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Deriving presupposition projection in coordinations of polar questions: a reply to Enguehard 2021

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Abstract
This paper is a response to Enguehard (Natural Language Semantics 29(4):527–578, 2021), who observes that presuppositions project in the same way from coordinations of declaratives and coordinations of polar questions, but existing mechanisms of projection from declaratives (e.g. Schlenker in Theoretical Linguistics 34(3):157–212, 2008, Semantics and Pragmatics 2:1–78, 2009) fail to scale to questions. His solution involves specifying a trivalent inquisitive semantics for (coordinations of) questions that bakes the various asymmetries of presupposition projection into the lexical entry of conjunction/disjunction. However, we argue that such a move faces both theoretical and empirical issues. Instead, we show that the data can be handled without moving to such an asymmetric inquisitive denotation, by adapting the novel pragmatic theory of *Limited Symmetry* (Kalomoiros in Proceedings of the 52nd annual meeting of the North East linguistic society, GLSA, Amherst, 2022) to an inquisitive framework in a way that leaves the underlying semantics for conjunction symmetric and bivalent, while deriving the projection data.

Keywords Presupposition projection · Polar questions · (A-)symmetries · Inquisitive semantics

1 Introduction

This paper is a response to Enguehard (2021), who observes that presuppositions project in the same way from coordinations of declaratives and coordinations of polar questions, but existing mechanisms of projection from declaratives (e.g., Schlenker 2008, 2009) fail to scale to questions. His solution involves specifying a trivalent inquisitive semantics for (coordinations of) questions that bakes the various asymmetries of presupposition projection into the lexical entry of conjunction/disjunction, and as a result makes the resolution conditions of such polar questions asymmetric.

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We argue however that such a move faces both theoretical and empirical issues. On the theoretical side, it suggests that the way to unify the filtering properties of declaratives and questions is to semanticize presupposition and its (a-)symmetries, adopting a trivalent semantics that regulates filtering. This moves away from the Stalnakerian intuition that takes filtering and its (a-)symmetries to derive from the way comprehenders gradually integrate sentences into a context. On the empirical front, we argue that making the semantics asymmetric in order to capture filtering asymmetries in questions leads to wrong resolution conditions, at least for some questions. In contrast to the semantic approach, we pursue a pragmatic alternative, showing that the data can be handled without semanticizing the relevant (a-)symmetries: we adapt the novel pragmatic theory of *Limited Symmetry* (Kalomoiros 2022) to an inquisitive framework in a way that leaves the underlying semantics for coordinations of polar questions symmetric and bivalent, while deriving the projection data.

The basic intuition underlying our approach is Stalnakerian in origin (building on Schlenker's 2008 *Transparency* theory): presupposition is information that is taken for granted, and hence should be ignorable without affecting the truth conditions in a context C. In a conjunction like $(p \wedge q)$, if the presuppositions of q are entailed by p, then all worlds in C where p is false are worlds where the whole conjunction is false, regardless of whether q carries any presuppositions. And in worlds where p is true, the presuppositions of q will be satisfied, so the truth value of the sentence will depend solely on the truth value of the assertion of q. In either case, the presuppositions of q play no role in determining the truth value of the conjunction. We argue that the parallel intuition for questions is that presuppositions should not affect the **polarity** of the resolution conditions of a question. Polarity is a notion that tracks the truth conditions of the declarative that underlies a polar question. Suppose we have a conjunction of polar questions $(?p \wedge ?q)$ where q carries a presupposition. In that case, the issue raised by the questions is resolved positively in sets of worlds where $(p \wedge q)$ is true, and negatively in sets of worlds where $(p \wedge q)$ is false. Thus, sets of worlds where p is false, if they resolve the issue raised by $(?p \wedge ?q)$, resolve it negatively, no matter whether q carries any presuppositions. And in sets of worlds where p is true, whether the question is resolved positively or negatively depends on whether q is true or false. If p entails the presuppositions of q, then q will never fail in a set of worlds where p is true because of presupposition failure; instead truth/falsity will depend only on the assertive componenet of q. So, like the declarative case, the presuppositions of q will play no role in deciding the polarity of the resolution of the question as long they are entailed by p.

We formalize this idea within an inquisitive extension of the theory of *Limited Symmetry* (Kalomoiros 2022). This is a pragmatic, parsing-oriented approach to projection that aims to keep the semantics of the connectives classical (in the spirit of Stalnaker 1974, Schlenker 2008). It was originally designed as a theory that can derive **asymmetric** conjunction but **symmetric** disjunction from a single mechanism (unlike, e.g., Schlenker 2009, who has to postulate distinct mechanisms for symmetry vs. asymmetry). The core of our response consists in showing that *Limited Symmetry* lends itself very naturally to an inquisitive extension that derives Enguehard's data.

The rest of the paper is organized as follows: Sect. 2 reviews the main issues and data, Enguehard's (2021) approach to them, and examines the theoretical and empirical motivations for the alternative pursued in this paper. Section 3 introduces the theory of *Limited Symmetry*, and shows how it accounts for the projection behavior of declaratives. Section 4 lifts *Limited Symmetry* to an inquisitive framework and proceeds to apply it to Enguehard's data. The main focus is on conjunction (since this is what Enguehard (2021) mostly focuses on as well), but in Sect. 5 we also spell out the system's predictions for disjunctions (which are systematically predicted to be symmetric, in contrast to conjunctions, and in contrast to Enguehard 2021). Section 6 discuses the similarities and differences between our own and Enguehard's approach, as well as the explanatory and theoretical trade-offs involved in putting the asymmetries of presupposition in the semantics vs. pragmatics of questions. Section 7 concludes.

2 Background

2.1 The problem

Basic data Enguehard (2021) (henceforth E) makes the novel observation that coordinations of polar questions behave very similarly to their declarative counterparts in terms of presupposition projection,[1] with the same asymmetry holding in both cases: when the question/declarative in the first conjunct entails the presupposition of the question/declarative in the second conjunct, that presupposition is filtered. However, when the question/declarative in the second conjunct entails the presupposition of the question/declarative in the first conjunct, infelicity ensues (in contexts that do not support the relevant presupposition), which is typically attributed to projection:[2]

(1) Declaratives
   a. ***Context:*** We have no idea whether or not Emily is married.
   b. Emily is married and her spouse is a doctor.
   c. #Emily's spouse is a doctor and she is married.

(2) Questions
   a. ***Context:*** We have no idea whether or not Emily is married.
   b. Is Emily married and is her spouse a doctor?
   c. #Is Emily's spouse a doctor and is she married?

[1] But see van Rooij (2005) for an interesting precursor that examines the general problem of projection from modal subordination environments, and who considers (among other things) a version of E's data.

[2] E's original paper makes use of the following example:

(i) Is Syladvia a monarchy and is the Syldavian monarch a progressive?

However, when considering the negation of 'Syldavia is monarchy' in the context of negated polar questions, and disjoined questions, E takes the opposite of 'monarchy' to be 'republic', leading to examples like:

(ii) #Is Syldavia a republic and is the Syldavian monarch a progressive?

Native speakers that we consulted found it hard to keep in mind 'monarchy' and 'republic' as polar opposites, as they did not consider these two systems to exhaust the types of government. The examples in the current paper are still based on the existential presupposition of definites, but instead exploit the 'married' vs. 'unmarried' contrast, which was judged to be a lot more straightforward by consultants.

