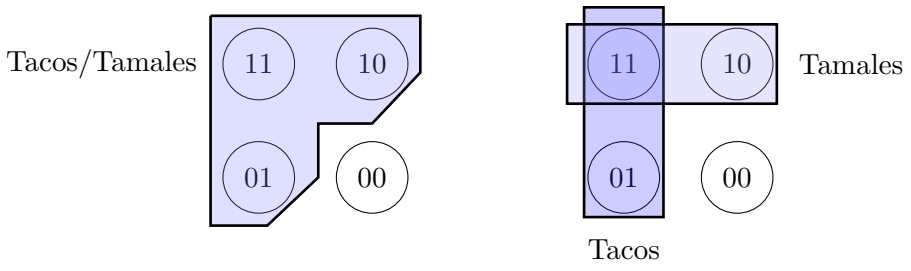
Applying this in the example in (63) we produce the two-tiered meaning in (63d). Aside from being the intermediate step in the computation of the PosQ, we also take this to be the meaning of the corresponding positive assertion *Amelia brought a Mexican dish.* Its main issue consists of a single alternative consisting of all the worlds where Amelia brought some Mexican dish or other. Recalling that the main issue reflects the direct contribution of the sentence to the QUD, the single alternative main issue here reflects the fact that the only QUD the assertion establishes is whether or not it is accepted.[26] Its projected issue, made salient as a potential QUD, is a set of alternatives of the form 'Amelia brought x.'. In this way, we are able to retain a core insight of inquisitive semantics, while giving uniform pragmatic roles to both main and projected issues – main issues must be addressed by cooperative interlocutors when possible, projected issues merely can be.

(63) d. $\langle\!\langle \Sigma\text{P} \rangle\!\rangle =$

Main Issue **Projected Issue**

[25] We leave open the question of whether the two-tiered system ought to be extended to the subsentential level as well. In this case, IPs with narrow-scope inquisitive element might make use of the projected issue as well (e.g. to handle inquisitive elements which take narrow scope relative to some other element within IP). While not unreasonable, such a generalization is not relevant for polar questions and is therefore left to future work.

[26] This exact formulation follows Ginzburg (1996) more closely than Roberts (1996). However, given that many subsequent works have made a tight connection between proposals and the QUD (e.g. Farkas & Bruce (2010), AnderBois et al. (2015)), we do not take this to be a deep difference.

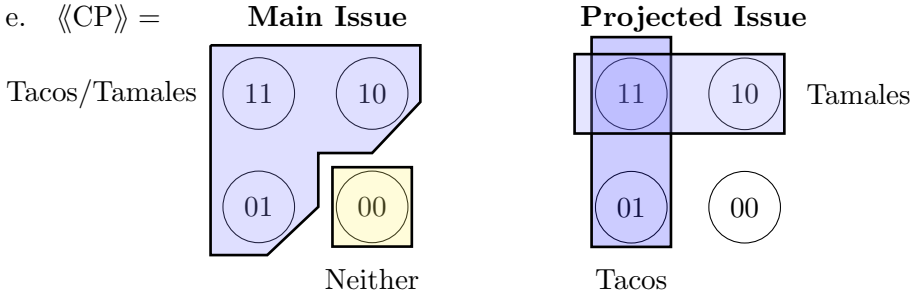


The final step in the computation, then, is to combine with the disjunctive polar question operator, Q_{op}, adding in the negative alternative and thereby creating an inquisitive main issue. This operator, essentially of the form $p \vee \neg p$ is defined in (65) and produces the top-level meaning in (63e). Although this operator incorporates a negation of sorts, none of the thorny issues we are concerned with for negative polar questions arise here since the main issue of its argument, ΣP, is always a singleton set.

(65) **Question operator ($Q_{op}(\Sigma\mathbf{P})$):**
$\langle\!\langle Q_{op}(\Sigma\mathrm{P})\rangle\!\rangle^{\mathcal{M},g,w} =$

$$\frac{\{\{w' : \textit{there is some } \alpha \in \langle\!\langle \Sigma\mathrm{P}\rangle\!\rangle_{\textsc{Main}} \textit{ s.t. } w' \in \alpha\}, \{w' : \textit{ for all } \gamma \in \langle\!\langle \Sigma\mathrm{P}\rangle\!\rangle_{\textsc{Main}} : \alpha \cap \gamma = \varnothing\}\}}{\langle\!\langle \Sigma\mathrm{P}\rangle\!\rangle_{\textsc{Proj}}}$$

(63) e. $\langle\!\langle \mathrm{CP}\rangle\!\rangle =$



The top-level meaning, ⟪CP⟫, then, includes as its main issue a set of two alternatives 'Amelia brought some Mexican dish or other' and 'Amelia brought no Mexican dish', establishing this as the QUD following the utterance. The projected issue is a set of alternatives of the form 'Amelia brought x' where x is a Mexican dish, highlighting this issue as a potential future QUD. Whereas this main issue will be identical across positive and negative counterparts, the projected issue will differ. By hypothesis, IPs more or less uniformly include an inquisitive element (though often in the form of a covert existential). The details of the projected issue, then, are determined by the semantics of the low polarity head (the vacuous Pos_0 in this case) and the high Σ head (the alternative demoting $\Sigma_{\exists}$). While we leave a detailed discussion to §4, this projected issue intuitively relates quite directly to the licensing of secondary answers like *Yeah, tamales.* and a bit less directly to positive speaker bias.