This paradigm crucially shows that the projection problem generalizes across speech acts, setting up a simple (yet hard) challenge for any account of projection that purports to be explanatory: does the explanation for the declarative case generalize to the question case in a straightforward fashion?

The complication of symmetry The problem is compounded by the fact that in classic approaches to the semantics of questions, polar questions receive a symmetric denotation in terms of their resolution conditions. We illustrate this via the inquisitive semantics approach to polar questions (Ciardelli et al. 2013, 2018):

(3) a. Is Mary married?
  b. $\{s \mid s \vdash \ulcorner \text{Mary is married} \urcorner \textit{ or } s \vdash \ulcorner \text{Mary is unmarried} \urcorner\}$

The idea behind the inquisitive denotation in (3b) is that the resolution conditions of a polar question should be states (where a state is a set of possible worlds) which provide a **complete** answer to the question. Thus, the resolution conditions for the question in (3a) consist of states which support the sentence 'Mary is married' and states which support that 'Mary is unmarried', as in both kinds of state the question is fully resolved (in inquisitive semantics, a state s supports ($\vdash$) an inquisitive sentence p iff $|p|$ is true in all worlds in s, where $|p|$ is the classical proposition associated with p). While the 'states' perspective is based on the inquisitive semantics approach to question meanings, both Karttunen/Hamblin semantics (Hamblin 1976; Karttunen 1977) and partition semantics (Groenendijk and Stokhof 1984) essentially pursue a similar idea (see E for details). For the purposes of this reply, we focus on the inquisitive approach.

Given the above, positive and negative polar questions are predicted to have the same resolution conditions, and the same holds for the 'or not' counterparts of positive polar questions:

(4) a. Is Emily married?
  b. Is Emily unmarried?
  c. Is Emily married or not?
  d. $\{s \mid s \vdash \ulcorner \text{Emily is married} \urcorner \textit{ or } s \vdash \ulcorner \text{Emily is unmarried} \urcorner\}$

As E points out, if (4d) is the denotation of all the polar questions in (4a)-(4c), then these should be interchangeable in the paradigm in (2). However, the intuitive judgment is that this is not the case; examples (5c)-(5d) are infelicitous:

(5) a. ***Context:*** We have no idea whether Emily is married.
  b. Is Emily married and is her spouse a doctor?
  c. #Is Emily unmarried and is her spouse a doctor?
  d. #Is Emily married or not, and is her spouse a doctor?

The outcome of all this, according to E, is that any account of the asymmetry of the projection data in (2) cannot be based on the resolution conditions semantics for polar questions, as this semantics is not fine-grained enough to differentiate between positive and negative versions of a polar question (as the data in (5) seem to require). Moreover, E shows that the resolution conditions semantics is also inadequate in an even more fundamental respect: combined with current explanatory accounts of presupposition projection for declaratives (Schlenker 2008, 2009, George 2008b) it leads to wrong results for projection from coordinations of polar questions. To properly see this, a brief foray into Schlenker (2008) is required.

2.2 Schlenker (2008)

Motivations The filtering asymmetry in declaratives, (1), has generated a lot of debate: Stalnaker's (1974) original suggestion was that presuppositions express information that is redundant (already part of the common ground). From this perspective, the asymmetry of conjunction can be derived pragmatically as follows: interpretation is rooted in the inherently left-to-right nature of incremental processing; as a conjunction is incrementally interpreted, we get access to the initial conjunct first, and we add it to the context; thus, when we get access to the second conjunct, this gets interpreted against a set of worlds that entails the first conjunct. So, if the first conjunct contains a presupposition that is not established in the common ground, then that presupposition is not redundant, but rather quite informative. But if the second conjunct carries a presupposition that is entailed by the first conjunct, then this presupposition plays no informative role when we add the second conjunct to the context; the context already entails it.

While explanatorily powerful, this way of thinking did not generalize straightforwardly to other connectives; in turn, this led to the dynamic approach of Heim (1983), which put the relevant asymmetries into the lexical entry of the connectives: for instance, conjunction is asymmetric because it denotes a function that updates a context *C* **first with the initial conjunct**. Despite the gains in empirical coverage, the dynamic approach was criticized for semanticizing the asymmetries: if we can write a lexical entry for conjunction that updates with the initial conjunct first, then we can write an entry that updates with the second conjunct first; nothing in the formalism forces one option over the other (Soames 1989, a.o.).

More recently, there have been attempts to retain the explanatoriness of Stalnaker's intuition within a theory that keeps the empirical coverage of dynamic semantics (Schlenker 2008, 2009; Rothschild 2011). Schlenker's (2008) *Transparency* theory represents one influential attempt along these lines: its aim is to formalize the idea that a presupposition must be redundant in a way that is predictive across connectives. Since this is the approach that E takes to represent his baseline for an explanatory theory of projection, it's worth presenting the basic idea.

Assumptions and mechanics Let's assume that presupposition triggers are separable into a presupposition component and into an assertion component. For instance, 'John stopped smoking' presupposes that 'John used to smoke' and asserts that 'he currently doesn't smoke'. Given this, Schlenker (2008) assumes a formal language with atomic sentences of the form $p'p$, where p' is the presupposition and p the assertion.[3] These will be interpreted conjunctively, assuming an underlyingly bi-

[3] We deviate slightly from Schlenker's notation who writes $\underline{p}p'$ for a sentence where $\underline{p}$ is the presuppositional component and p' the assertive component.

valent and classical semantics, so $p'p$ is true in a world w iff p' is true and p is true.[4,5]

Schlenker's *Transparency* idea takes the Stalnakerian intuition about redundancy quite literally: a sentence r is Transparent in the position of a sentence D embedded in a sentence $S = \alpha D\beta$ (where α and β are the substrings of S on the left and right of D) iff conjoining r to D doesn't change the truth conditions of S for any D (the definition below is adapted from Schlenker 2008):

(6) **(Symmetric) *Transparency*:** Given a context C, a sentence r and sentence $S = \alpha D\beta$ (where α and β are substrings of S on the left and right of D), then r is *transparent in the position of D* iff the following holds:

– For all D: $C \models \alpha\ (r \wedge D)\ \beta \leftrightarrow \alpha\ D\ \beta$

Therefore, sentences that are transparent in the position of D are redundant: adding them or removing them won't change the truth conditions. Given a presuppositional sentence $p'p$ embedded in S, p' then is restricted to be redundant information, in the sense that it is restricted to be transparent in the position of p.

To get a sense of how this works, consider $p'p$. *Transparency* requires that p' should be transparent in the position of p. This is satisfied just in case $C \models p'$. To see this, consider what the constraint requires in a context C:

(7) For all p: $C \models p'p \leftrightarrow p$

Suppose (7) holds. Then it holds for all p, so specifically it holds for $p = \top$, where $\top$ is a tautology. Then, the condition becomes:

(8) $C \models p'\top \leftrightarrow \top$

Recall that $p'p$ is interpreted conjunctively, so the condition becomes:

(9) $C \models p'$

[4] The assumption that presuppositions are separable from the other entailments of a sentence is implicit in a lot of work on presupposition. For instance Karttunen (1974) talks about the 'atomic presuppositions' of a sentence. Moreover, presupposition-triggering algorithms (e.g., Abrusán 2011) assume that a presupposition starts as an entailment that gets marked as a presupposition. We then can view the p' in $p'p$ as precisely this entailment to be marked as a presupposition (hence the prime). Nevertheless, it should be noted that this is probably an idealization, and that sometimes separating the entailment which is to be presupposed is not as straightforward (see Schlenker 2010). Nonetheless, we think it's a useful idealization, and we end up adopting it in our system as well.