3.5 Low negation polar questions

We turn now to LoNegQs, which we claim have the same main issue as corresponding PosQs, but have as a projected issue a set of negative alternatives. To accomplish this,

we make use of the two polarity heads, Σ_0 and Neg_0. While the semantic role we assign to these two heads is novel, the idea that polarity is distributed across two positions has been proposed (e.g. Laka (1990), Kramer & Rawlins (2009)) on the basis of various constructions cross-linguistically in which a single semantic negation can or must be expressed in multiple positions in the clause (e.g. negative inversion, negative concord, double negation as in French *ne... pas*). We note also that the very existence of high and low negation in polar questions in the first place lends further credence to the basic idea of there being two polarity heads.

In flat inquisitive semantics, negation of a formula φ was defined in (56), repeated here as (66), as returning the maximal alternative which does not intersect with *any* alternative in $[\![\varphi]\!]$. There are in essence two components of this definition: universal quantification and set complementation.[27]

(66) $[\![\neg\varphi]\!]^{\mathcal{M},g,w} = \textsc{Alt}\{\alpha \subseteq \text{W} \mid \textit{every } \beta \in [\![\varphi]\!]^{\mathcal{M},g,w} \textit{ is such that } \alpha \cap \beta = \emptyset\}$

In clauses with low negation, then, we analyze these two parts as being distributed across Σ_0 and Neg_0, as defined in (67). While not utilizing a special pointwise compositional mode of the Kratzer & Shimoyama (2002) sort, Neg_0 in essence looks individually at the alternatives in $[\![\varphi]\!]$ and returns an alternative set consisting of the set complement of each. One thing to note about Neg_0 is that the alternative set it provides is (at least for simple cases) the same semantics that one would expect for the wide scope reading of an indefinite or disjunction.[28] While this lends plausibility to the present account, it also is the reason why downward closure cannot be easily integrated into the present account since downward closure and the use of alternatives for scope-taking have yet to reconciled (see, e.g. Charlow (2014), Ciardelli et al. (2015)).

Returning to LoNegQs, whereas $\Sigma_\exists$ in PosQs provided existential closure, here, $\Sigma_\forall$ delivers universal closure, while again retaining the alternatives in $[\![\text{IP}]\!]$. We note that the meaning of $\Sigma_\forall$ may be somewhat surprising to the reader since closure operators typically involve existential quantification rather than universal quantification. As we will see below, this sequence produces the same main issue as the flat inquisitive semantic negation, but differs in the alternatives generated along the way, and therefore in the projected issue. One potentially counterintuitive thing to point out about Σ_0 heads generally is that despite being central to the account of polarity, they do not contribute anything close to set complementation, as this is the role of Neg_0.

(67) a. **Neg_0 defined:**
$[\![\text{Neg}_0(\varphi)]\!]^{\mathcal{M},g,w} = \textsc{Alt}\{\alpha \subseteq \text{W} \mid \textit{there is some } \beta \in [\![\varphi]\!]^{\mathcal{M},g,w} \textit{ is such that } \alpha \cap \beta = \emptyset\}$

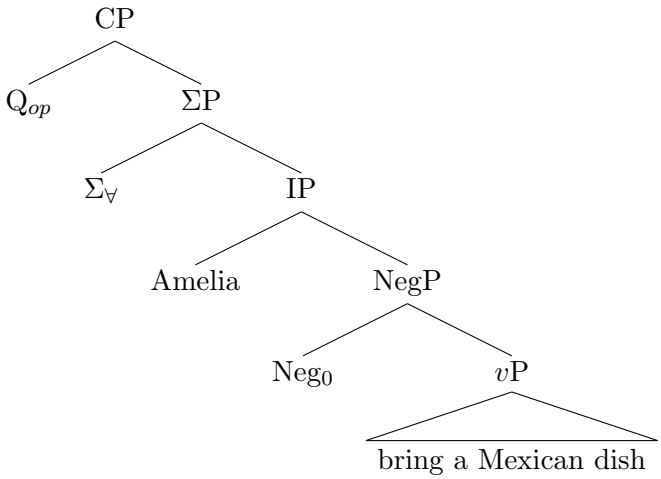
[27] This latter component is admittedly obscured a bit in the formal definition here. However, it arrives at the same place by collecting all sets of possible worlds whose intersection with a given α is null and then taking the maximal of these. See Roelofsen (2013) for detailed discussion of the algebraic foundations of (flat) inquisitive semantics.