[5] An anonymous reviewer wonders under what assumptions this could be made to work in a direct interpretation framework, suggesting that this might require taking presupposition triggers to be syntactically complex in the object language. We share the sense that if someone wanted to use this system to directly interpret a more naturalistic syntax, then taking triggers to form syntactic complexes of the form *presupposition* + *assertion* would probably be required. In the case of triggers like factive verbs (e.g., 'know') there is a sense in which the presuppositional component is already syntactically separable as it appears in the form of a CP complement to the factive verb. For triggers like 'stop', we might end up having to postulate the required syntactic complexity, but take the presuppositional component of 'stop' to be unpronounced. For current purposes, we leave this issue aside.

For the other direction, suppose that (9) holds. Then, it's easy to see that (7) also holds. This therefore derives that a presupposition p' of a sentence $p'p$ must be entailed by the global context.

As it stands in (6), the definition of *Transparency* is symmetric, in the sense that information that comes after the presupposition trigger $p'p$ can be used to check if p' is redundant in S. For instance, applied to a conjunction like $(p'p\ and\ q)$, *Transparency* demands that:

(10) For all p: $C \models (p'p\ and\ q) \leftrightarrow (p\ and\ q)$.

Going through the relevant calculations, we can show that this holds just in case $C \models q \rightarrow p'$, i.e., the second conjunct (contextually) entails the presupposition of the first conjunct. To derive the asymmetry associated with conjunction, Schlenker (2008) proposes an asymmetric version of *Transparency* whereby r is redundant in the position of D just in case $(r \wedge D)$ can be replaced with D (for any D) **no matter what follows D in S**. Applied to the case of $p'p$, this forces the p' component of p' to be redundant in S no matter what follows $p'p$. The idea is that as soon a comprehender encounters a presupposition trigger from left to right, they check if it is redundant no matter what follows. The sentence suffers presupposition failure if that is not the case:

(11) **(Asymmetric) *Transparency*:** Given a context C, a sentence r and sentence $S = \alpha D \beta$ (where α and β are substrings of S on the left and right of D), then r is *transparent in the position of D* iff the following holds:

– For all D, for all β: $C \models \alpha\ (r \wedge D)\ \beta \leftrightarrow \alpha\ D\ \beta$

Note how now the constraint quantifies universally over all possible continuations (good finals) β that follow $(r \wedge D)$. To get a sense of how this works, consider the case of $S = (p'p\ and\ q)$. We can show that *Transparency* is satisfied just in case $C \models p'$. The constraint demands that:

(12) For all p, for all β: $C \models (p'p\ \beta \leftrightarrow (p\ \beta$

Suppose that this holds. Then it must hold for $\beta = and\ \top)$.[6] Then the condition becomes:

(13) For all p: $C \models (p'p\ and\ \top) \leftrightarrow (p\ and\ \top)$

This last expression is clearly equivalent to:

(14) For all p: $C \models p'p \leftrightarrow p$

As we saw earlier, this holds just in case $C \models p'$. For the other direction, suppose that $C \models p'$. Then $p'p$ is equivalent to p in C for all p, so substituting $p'p$ for p (and vice versa) in a larger sentence will not affect the truth conditions for any p.

[6] Note that β is a variable over substrings.

On the other hand, in a sentence like $(p \wedge q'q)$, things are fine as long as $C \models p \rightarrow q'$. Intuitively, the reason is that since $p \models q'$, $(p \wedge q'q)$ is equivalent to $(p \wedge q)$, which means that the q' can be removed without any change to the truth conditions for any q (see Schlenker 2007, 2008 for more details).[7]

Upshots Note how this kind of constraint puts no asymmetry in the semantics, which has remained fully commutative and bivalent. Presupposition failure results from a pragmatic constraint that is inspired by the idea that comprehenders evaluate whether a presupposition represents redundant information contextually as soon they encounter the relevant trigger in interpreting the sentence from left to right. Thus, Schlenker (2008) derives the asymmetry of conjunction, while keeping its base semantics fully symmetric. His theory represents a major advance in pro-

[7] An interesting thing to note here is that the strategy of quantifying over possible continuations as a way of making a projection system asymmetric isn't necessarily tied to the particularities of *Transparency*. As pointed out in Fox (2008) (see also Chemla and Schlenker 2012), we can use this strategy to incrementalize more familiar trivalent accounts of projection (Kleene 1952, Peters 1979, Beaver and Krahmer 2001, George 2008a). Suppose that we start with the traditional Strong Kleene system, which is fully commutative in its base semantics. For example, here's Strong Kleene conjunction:

(i)

$p \wedge q$	T	F	#
T	T	F	#
F	F	F	F
#	#	F	#

Then we can add a constraint like the following:

(ii) Given a sentence $S = (\alpha * \beta)$, where $*$ is a binary connective, if it's the case that α receives the # value in some world w, and it's the case that for all possible constituents γ the truth value of $(\alpha * \gamma)$ is constant in w (according to the Strong Kleene table), then assign to S that constant truth value. Otherwise, assign to S the value #. If α doesn't receive the # value in w, then the value of the entire sentence in w is the one given by the Strong Kleene table.

In this constraint, good finals are thought of as possible constituents that can substitute for the second argument in $(\alpha * \beta)$, and as such the constraint has a more structural nature than the *Transparency* constraint, where good finals are substrings. However, the effects are similar: by applying this constraint to the Strong Kleene tables, we get the so-called Middle Kleene tables. For example, in $(\alpha \wedge \beta)$, if α is # in some w, then there are continuations that make the sentence both 0 (take $\beta = 0$) and # (take $\beta = \#$). So, the truth value of the sentence isn't constant regardless of continuation in w, and the sentence receives the # value. The full Middle Kleene table for conjunction is as follows:

(iii)

$p \wedge q$	T	F	#
T	T	F	#
F	F	F	F
#	#	#	#

viding an account of projection that is explanatory and fully general at the same time.[8,9]

Given the theory's success, it's natural to wonder if it can be extended to the question data. E argues that it cannot.

2.3 The tripartition requirement

Language and semantics To see why *Transparency* does not work to derive presupposition filtering in a conjunction of questions like $(?p \wedge ?q'q)$, let's spell out some assumptions about the language and its semantics. Assume the following language $\mathcal{L}$ (adapted from Schlenker 2008):

(15) $\phi := p_i \mid p'_j p_k \mid \top \mid \bot \mid \neg\phi \mid (\phi \wedge \phi) \mid (\phi \vee \psi) \mid \phi \to \psi \mid ?\phi$ (indices are natural numbers and are omitted below)

The semantics of this language is a garden-variety inquisitive semantics (Ciardelli et al. 2013, 2015, a.o.), that specifies the conditions under which a state s (a set of worlds) supports ($\vdash$) an $\mathcal{L}$-sentence:

(16)
- $s \vdash p$ iff for every $w \in s$, $|p|$ is true
- $s \vdash p'p$ iff $s \vdash p'$ and $s \vdash p$
- $s \vdash \top$ iff $s \subseteq W$ (where W is a set of worlds)
- $s \vdash \bot$ iff $s = \emptyset$
- $s \vdash \phi \wedge \psi$ iff $s \vdash \phi$ and $s \vdash \psi$
- $s \vdash \phi \vee \psi$ iff $s \vdash \phi$ or $s \vdash \psi$
- $s \vdash \phi \to \psi$ iff $\forall t \subseteq s$: if $t \vdash \phi$ then $t \vdash \psi$
- $s \vdash ?\phi$ iff $s \vdash \phi \vee \neg\phi$
- $s \vdash \neg\phi$ iff $s \vdash \phi \to \bot$

A couple of notes: first, since a state s supports p iff the classical proposition associated with p (namely $|p|$) is true in all worlds in s, the empty state supports any p. Second, a state s supports $\neg\phi$ iff there are no non-empty subsets of s that support ϕ.