[28] In more detail, the combination of Neg_0 and $\Sigma_\exists$ provides a suitable meaning for an indefinite or disjunction taking wide-scope over negation and therefore is also plausibly attested. While working out such an account of scope-taking is left to future work, the fact that this combination is plausible whereas $\Sigma_\forall$ and Pos_0 is plainly not (i.e *Amelia brought a Mexican dish* does not have a separate reading on which she brought every Mexican dish) again highlights that $\Sigma_\exists$ has a broader distribution, with $\Sigma_\forall$ only present when another element specifically requires it.

b. **Universal alt-closure ($\Sigma_\forall$) defined:**
$\langle\!\langle \Sigma_\forall(\text{IP}) \rangle\!\rangle^{\mathcal{M},g,w} = \frac{\{\{w' : \textit{ for all } \alpha \in [\![\text{IP}]\!], w' \in \alpha\}\}}{[\![\text{IP}]\!]}$

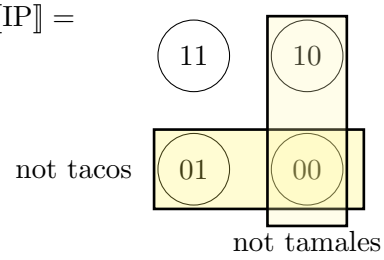
Syntactically, we take the LoNegQ to have the structure in (68b), differing from the above in two polarity heads, $\Sigma_\forall$ and Neg_0. These two differences are, of course, related to one another. That is to say, there exists some kind of relationship between the two polarity heads restricting the combinations in which they may occur. While other options may be possible, we will assume here that this relationship is one of syntactic agreement, with Pos_0 agreeing with $\Sigma_\exists$ in PosQs, and Neg_0 agreeing here with $\Sigma_\forall$.

(68) a. Did Amelia not bring a Mexican dish?

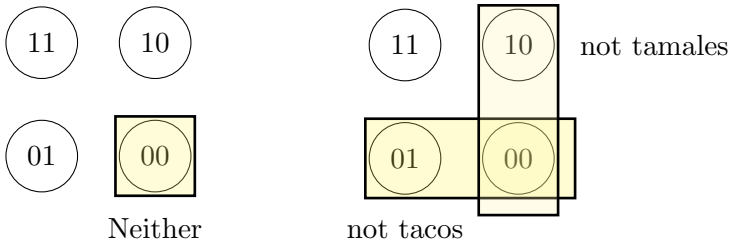
b.


The semantic computation proceeds as follows. First, in (68c), the flat meaning of IP is a set of individually negated alternatives of the form 'Amelia didn't bring x' where x is a Mexican dish. Then, $\Sigma_\forall$ provides universal closure, while retaining the alternative set of the IP in its projected issue. Finally, as above, the Q_{op} adds in the elsewhere alternative to the main issue, again leaving the projected issue unaltered.

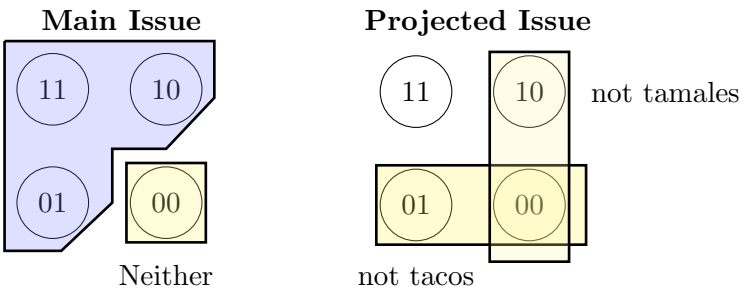
(68) c. $[\![\text{IP}]\!] =$



(68) d. $\langle\!\langle \Sigma\text{P} \rangle\!\rangle =$ **Main Issue** **Projected Issue**



(68) e. $\langle\!\langle \text{CP} \rangle\!\rangle =$



We leave discussion of the pragmatics to §4, but briefly note that this semantics reflects the fact that LoNegQs have the same main issue as corresponding PosQs. The negated alternatives they project relate to the negative speaker bias discussed in §2.2, roughly parallel to the positive alternatives in the projected issue of PosQs. However, there is one respect in which the semantics we have proposed also produces an asymmetry between LoNegQs and PosQs: the relationship between the projected and main issues. In PosQs, the projected alternatives are each *sub-alternatives* of one the main issue alternatives.[29] In contrast, in the LoNegQ here, each of the projected alternatives is a *super-alternative* of the negative main issue alternative. The projected issue is logically prior to the main issue in this case – if the main issue is resolved, then the projected issue is also necessarily resolved. We argue below that this fact explains the observation from §2.2 that LoNegQs are infelicitous in contexts where the speaker expects the main issue to be readily resolvable by the addressee.

At a more theoretical level, this asymmetry provides a particular way of thinking about the age-old intuition that negated sentences, at least for assertions, are somehow 'weaker' than their unnegated counterparts (see Horn (1989) for extensive discussion). While their main issues are equally informative, the relationship between their projected and main issues means that they do not push the conversation forward to the same extent. They project alternatives which are logically prior to the main issue, whereas positive assertions project alternatives which further refine the main issue.