[8] That is not to say that there aren't issues. In particular, the case of connectives that behave symmetrically (e.g., disjunction) forces Schlenker to say that both symmetric *Transparency* and asymmetric *Transparency* are available, with asymmetric *Transparency* being the preferred default, as it follows the order imposed by incremental interpretation. However, recent experimental results suggest that symmetry is not available to the same extent for all connectives. It is much more readily available in disjunctions than in conjunction; this constitutes a challenge for the idea that all connectives have access to both kinds of *Transparency*. In this respect, some of the questions that arise in Heim's theory reappear, in the form of what conditions the choice of one kind of local context over the other. It is exactly this kind of problem that *Limited Symmetry* was originally designed to solve. See Sect. 3 for some more discussion of this, as well as Kalomoiros and Schwarz (Accepted).

[9] Schlenker (2009) proposes an equivalent formulation of these ideas in the form of his *Local Contexts* theory. The idea behind that reformulation is that the Karttunen-Heim notion of 'local context' (Karttunen 1974; Heim 1983) can be re-conceptualized as the strongest proposition r that we can conjoin to a constituent E such that $\alpha(r\ and\ E)\beta$ is equivalent to $\alpha E\beta$, for all E, and for all β (it should be clear that this requires r to be asymmetrically transparent with respect to E). Since the theory that we use to develop our own ideas in this paper is much more transparently connected to *Transparency Theory* than to *Local Contexts*, we limit our presentation here to *Transparency*. See Schlenker (2009) for more details on *Local Contexts*.

Given the semantics above, $(?p\wedge?q)$ denotes a set that contains four different kinds of states (we call this set the *quadripartition* following E):

(17) $\{s \mid s \vdash p \; or \; s \vdash \neg p\} \cap \{s \mid s \vdash q \; or \; s \vdash \neg q\}$.

This is equivalent to:

(18) **Quadripartition denotation:** $\{s \mid (s \vdash p \; and \; s \vdash q) \; or \; (s \vdash p \; and \; s \vdash \neg q) \; or \; (s \vdash \neg p \; and \; s \vdash q) \; or \; (s \vdash \neg p \; and \; s \vdash \neg q)\}$

A conjunction of polar questions then denotes a partition of the context into states where both p and q holds, states where p holds but q doesn't hold, states where p doesn't hold but q holds, and finally states where neither p nor q hold. Under an approach to question meaning as resolution conditions, this makes sense. In each kind of state, we are able to give a complete answer that resolves the issue arising from conjoining the questions $?p$ and $?q$.

Applying *Transparency* To apply *Transparency* to questions, we need a notion of equivalence between questions. Following E, we take two questions to be equivalent just in case they denote the same set of states (contextually). We can now check whether we can use *Transparency* to derive filtering conditions. Specifically, we want to know if in a sentence like $(?p\wedge?q'q)$ the presupposition q' gets filtered when we assume that p (contextually) entails q' (all the states that support p support q'). *Transparency* imposes the condition that for all q the denotations of $(?p\wedge?q'q)$ and $(?p\wedge?q)$ are equivalent. The inquisitive denotations for these two sentences in a context C are:

(19) $(?\mathbf{p}\wedge?\mathbf{q'q})$: $\{s \subseteq C \mid s \vdash p \; or \; s \vdash \neg p\} \cap \{s \mid s \vdash q'q \; or \; s \vdash \neg q'q\} = \{s \mid (s \vdash p \; and \; s \vdash q'q) \; or \; (s \vdash p \; and \; s \vdash \neg q'q) \; or \; (s \vdash \neg p \; and \; s \vdash q'q) \; or \; (s \vdash \neg p \; and \; s \vdash \neg q'q)\}$

(20) $(?\mathbf{p}\wedge?\mathbf{q})$: $\{s \subseteq C \mid (s \vdash p \; and \; s \vdash q) \; or \; (s \vdash p \; and \; s \vdash \neg q) \; or \; (s \vdash \neg p \; and \; s \vdash q) \; or \; (s \vdash \neg p \; and \; s \vdash \neg q)\}$

Using the fact that $p \models q'$, we can re-write (19) as:

(21) $(?\mathbf{p}\wedge?\mathbf{q'q})$: $\{s \subseteq C \mid (s \vdash p \; and \; s \vdash q) \; or \; (s \vdash p \; and \; s \vdash \neg q) \; or \; (s \vdash \neg p \; and \; s \vdash q'q) \; or \; (s \vdash \neg p \; and \; s \vdash \neg q'q)\}$

Now consider a q such that $|q|$ is not related by (contextual) entailment to either $|p|$, or $|\neg p|$, or $|q'|$, or $|\neg q'|$. This means that there are worlds where $|q|$ is true, and $|p|$ is false and $|q'|$ is false. Also, there are worlds where $|q|$ is false, and $|p|$ is false and $|q'|$ is false.[10] Take a world w of the first kind, and a world w' of the second kind, and form the set $\{w, w'\}$. This is a state that supports $\neg p$ and $\neg q'$, so it is in the denotation of $(?p\wedge?q'q)$. However, it is not in the denotation of $(?p\wedge?q)$: while

[10]If there were no such worlds, then all worlds where $|q|$ is false would be worlds where either $|p|$ is true or $|q'|$ is true; that is, $|\neg q| \models |p \vee q'|$. Since $|p| \models |q'|$, this is equivalent to $|\neg q| \models |q'|$, which is equivalent to $|\neg q'| \models |q|$, which violates the assumption that $|q|$ and $|\neg q'|$ are not related by contextual entailment.

the state supports $\neg p$, it supports neither q nor $\neg q$. Therefore, for this q, the two denotations are not the same.

The tripartition to the rescue This is an undesirable result, as clearly q' gets filtered in the second conjunct of a conjunctive question when p entails it. Are there ways to get to the required filtering conditions? In fact, E argues that the only way for $p \models q'$ to guarantee the filtering of q' is if conjunctive questions have the form $?(p \wedge ?q)$. In this case, a conjunctive question denotes a ***tripartition***:

(22) **Tripartition denotation:** $\{s \mid (s \vdash p \ and \ s \vdash q) \ or \ (s \vdash p \ and \ s \vdash \neg q) \ or \ (s \vdash \neg p)\}$

Going through the relevant computations reveals that if $p \models q'$, then $?(p \wedge ?q'q)$ and $?(p \wedge ?q)$ have the same denotation for all q (see E's original paper for more details). This gives us the correct filtering conditions.

However, as E points out, $?(p \wedge ?q)$ does not represent the syntax that questions like (2) arguably have: they are conjunctions of questions, not questions of the conjunction of a declarative with a question (see E's paper for an elaboration of this criticism). Thus, E aims to develop an account that essentially makes a conjunctive polar question denote the tripartition in (22), while retaining the syntactic intuition that we are dealing with a conjunction of questions.

2.4 Enguehard's (2021) account

E states his solution in a framework where questions denote trivalent inquisitive predicates:

(23) $$?p = \lambda s. \begin{cases} 1, \text{if } s \vdash p \\ 0, \text{if } s \vdash \neg p \\ \#, \text{ otherwise} \end{cases}$$

This predicate of states maps a state s to 1 if s supports p, to 0 if s supports the negation of p, and to # otherwise. The # case is meant to capture the cases where either: i) s contains a mix of worlds, where in some p is 1, while in others 0 or ii) the presuppositions of p fail. Here's the intuition behind this move. A polar question $?p$ partitions the context into resolution and non-resolution states: the first kind of state is a state that supports either p or $\neg p$. In these cases, the issue raised by the question is resolved, positively or negatively. In the second kind of state, the issue raised is not resolved, either because the state is mixed or because it gives rise to a presupposition failure.

E formalizes this within a fully trivalent system in which presupposition failure for both declaratives and questions is modeled as #. However, as he points out, the choice matters only in the case of questions. Simple declaratives could receive an analysis within Schlenkerian *Transparency(/Local Contexts)*. Furthermore, note that the denotation in (23) assigns different denotations to positive vs. negative polar questions, as $?(\neg p)$ maps states that support p to 0, and states that support $\neg p$ to 1. This breaks the symmetry between positive and negative polar questions (as well as 'or not' questions) and allows E to account for the asymmetries in (5).

Given this, here's his definition for a coordination of polar questions:

(24) $$?p \wedge ?q = \lambda s. \begin{cases} 1, \text{if } s \vdash p \text{ and } s \vdash q \\ 0, \text{if } s \vdash \neg p, \text{ or } s \vdash p \text{ and} s \vdash \neg q \\ \#, \text{ otherwise} \end{cases}$$

The important thing to note here is that collecting the states that are being mapped to 1, 0 by this trivalent predicate creates the tripartition in (22). The conjunction of two polar questions $?p$ and $?q$ is resolved positively in states that support the truth of p and q and negatively in states that support the falsity of p or the truth of p and the falsity of q. States that include worlds where p is undefined are mapped to #, as are states that support p but where q is undefined. This makes conjunction of polar questions follow a Middle Kleene logic which derives the desired asymmetry of projection (see also fn 7). When does $(?p \wedge ?q)$ map a state s to a classical truth value (and hence doesn't suffer from presupposition failure)? Either p or $\neg p$ must be supported by s (so the presuppositions of p must be satisfied in s); if s supports p, then s must also support either q or $\neg q$, so in both cases q must not receive the # value (which is equivalent to saying that all the states that support p must not cause a presupposition failure for q, so p entails the presuppositions of q). These are the desired filtering conditions.

Apart from leading to correct filtering properties, an additional important motivation put forth by E for the denotation in (24) is the predictions it makes for what kinds of answer resolve the issue raised by a conjunction of polar questions like (2), repeated here as (25a):

(25) a. Is Emily married and is her spouse a doctor?
b. Emily is not married.
c. Emily is married and her spouse is not a doctor.
d. Emily is married and her spouse is a doctor.

According to the tripartitive denotation, (25a) is resolved by states where Emily is married and her spouse is a doctor (i.e., states that support p and q), states where Emily is unmarried (i.e., they support $\neg p$), and finally states where Emily is married and her spouse is not a doctor (i.e., states that support p and $\neg q$). The point is that considering the case where both Emily is unmarried and Emily's spouse is not a doctor is not needed; knowing that the proposition underlying the first conjunct fails is enough to resolve the question negatively. This is captured by the asymmetric denotation in (24), as $\neg p$ *and* $\neg q$ simply does not appear as a case where the question returns 0; knowing that $\neg p$ is enough. To the extent then that E is right is arguing that a conjunction of polar questions is fully resolved by the tripartition, this provides an additional empirical argument for moving away from the quadripartitive denotation.

Summarizing, the main claim is that putting classical accounts of polar questions together with a pragmatic theory of presupposition projection like Schlenker (2008) does not lead to a satisfactory account of the projection data in polar questions.[11]

[11] E extends this claim to trivalent accounts of presupposition projection like George (2008a). The point is that trivalence ends up operating on the question level in E's theory, and not just at the declarative level.

E's solution is to treat polar questions as trivalent inquisitive predicates that follow a Middle Kleene logic, thus accounting for the filtering patterns; the same trivalence makes $?p$ (positive polar), $?(\neg p)$ (negative polar), $?p \vee ?(\neg p)$ ('or not') questions denote different objects, hence accounting for their non-substitutability (see E for details).

2.5 Why look for an alternative?

Theoretical perspective E claims that the core intuition behind his analysis is that a question Q should be associated with positive and negative answers (states mapped to either 1 or 0, respectively, in his analysis), and that whether a state counts as positive or negative depends on whether the proposition related to Q is True or False in that state. We agree with this core intuition, and in fact our own reanalysis of the phenomenon relies on a similar notion of positive vs. negative resolution to a question. However, E's approach puts this notion of positivity vs. negativity directly into the semantics. A consequence of that is that the asymmetry of conjunction is also semanticized, with conjunction no longer being commutative. We can then repeat the same question posed in the original asymmetry debate reviewed above: are the asymmetries of 'and' with respect to projection something to bake into the lexical entry, or are they to be derived from more general pragmatic mechanisms (which leave the basic conjunction semantics commutative, reintroducing the notion of positive vs. negative resolution in the pragmatics)?

In addition, while E claims that a *Transparency*(/*Local Contexts*)-style pragmatic approach does not work for (bivalent denotations of) questions, he sketches the possibility that *Transparency*(/*Local Contexts*) could apply to both declaratives and questions, with the condition that while declaratives would receive a classical bivalent semantics, questions would crucially continue to receive a Middle Kleene trivalent semantics. However, this would be a case where *Transparency*(/*Local Contexts*) **derives** the filtering conditions of declaratives, but **restates** the filtering conditions of questions, since the underlying trivalence already encodes the filtering conditions of questions (i.e., *Transparency*(/*Local Contexts*) would be explanatory only for declaratives). Such a move would substantially weaken the parallelism between projection from declaratives and projection from questions at the theoretical level. If we think that it is desirable for the declarative data and the question data to receive parallel **explanations**, and if we also think that there is merit (explanatory or otherwise) to the pragmatic, Stalnaker-style approach to projection that *Transparency*(/*Local Contexts*) aims to formalize, then it becomes interesting to inquire whether we can have a successful pragmatic theory of projection that keeps the semantics bivalent across the board, and scales across speech acts.