3.6 High negation polar questions

We have just proposed a semantics where low negation consists of two steps: a low Neg_0 which creates a set of individually negated alternatives and a high $\Sigma_\forall$ which quantifies over them. In contrast to this two step process, we propose that high negation achieves the same truth-conditional effect in one single step. Since there is no intermediate step creating

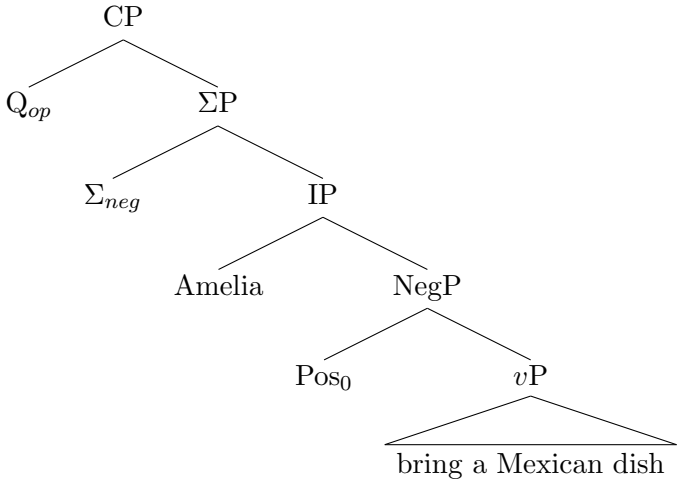
[29] Given Groenendijk & Roelofsen (2009)'s definition of inquisitive semantic entailment in terms of subset relations, we can in fact make a stronger statement for PosQs, namely that the projected issue necessarily entails the main issue. In contrast, for LoNegQs, neither the main nor projected issues entail one another.

a set of individually negated alternatives, the projected issue is therefore empty.[30] This, we claim, corresponds to the intuition that HiNegQs involve emphasis on the truth of the main issue, i.e. verum focus.

(69) **Negative alt-closure**[31]**(Σ_{neg}):**
$\langle\!\langle \Sigma_{neg}(\varphi) \rangle\!\rangle^{\mathcal{M},g,w} = \frac{\{\{w' : \textit{ for all } \alpha \in [\![\text{IP}]\!],\ w' \notin \alpha\}\}}{\varnothing}$

With this definition for high negation in mind, we can now see the step-by-step semantic computation for the HiNegQ in (70). Note that unlike the LoNegQ, the low polarity head is Pos_0 rather than Neg_0. Indeed, given the vacuity of Pos_0, we could in principle go a step further and claim that HiNegQs only involve the high Σ_{neg}, with no low polarity head present. The flat interpretation of the $[\![\text{IP}]\!]$, therefore, is the same as the corresponding PosQ rather than the LoNegQ. The main issue in $\langle\!\langle \Sigma\text{P} \rangle\!\rangle$, then, is the same as in the case of the LoNegQ, but without a projected issue. Finally, as in the case of the LoNegQ, the Q_{op} adds in the positive alternative, resulting in the same main issue as we saw in both the PosQ and the LoNegQ.

(70) a. Didn't Amelia bring a Mexican dish?

b.


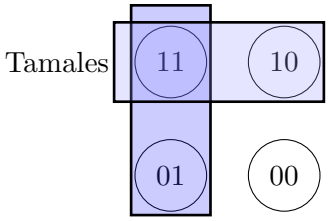
c. $[\![\text{IP}]\!] =$

[30] We note again the parallel with wide-scope readings. Whereas the projected issue in low negation paralleled the wide-scope reading, with high negation there is no such set of projected alternatives and no wide-scope reading is possible, as observed by Haegeman (2000) and others:

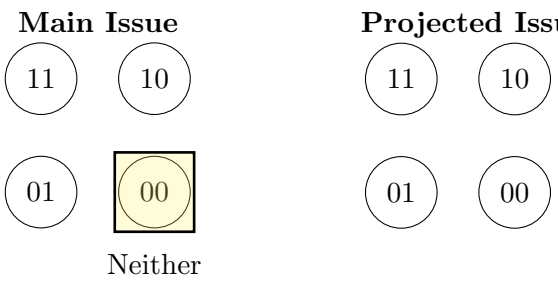
(i) Never has John talked to a professor. (✓ NEVER≫∃, ✗ ∃≫NEVER)

(ii) John has never talked to a (certain) professor. (✓ NEVER≫∃, ✓ ∃≫NEVER)

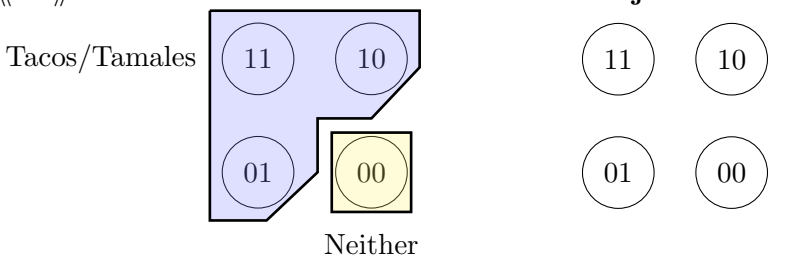
[31] This definition is quite similar to Groenendijk & Roelofsen (2009)'s original definition in (56) and indeed can be formulated in a quite similar way:
$\langle\!\langle \Sigma_{neg}(\varphi) \rangle\!\rangle^{\mathcal{M},g,w} = \frac{\textsc{Alt}\{\alpha \subseteq W \mid \textit{ for all } \gamma \in [\![\varphi]\!]^{\mathcal{M},g,w} : \alpha \cap \gamma = \varnothing\}}{\varnothing}$