Empirical perspective In addition to theoretical consequences, the point about whether the asymmetry of 'and' needs to be semanticized or not also has empirical consequences. In this respect, we want to set up an empirical challenge for the view that makes conjunctions of questions denote the tripartition directly. E himself notes that there are cases where a conjunction of questions seems to denote the quadripartiton, and entertains the possibility that the quadripartitive denotation coexists with the tripartitive one (see his paper for details), with context determining which one is called for in a particular case. However, he maintains that when there is a presupposition trigger, it **forces** the tripartition, as in (25a) (otherwise filtering will not come out right). But consider minimal variations of (25a), which show filtering, while simultaneously calling for a quadripartition in terms of their complete answers:

(26) a. ***Context:*** I'm visiting Emily's house, and I see a full pack of Marlboro cigarettes in the dustbin in her office. I have no idea if Emily has ever smoked, so I ask her spouse:
b. Did Emily use to smoke Marlboros and has she stopped smoking?
c. (i) # Emily did not use to smoke Marlboros
(ii) ✓Emily has never smoked.
(iii) ✓Emily didn't use to smoke Marlboros (although she was a smoker), and she has stopped smoking.
(iv) ✓Emily didn't use to smoke Marlboros (although she was a smoker), and she hasn't stopped smoking.
(v) ✓Emily used to smoke Marlboros, and she (hasn't) stopped smoking.

(27) a. ***Context:*** Emily has left for an educational program somewhere in Europe. Possible destinations include Paris and Strasbourg in France, or Amsterdam and Utrecht in the Netherlands. I have no idea where she ended up going, but one day I heard one of her friends chatting to someone on the phone in French. So, I asked them:
b. Is Emily in Paris and is she happy that she's in France?
c. (i) # Emily is not in Paris.
(ii) ✓Emily is not in France.
(iii) ✓Emily isn't in Paris (although she is in France), and she is happy to be in France.
(iv) ✓Emily isn't in Paris (although she is in France), and she is not happy to be in France.
(v) ✓Emily is in Paris, and she is (not) happy to be in France.

The examples in (26b) and (27b) have the same form as (25a), the only difference being that in (25a), the (proposition underlying the) first conjunct is equivalent to the presupposition of the second conjunct (i.e., that Emily is married), but in (26b)/(27b) the first conjunct asymmetrically entails the presupposition of the second conjunct (i.e., that Emily used to smoke/Emily is in France).

Focusing on (26) for the moment, suppose that you wanted to resolve the issue raised by the question negatively. E doesn't consider this type of example, but given his commitment to the tripartition for (25a), the prediction is that negating the declarative underlying the first conjunct should be enough to resolve the question negatively: denying just the first conjunct should fully address the issue raised by the question, as states that support that negation are mapped to 0. But as indicated in (26c)-(i), this is not the case; instead a complete answer where the first conjunct is negated somehow needs to address the issue raised by the second conjunct as well: either by denying the presupposition of the second conjunct that Emily used to smoke (26c)-(ii), or by saying that Emily used to smoke and currently does(n't)

(26c)-(iii)–(26c)-(iv). The example in (27) illustrates the same point with a different presupposition trigger, showing that the observation here is quite general.

It is instead more plausible that conjunctions like (25a), (26b) and (27b) actually do have quadripartite answerhood conditions, but in a case like (25a), replying negatively to the first conjunct addresses the issue raised by both conjuncts (if Emily is not married then there is no need to inquire about her spouse's occupation), so Gricean considerations of quantity apply. Answers that address the second conjunct explicitly end up being redundant. However, when just resolving the issue raised by the first conjunct negatively is not enough to also address the issue raised by the second conjunct, then a complete answer requires further specification, which in turn is determined by the quadripartion. This would then be an empirical argument that the tripartition required to capture presupposition filtering should be operative at a pragmatic, not semantic, level.

The purpose of the rest of this response is to show that such a pragmatic theory of projection is indeed possible: it retains a classical bivalent semantics for polar questions, where conjunction is commutative, and derives the projection data for questions and declaratives in a parallel way. We turn to this theory below.

3 *Limited Symmetry*: the classical system

Language and semantics *Limited Symmetry* is a novel pragmatic theory of presupposition projection that aims to provide an explanatory and predictive account of the phenomenon.[12] Its main appeal comes from the fact that it derives asymmetric filtering for conjunction but symmetric filtering for disjunction **through a single mechanism** (thus accounting for the experimental results in Kalomoiros and Schwarz Accepted). As such, the theory can handle contrasts like the following without positing two different filtering mechanisms, one symmetric and one asymmetric (see e.g., Schlenker 2009, Rothschild 2011):

(28) a. ***Context:*** We have no idea if Emily is married.
b. #Emily's spouse is a doctor and Emily is married
c. ✓Either Emily's spouse is a doctor or Emily is not married.

Here we give a brief introduction to the propositional version of the system. We then proceed to 'lift' the theory to an inquisitive semantics in Sect. 4. We begin with a simple propositional language $\mathcal{L}^-$ that includes only conjunction, disjunction and negation, as well as atomic propositional constants (both presuppositional and non-presuppositional):

(29) $\phi := \; p_i \mid p'_j p_k \mid \top \mid \bot \mid \neg\phi \mid (\phi \wedge \phi) \mid (\phi \vee \phi)$ (indices are natural numbers and are omitted below)

[12] Here we present a version of *Limited Symmetry* that is formalized enough to make the main ideas clear, but is not meant to be comprehensive. For a more comprehensive statement of the theory, see Kalomoiros (2023). An even fuller treatment will hopefully be published in the future.

The semantics for this language is classical (fully bivalent, with no asymmetry encoded in the semantics). As before, $p'p$ represents an atomic formula with a presuppositional part (p') and a non-presuppositional part (p); its interpretation is conjunctive. We also assume that $\mathcal{L}$ is expressive enough to have atomic constants for tautologies and contradictions, $\top$ and $\bot$ respectively.

Intuitions Recall Schlenker's symmetric *Transparency* theory where a sentence S doesn't suffer from presupposition failure as long as for each $p'p$ in S, the version of S with $p'p$ and the version of S with $p'p$ replaced by p have equivalent truth conditions for all p. It is convenient to adopt the notation $S_{p'p/p}$ for the version of S where $p'p$ has been replaced by p (see below for more precise statement of this). Then *Transparency* amounts to requiring that for every $p'p$ in S:

(30) $\forall p: C \models S \leftrightarrow S_{p'p/p}$

It's useful to break this biconditional down to the following two conditionals:

– $S \rightarrow S_{p'p/p}$
– $\neg S \rightarrow \neg S_{p'p/p}$ (the contrapositive of $S_{p'p/p} \rightarrow S$)

Thinking in terms of worlds, the first conditional says that all the worlds in the context where S is true are worlds where $S_{p'p/p}$ is true (for all p). The second conditional says that all the worlds where S is false are worlds where $S_{p'p/p}$ is false (for all p).

Limited Symmetry starts from the idea that this formulation of presupposition failure is essentially correct. However, compreheders in parsing a sentence S do not wait until the end of S in order to check whether this equivalence obtains. Instead, they are playing a Stalnakerian game, where they try to categorize worlds in their context as true vs. false. They aim to be fast at this, so in parsing S they are constantly looking to isolate subsets of the context where S is already true/not true, so that they can categorize the worlds in them accordingly, and also so as not to have to worry about those worlds in subsequent truth/non-truth calculations (I assume, following Schlenker 2009, that the less worlds they have to categorize as they are incrementally interpreting S, the easier the overall categorization task becomes). As comprehenders get incremental access to these sets of worlds where at some point in the parse S is already true/not true, they check as much of the *Transparency* equivalence as they can, based on where they know the sentence to be already true/not true. For example, if they are at a point where they already know a set of worlds where S is true, they check whether those worlds are also included in the worlds where $S_{p'p/p}$ is already true (in so far as this can be known at that point in the parse). Similarly for falsity. Essentially, comprehenders are 'building' the equivalence required by *Transparency* in real time, as they are processing a sentence from left to right.

Presupposition failure results if at some point in the parse there are worlds where we know that S is already true/false, but these worlds are not (perhaps yet) worlds where $S_{p'p/p}$ is already true/false. A clarification is in order here: it's possible that in the presence of such worlds, the comprehender could simply keep them in memory, move on with parse and check again if after parsing a bit more of the sentence then these worlds are worlds where both S and $S_{p'p/p}$ are true/false. Such a strategy is consistent with the fact that the overall requirement on presuppositions is symmetric (not asymmetric) *Transparency*. On such a view, 'real' presupposition failure occurs if *Transparency* fails once you have access to the entirety of S. However, we assume that such 'delayed' satisfaction comes with a cost of having to keep these worlds 'in memory', and as such entails a processing cost. The ideal situation that carries no cost is if at every parsing point, for all p, the worlds where S is already true/false are worlds where $S_{p'p/p}$ is already true/false. Therefore, our formalization below presents the failure of this ideal situation as a hard constraint on acceptability, even though such a constraint might be seen as violable given a processing cost.

Formalization A core driving force in *Limited Symmetry* is that sentences are parsed from left-to-right, symbol by symbol; the basic symbolic parsing units are: p_i (simple atomic formulas), $p_j p_k$ (presuppositional atomic formulas), $\neg$, $\wedge$, $\vee$, and the parentheses (,). We thus gain access to progressively larger partial syntactic structures. So for a sentence like $(p'p \ \wedge \ q)$, we start with the parenthesis (; then we parse $p'p$, then $\wedge$, then q and finally the closing parenthesis. We can collect these **parsing steps/points** in a list: [`(`, `(p'p`, `(p'p ∧`, `(p'p ∧ q`, `(p'p ∧ q)`].[13] The i-th element of such a list for a sentence S is referred to as the i-th parsing step/point of S, and is notated as $(S)_i$.

Following the Stalnakerian intuition described above, at each parsing step we are trying to decide in what worlds in the context C the sentence is already true or not true, regardless of continuation.

For instance, for $S = (p'p \wedge q)$, at parsing step $(S)_3 =$ `(p'p ∧`, we know that the sentence is already false in all worlds where $p'p$ is false. It doesn't matter what follows, since we are dealing with a conjunction, which means that as long as we know that the first conjunct is false, the whole conjunction is false.

For any $\mathcal{L}^-$-sentence S then, at any i-th parsing point $(S)_i$, we can define sets of worlds where S is true or not true in the context C, no matter what good final d (Schlenker 2009) follows $(S)_i$:

(31)
- $\mathbb{T}_i^S = \{w \in C | \forall d : \ (S)_i^\frown d \ \mathit{is\ true\ in\ w}\}$ (the set of worlds where S is already true at $(S)_i$, no matter what good final d is concatenated ($^\frown$) to $(S)_i$)
- $\mathbb{F}_i^S = \{w \in C | \forall d : \ (S)_i^\frown d \ \mathit{is\ not\ true\ in\ w}\}$ (the set of worlds where S is already false at $(S)_i$, no matter what good final d is concatenated ($^\frown$) to $(S)_i$)[14]

The novel bit in *Limited Symmetry* is how it connects all this to presuppositions. First some notation:

(32) **Substitution:** Given a sentence S, $S_{p'p/p}$ is the version of S with all $p'p$ components replaced by p. If S contains no $p'p$ components, then $S_{p'p/p} = S$.

[13] We use the `verbatim` font to refer to partial syntactic objects.

[14] As pointed out by an anonymous reviewer, formulating these sets based on true vs. non-true opposition (instead of the true vs. false opposition) has the advantage of allowing the system to be compatible with an underlying semantics that involves truth value gaps/trivalence. We do not pursue this alternative here (since classical bivalent logic is enough to derive our basic results), but it's an interesting potential extension of the ideas here. See also Kalomoiros (2023) for more.

I make the following assumption: every presuppositional atomic sentence in S is unique. As such, $S_{p'p/p}$ contains (at most) only one substitution instance.[15] For example, if $S = (p'p \wedge q)$, then $S_{p'p/p} = (p \wedge q)$.

Now we can state the requirement on $p'p$ constituent of S that we described informally above:

(33) **Presupposition Constraint:** For all sentences S, any i such that $1 \leq i \leq length(S)$ and any presuppositional constants $p'p$ in $(S)_i$ (the i-th parsing point of S), it must hold that for all sentences p:

- $\mathbb{T}_i^S \subseteq \mathbb{T}_i^{S_{p'p/p}}$
  - where $\mathbb{T}_i^S = \{w \in C | \forall d : (S)_i^\frown d \text{ is is true in } w\}$
  - and $\mathbb{T}_i^{S_{p'p/p}} = \{w \in C | \forall d : (S_{p'p/p})_i^\frown d \text{ is true in } w\}$
- $\mathbb{F}_i^S \subseteq \mathbb{F}_i^{S_{p'p/p}}$
  - where $\mathbb{F}_i^S = \{w \in C | \forall d : (S_{p'p/p})_i^\frown d \text{ is not true in } w\}$
  - and $\mathbb{F}_i^{S_{p'p/p}} = \{w \in C | \forall d : (S_{p'p/p})_i^\frown d \text{ is not true in } w\}$

The way this works is that given a presuppositional constant $p'p$ in some i-th parsing point of S, we ask two things: i) is it the case that for all p, the set of worlds where S is **already true** at its i-th parsing point is a subset of the set of worlds where $S_{p'p/p}$ (the non-presuppositional version of S with p substituting for $p'p$) is **already true** at its corresponding i-th parsing point $(S_{p'p/p})_i$? and ii) is it the case that for every p, the set of worlds where S is **already not true** at its i-th parsing point is a subset of the set of worlds where $S_{p'p/p}$ (the non-presuppositional version of S with p substituting for $p'p$) is **already not true** at its corresponding i-th parsing point $(S_{p'p/p})_i$? If the answer to both of these questions is positive, then the update continues to the next parsing point, $i+1$, repeating the above process. If either of the two conditions receives a negative answer, then the process stops (due to presupposition failure).[16]

Examples To make all this more concrete, we briefly illustrate how conjunction works in the system. In a conjunction $S = (p'p \wedge q)$, at parsing step $(S)_3 = (\mathrm{p'p} \wedge$, the following obtains:

[15]This assumption does not lead to any loss of generality. If a sentence S has multiple instance of $p'p$ in it, rewrite the ones after the first instance with other symbols of the $p'_i p_j$ form, stipulating that the interpretation of these is the same as the original $p'p$ (see also Rothschild 2008).

[16] Suppose that at some parsing point, we can determine that for all p, all of the worlds where the sentence S is already true/false for all continuations are worlds where $S_{p'p/p}$ is also true/false. Then since these worlds are in the set of true/false worlds for all continuations, when the comprehender moves to next parsing point and recalculates these sets, there is no need to include the worlds that they checked on the previous step. For those worlds the constraint holds. So, the comprehender could explicitly remove these worlds from the context as they restart the checking routine. However, encoding this in the definitions above directly would only add to their complexity without any gain/change in the predictions of the theory. Even though we do not pursue this enhancement here, the point is important in the larger scheme of things, as it could help us recover a notion of 'local context' parallel to that of Schlenker (2009). We leave a more detailed elaboration of this point for the future.