d. $\langle\!\langle \Sigma P \rangle\!\rangle$ =



e. $\langle\!\langle CP \rangle\!\rangle$ =



As we have seen, then, high negative Σ_{neg} eliminates the fine-grained alternatives of the projected issue, thereby giving greater relative emphasis to the truth/falsity of the main issue. This gives us a somewhat different way of capturing Romero & Han (2004)'s intuition that HiNegQs are an instance of so-called Verum focus. While seizing upon the intuition that HiNegQs involve emphasis on truth, we leave open the question of whether other kinds of Verum focus constructions deserve a unified analysis. There may well be several different ways in which the intuitive notion of 'emphasis on truth value' is realized across different constructions and it should not be assumed that all verum focus is rooted in the absence of projected issues.

One virtue of the account we give here is that the interpretation of the HiNegQ is derived compositionally from the semantics of negation itself, rather than a covert Verum operator. While it is true that we posit distinct semantics for high and low negation, there is no clear sense that the account we have given for high negation is any less plausible (indeed, it is quite similar to previous accounts of negation in inquisitive semantics). This is, we believe, a virtue since Romero & Han (2004) argue that these properties arise in polar questions with (preposed) negation cross-linguistically. In addition to the examples they give, we can see this is in (71) from Yucatec Maya, where the question is only felicitous in contexts where the prior speaker bias is plausibly present. This is especially notable here since Yucatec Maya only allows negation in a 'high' position.

(71) **Scenario:** Juan goes to a restaurant that he used to eat at in the past. At that time, they sold tortas, but now that he returns, he doesn't see any.

a. ma'-wáa a kon-ik torta
NEG-wáa A2 sell-STATUS torta
'Didn't you sell tortas?'

b. **Prior speaker bias:** Addressee sold/sells tortas.

c. **Preferred resolution:** Addressee sold/sells tortas.

4 Pragmatic reasoning about polar questions

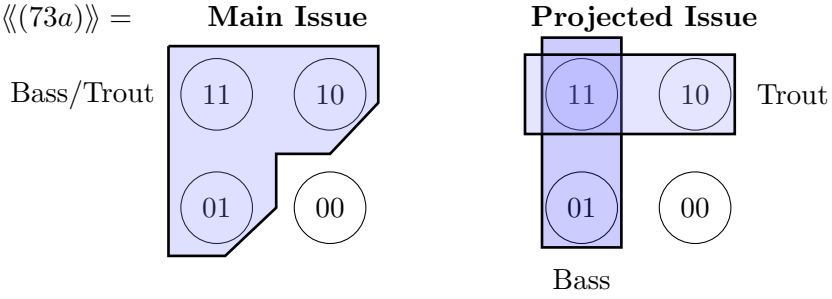
In the previous section, we have proposed a semantics where sentence meanings are comprised of two 'tiers' of alternatives, the *main issue* and the *projected issue*. We have given brief characterizations of the two tiers: the main issue proposes to establish a new immediate QUD, while the projected issue highlights a potential future QUD. In this section, we spell out the pragmatics of this latter contribution in more detail, showing how the semantics/pragmatics of projected issues explain the major properties of positive and negative polar questions. The basic intuition we pursue is that speakers typically assume a principle such as the one in (72), which we regard as a particular instantiation of the Maxim of Relation.

(72) **Utility principle for projected issues:** Where possible, cooperative speakers choose projected issues whose resolution is expected to be useful in the discourse.

Of course, this principle is one among many and not all utterances will necessarily be chosen for their projected issues. This is especially so since projected issues arise as part of semantic composition and hence are inextricably linked to the main issue. For example, a speaker may choose an assertion with a disjunction such as (73a), with the meaning in (73b), simply because of the information its main issue contains rather than the utility of its projected issue. Certainly, in considering corresponding positive and negative assertions, such concerns will not be relevant since their main issues are disjoint.

(73) a. Anita caught a bass or a trout.

b. $\langle\!\langle (73a) \rangle\!\rangle$ =

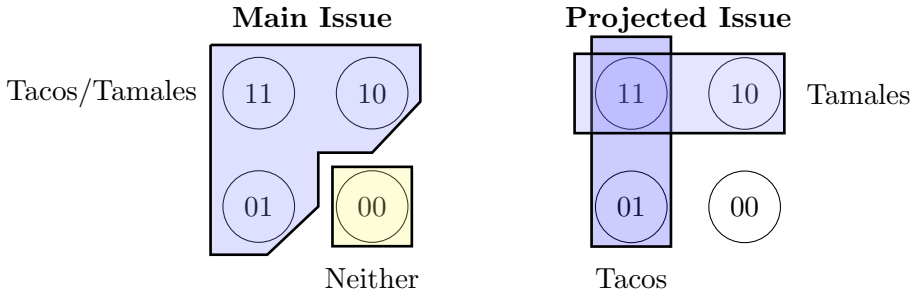


In polar questions, however, such concerns do not arise – the Q_{op} ensures that corresponding PosQs, LoNegQs, and HiNegQs have identical main issues. Therefore, we expect that the choice between different forms will indeed be driven primarily by the expected utility of their projected issues. The one clear exception is the default status of PosQs discussed in §2.1 and in §4.1 below.

4.1 PosQs

In §2.1, we argued that PosQs often (but not always) convey a positive speaker bias and readily allow for elliptical secondary answers like 'Yeah, tacos.'. In §3.4, we have proposed a two-tiered semantics where, in addition to their main issue, PosQs make salient a projected issue, as in (74), consisting of a set of alternatives introduced by inquisitive material inside the question radical, in this case, the overt indefinite *a Mexican dish*.

(74) Did Amelia bring a Mexican dish?



Earlier in this section, we proposed that speakers assume the principle in (72), choosing their projected issues strategically when possible. At the same time, the speaker of a PosQ also puts forth the main issue as the immediate QUD. The addressee, then, must think of when the projected issue will be useful given the main issue the question conveys. In the case of the PosQ, the alternatives of the projected issue are subalternatives of the positive alternative to the main issue. Therefore, the projected issue can only be useful as a *secondary* issue, to be taken up following a positive resolution of the main issue. This, we claim, is the source of the positive speaker bias in PosQs: their projected issues further refine the positive response and therefore will not be relevant unless the addressee gives a positive response. A speaker who chooses to utter a PosQ for relevance-based reasons like (72), therefore, should only do so if they are biased towards the positive answer (recalling from above that we follow van Rooij & Šafářová (2003) in taking bias here to be a combination of doxastic and bouletic).

However, as we have seen in §2.1, some utterances of PosQs clearly do not convey any bias at all (e.g. *Is [b] a fricative?*). We have suggested above that this is due to the 'default' syntactic status of the PosQ, rather than anything having to do with the utility/relevance of its alternatives. That is to say that speakers may utter a PosQ not because its projected issue is expected to be relevant, but rather in order to best adhere to the Maxim of Manner. In order to convey the main issue, the speaker of course must choose some polar question form or other. In cases where the speaker's bias is contextually irrelevant or otherwise already established, then, no inference of speaker bias will arise.

This of course is a potentially risky strategy since the addressee might mistake a manner-driven choice of PosQ for one driven by positive speaker bias. In scenarios where this risk is present, speakers sometimes opt to instead use an alternative question with *or not* which stresses their neutrality, as in the following examples from COCA (see AnderBois (2011) for an account of alternative questions of this sort within a similar framework). In both cases, the corresponding PosQ is felicitous but runs the risk of the addressee misinterpreting the speaker as having a positive bias.

(75) **Scenario:** A reporter asking the president for his comment.

Q: I had Mitch McConnell out on the show last week and he ridiculed it. Saying that, you know, this is the example of the kind of pork we don't want. Yet, its advocates say, wait a second. It's a construction project. It's ready to go. It's going to create jobs. **Is that the kind of project that you want to fund or not?**

(76) **Scenario:** Question from a Gallup poll.

Q: Would you personally like to belong to a labor union at work, or not?

Summing up, the positive speaker bias often conveyed by PosQs results pragmatically from the utility principle for projected issues in (72) together with the two-tiered semantics laid out in §3.

4.2 LoNegQs

For LoNegQs too, we follow the same basic approach of deriving their usage facts from the two-tiered semantics proposed in §3 combined with pragmatic reasoning based on the principle in (72) about the utility of the projected alternatives in the discourse. In §2.2, we argued that LoNegQs exhibit a consistent negative speaker bias, similar to the positive bias in PosQs, though without the potential for truly neutral uses like the test question scenario. However, we have also argued that LoNegQs are more restricted than this, being infelicitous in scenarios where a simple negative answer to the main issue is expected as in (77), repeated from (21).

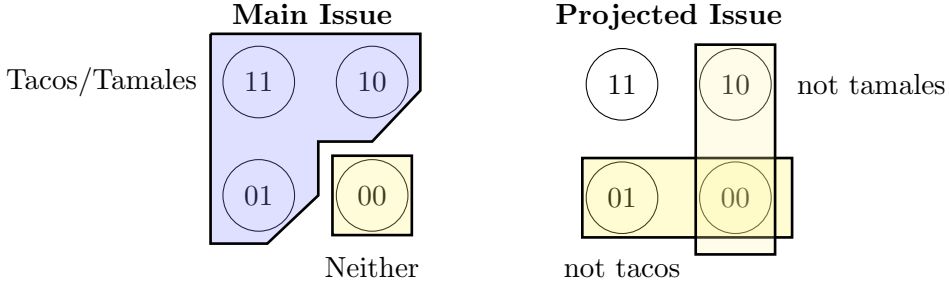
(77) **Scenario:** A strict vegan at a café.

Q: Excuse me, I'm vegan. #Does your veggie burger not have dairy in it?

Q': Excuse me, I'm vegan. Does your veggie burger have dairy in it?

Semantically, we have proposed the two-tiered semantics in (78) with projected alternatives of the form 'Amelia didn't bring x' where x is a Mexican dish. As we noted above, however, there is a notable asymmetry that emerges in LoNegQs as opposed to PosQs: the projected alternatives are *super*-alternatives of a main issue alternative rather than *sub*-alternatives of one.

(78) Did Amelia not bring a Mexican dish?



Pragmatically, then, the addressee – again, assuming the utility principle in (72) – reasons about why the speaker might expect the projected alternatives to be useful in the

immediate future of the discourse. There are therefore two conditions that ought to be met for a cooperative speaker to choose the LoNegQ. First, the speaker must be biased towards the negative answer, since each of the negated alternatives would provide partial answers for it but cannot similarly help establish the positive answer. Second, the speaker believes that some sort of protracted discussion or reasoning may take place, such that even a partial negative answer may be useful. There are various reasons why this might be the case. For example, if the speaker in (78) knows who brought some of the dishes at the potluck already, then, this knowledge plus a partial answer might allow the speaker to resolve the main issue (recall our characterization of LoNegQs as often indicating a 'hunch' on the part of the speaker). Alternatively, the speaker might have other potential sources of information (other pot-luck attendees in this scenario) such that a partial answer may still be a useful step towards resolving the main issue.

We can contrast these felicitous scenarios with LoNegQs to the infelicitous LoNegQ in the vegan scenario in (77). Here, the speaker's goals are such that partial answers like *Well, no cheese* are not themselves helpful. The speaker in this context likely has no other information source other than the waiter (e.g. they are not likely to be going around asking other employees) and so despite the speaker's negative bias (both epistemic and bouletic), the LoNegQ is correctly predicted to be infelicitous.

Summing up, we have argued that the usage patterns associated with LoNegQs – negative speaker bias and extended discussion or reasoning – follow from utility-based pragmatic reasoning together with the two-tiered semantics for low negation.

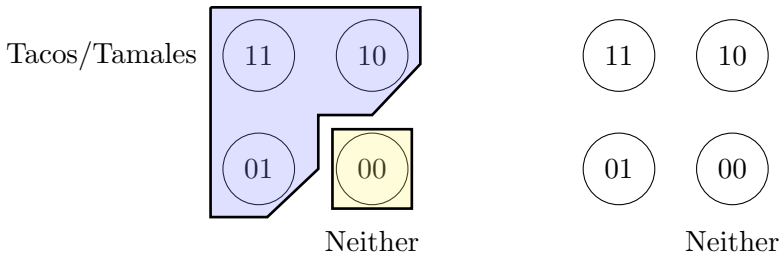
4.3 HiNegQs

As discussed in §§2.3-2.4, HiNegQs are the most divergent of the three types of questions under consideration in this paper. In particular, we have built on previous literature in claiming that HiNegQs have the following four essential properties (recalling that the we are only looking at HiNegQs without polarity items): **(i)** added emphasis on the truth-value of the proposition in question (Verum Focus), **(ii)** prior positive speaker bias (typically private), **(iii)** a plausible conversational purpose for the speaker wanting the addressee to assert some version of p or $\neg p$ given (ii), and **(iv)** a default preference or bias for the addressee to resolve the issue positively to avoid revising their prior bias, (ii).

While our characterization of some of these components differs somewhat from Romero & Han (2004), we follow the basic outline of their account in that we take verum focus, (i), to be encoded semantically with the other aspects of HiNegQs arising pragmatically. The two-tiered semantics we have proposed for HiNegQs, repeated in (79), avoids highlighting any projected issues, thereby giving added emphasis on the truth of the main yes/no issue, relative to the corresponding PosQ.

(79) Didn't Amelia bring a Mexican dish?

Main Issue	**Projected Issue**



One concrete consequence of this Verum focus is the infelicity of HiNegQs as what Gunlogson (2001) terms 'speculative' questions. In her words, such questions can be felicitously used as "questions designed to instigate thought and/or discussion without necessarily being answered or answerable". In our terms, these are questions which nominally present a main issue, but whose true purpose is to encourage discussion of various sub-issues (e.g. what evidence supports the main claim, under what conditions, in what way). Uttering a corresponding HiNegQs, as in (81), on the other hand, serves to limit the immediate discussion to the main issue itself. That is, the speaker is going out of their way (i.e. using a more marked form than the corresponding PosQ) to focus the conversation on the main issue itself.

(80) a. Does God exist?
b. Did Oswald act alone?

(81) a. # Doesn't God exist?
b. # Didn't Oswald act alone?

Based on this verum semantics, then, we turn to give a pragmatic explanation of property (ii) and, secondarily, of properties (iii)-(iv). For reasons of space, we refer the reader to Romero & Han (2004) and AnderBois (2011, §5.4) for extended discussion of the relationship between verum focus and prior speaker bias, but we briefly lay out one possible intuition underlying this connection, though we do not preclude the possibility that there may be alternative ways of deriving (ii). The utility principle means that an addressee who is asked a HiNegQ must reason why the speaker has chosen the projected issue they have chosen. In this case, the speaker chose to use a marked form in order to convey a meaning which does not move the conversation forward as much as the less marked PosQ, since it avoids highlighting any projected issues.

As we have seen, uttering the competing PosQ would have given greater informational salience to the positive answer by giving it a rich inquisitive structure, the projected issue. HiNegQs, on the other hand, eschew this asymmetry, giving equal prominence to both answers. While the speaker signals that the negative answer is of unusual importance, she does not assign it more informational salience than the positive answer (as the LoNegQ would do). That is to say, the speaker of a HiNegQ signals that she is in a special conversational state where the negative answer is unusually important, yet the speaker has conveyed a desire to limit the immediate discussion to this main issue.

To paraphrase, then, the HiNegQ conveys something like 'Just tell me whether p holds, especially if the answer is negative.' While the speaker of a HiNegQ conveys that the informational salience of the negative answer is heightened, she does not signal that the

negative answer is what she expects/desires, as the LoNegQ would do. Rather, the speaker has in fact conveyed that finding out the negative answer would be unusually important, despite not being particularly expected or desired more than the positive one (while they do not acknowledge a verum focus-like element, this logic has much in common with van Rooij & Šafářová (2003)'s account). In particular, the negative answer is of importance since it would force the speaker to revise her prior beliefs and therefore is of greater informational value. One piece of confirming evidence for a pragmatic account along these lines is the fact that questions with both high and low negation have a *negative* prior bias since their competitor, the LoNegQ, would have a negative projected issue.

Given this positive prior speaker bias,[32] then, we can understand (iii) and (iv) as secondary pragmatic inferences. As discussed above, there is a tension between the speaker's positive prior bias and the fact that the speaker is asking a question at all. Most frequently, this tension is due to compelling contextual evidence which conflicts with the speaker's prior bias. However, we have argued – building on Romero & Han (2004)'s discussion of suggestion uses of HiNegQs – that there are various uses of HiNegQs where this is not the case. In general, then, a cooperative speaker who utters a HiNegQ ought to have some purpose in asking the question. Given their prior bias which the question itself makes publicly known, the typical purpose of asking a question, wanting to know information you do not already know, will only be possible in the compelling contextual evidence cases. In other cases, it is a secondary effect of assertion (e.g. public commitment) which the speaker seeks, rather than the information itself. Finally, we have already proposed above that the speaker's preference for resolving the issue in the affirmative, aspect (iv), arises as a default preference against belief revision. Not unlike PosQs, this positive bias may be overridden by overt markers such as NPIs, intonation, and other scalar items (so-called 'inner' HiNegQs), but is otherwise present.

5 Conclusions

In this chapter, we have presented an analysis of positive and negative polar questions of the sort seen in (82). While all authors agree that pragmatic reasoning explains at least some of the differences in use between these forms, we have argued that the facts about them are complicated in ways that necessitate a larger role for compositional semantics than previously assumed.

(82) a. Is John cooking a Mexican dish? PosQ
b. Is John not cooking a Mexican dish? LoNegQ
c. Isn't John cooking a Mexican dish? HiNegQ

To this end, we have proposed a 'two-tiered' inquisitive semantics in which sentence meanings consist of two different 'tiers' of alternative sets. The first of these, the Main Issue, encodes a set of alternatives which a speaker typically proposes to make the immediate QUD. This tier is identical across the three question types in (82), reflecting the intuition that all three are ways of asking about the same issue. The second tier, the Projected

[32] Even if (ii) were to be stipulated, this would be no more stipulative than other accounts of HiNegQs, which are all non-compositional in some way (e.g. Romero & Han (2004)'s Verum operator).

Issue, consists of a different set of alternatives introduced by inquisitive elements within the question radical itself such as disjunction, indefinites, and covert existential quantification of various kinds. Compositional interactions between this alternative set and high (Σ_0) and low (Neg_0) polarity heads produce different alternative sets across the different varieties of polar question. Pragmatic reasoning still plays a role, of course, since hearers reason about why a cooperative speaker would find a given projected issue to be useful in the immediate future of the discourse.

In PosQs, the projected issue consists of subalternatives to the positive main issue alternative and is therefore plausibly useful any time the speaker is positively biased. PosQs may sometimes be selected for their unmarkedness relative to other polar questions (e.g. in cases where the speaker's bias is irrelevant or obvious) and this bias, therefore, need not arise in all cases. LoNegQs, on the other hand, have as their projected issue sets of individually negated alternatives, leading not only to the negative bias but also predicting their infelicity in scenarios where a simple yes/no answer is to be expected. Finally, the compositional semantics we have given for high negation means that HiNegQs have the empty set as their projected issue, thereby giving added emphasis to the truth value of the main issue (i.e. verum focus). The pragmatic reasoning this triggers is a bit more complex, but again the account derives the use of HiNegQs from more general pragmatic principles.

Stepping back a bit, we have proposed a finer-grained inquisitive semantics for assertions and questions which makes a principled distinction between their contributions to the QUD and further issues they highlight (or don't in the case of verum focus). One of the places where this two-tiered semantics had the most impact was in the account of negation, where negated sentences have an inquisitive element such as existential event quantification, a pseudo-pointwise negative element, and a universal closure operator. Since we have given (low) sentential negation itself a multi-part semantics, these tools have potential applications to understanding various other cases where a single semantic negation is expressed by multiple morphemes such as negative concord, negative polarity items, negative indefinites, double negation, etc. Whereas most accounts of negative polar questions have relied primarily on advances in the semantics of questions, we hope to have shown that the core of the puzzling properties of negative polar questions lies in the semantics of negation itself, and in particular, negation in inquisitive semantics.

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