(34) a. For $(S)_3 = (\mathrm{p'p} \wedge$:

(i) $\mathbb{T}_3^S = \emptyset$ (we cannot yet reason about worlds where S is already true)
(ii) $\mathbb{F}_3^S = \{w \in C |\ p' = 0\ \ or\ \ p = 0\}$ (S is already false in worlds here $p'p$ fails)

b. For $S_{p'p/p} = (p \wedge q)$ (the non-presuppositional version of S), at $(S_{p'p/p})_3 = (\mathrm{p} \wedge$:

(i) $\mathbb{T}_3^{S_{p'p/p}} = \emptyset$
(ii) $\mathbb{F}_3^{S_{p'p/p}} = \{w \in C |\ \ p = 0\}$

c. Checking the presupposition constraint requires that for all p:

(i) $\mathbb{T}_3^S \subseteq \mathbb{T}_3^{S_{p'p/p}}$ (trivial)
(ii) $\mathbb{F}_3^S \overset{?}{\subseteq} \mathbb{F}_3^{S_{p'p/p}}$, i.e., $\{w \in C |\ p' = 0\ or\ \ p = 0\} \overset{?}{\subseteq} \{w \in C |\ p = 0\}$

The $\mathbb{T}$ sets are empty in this case, as there is no world where it is guaranteed that no matter what second conjunct completes $(S)_3$, the whole sentence will be true (for any given world, many possible second conjuncts will be false). Accordingly, the subsethood constraint is trivially met with regard to these $\mathbb{T}$ sets. The crucial issue is (c-ii): since subsethood needs to hold for all p, it needs to hold in the case where p is $\top$. Since a tautology is always true, this amounts to:

(35) $\{w \in C |\ p' = 0\} \overset{?}{\subseteq} \emptyset$

This will hold just in case $\{w \in C |\ p' = 0\} = \emptyset$, which amounts to $C \models p'$.

Consider now the case of $S = (q \wedge p'p)$, where $q \models p'$. At parsing point $(S)_3 = (\mathrm{q} \wedge$, we know that S is already false in all worlds where q is false. There is no presupposition to check here, so the constraint is trivially met. The procedure continues. At parsing point $(\mathrm{q} \wedge \mathrm{p'p}$, the requirement becomes:

(36) a. For $(S)_4 = (\mathrm{p}\ \wedge \mathrm{q'q}$, (note that the only good final here is the closing parenthesis):

(i) $\mathbb{T}_4^S = \{w \in C |\ p = 1\ and\ q' = 1\ and\ q = 1\}$
(ii) $\mathbb{F}_4^S = \{w \in C |\ p = 0\ or\ q' = 0\ or\ q = 0\}$

b. For $S_{p'p/p} = (\mathrm{p} \wedge \mathrm{q}$:

(i) $\mathbb{T}_4^{S_{p'p/p}} = \{w \in C |\ p = 1\ and\ q = 1\}$
(ii) $\mathbb{F}_4^{S_{p'p/p}} = \{w \in C |\ p = 0\ or\ q' = 0\ or\ q = 0\}$

c. Checking the presupposition constraint requires that for all q:

(i) $\mathbb{T}_4^S \subseteq \mathbb{T}_4^{S_{p'p/p}}$ (trivial)
(ii) $\mathbb{F}_4^S \overset{?}{\subseteq} \mathbb{F}_4^{S_{p'p/p}}$, i.e., $\{w \in C |\ p = 0\ or\ q' = 0\ or\ q = 0\} \overset{?}{\subseteq} \{w \in C |\ p = 0\ or\ q = 0\}$

Reasoning again by taking $q = \top$, we derive the fact that if the constraint holds then it must hold that:

(37) $\{w \in C|\ p = 0\ or\ q' = 0\} \overset{?}{\subseteq} \{w \in C|\ p = 0\}$

This happens just in case all the worlds where $\neg q'$ is true are worlds where $\neg p$ is true. Taking the contrapositive of this, we derive $C \models p \rightarrow q'$. Thus, we derive asymmetric filtering for conjunction.

Crucially, the system predicts symmetry for disjunctions of the form $S = (p'p \vee q)$, where $\neg q \models p'$ (i.e., 'bathroom disjunctions', as in (28c)) (see Kalomoiros 2022, 2023; Kalomoiros and Schwarz Accepted). The reason is essentially that at parsing point (p′p ∨, the set of worlds where the sentence is true for all possible continuations is $\{w \in C|\ p' = 1\ and\ p = 1\}$. This is clearly a subset of the set of worlds where (p ∨ is true: $\{w \in C|\ p = 1\}$. At the same parsing point, the set of worlds where the sentence is false regardless of continuation is empty, both for S and $S_{p'p/p}$. So the constraint is not violated at this parsing point and the comprehender moves on, thus getting access to the second disjunct in subsequent computations. As shown in Sect. 5, this leads to symmetry in disjunctions of questions as well (making different predictions from E's account).

4 Limited Symmetry: the inquisitive system

4.1 *Limited Symmetry$_{inq}$*

Language and semantics We now 'lift' *Limited Symmetry* to inquisitive semantics. We return to our language $\mathcal{L}$ that extends $\mathcal{L}^-$ by adding questions:[17]

(38) $\phi := \ p_i \mid p'_j p_k \mid \top \mid \ \bot \ \mid \neg\phi \mid (\phi \wedge \phi) \mid (\phi \vee \psi) \mid \mid (\phi \rightarrow \psi) \mid ?\phi$ (indices are natural numbers and are omitted below)

The semantics of $\mathcal{L}$ are as in (16).

What won't work: full resolution The core step is to lift the $\mathbb{T}/\mathbb{F}$ concept to this new semantics. Recall that the intuition for the classical system had to do with computing worlds where a sentence was already True/ False. We need to retain this for $\mathcal{L}$ sentences that contain no $?\phi$ formulas, and hence are declaratives. We do this for an inquisitive declarative sentence ϕ by computing the set of states that support $\phi/\neg\phi$, no matter the continuation.

What is the corresponding intuition for polar questions? States in inquisitive semantics formalize the idea of classes of possible worlds where we can resolve a question. So, one starting point would be to try to define sets of states where a question

[17] As before, the language includes conditionals. We do not make use of conditionals in the examples that we study, and the connective is only included here because the semantics of negation are defined via reference to it. Moreover, in *Limited Symmetry*, conditionals are best represented via an $(if\ (\phi)(\psi))$ syntax, so that the parser knows immediately that they are dealing with a conditional, and not just after they have parsed the entirety of the antecedent. See Kalomoiros (2023) for more information.

is resolved regardless of possible continuation. On such a conception, $\mathbb{T}$ is the set of a states where a questions has been resolved for every continuation at some parsing point, whereas $\mathbb{F}$ is the set of states where at the current parsing the question has not been resolved. The constraint then can remain the same: we require that for every parsing point i, for every $p'p$, for all p: $\mathbb{T}_S/\mathbb{F}_S \subseteq \mathbb{T}_{S_{p'p/p}}/\mathbb{F}_{S_{p'p}}$.

However, it quickly becomes clear that this is not a tenable analysis.[18] The reason is that this approach doesn't allow us to differentiate between the filtering conditions of $(?p \wedge ?q'q)$ and $(?\neg p \wedge ?q'q)$.

In both cases, the presupposition constraint takes effect only after the second conjunct has been parsed, as it is just the second conjunct that carries a presupposition. And in both cases, the quadripartitive denotation of the two sentences is the same; therefore, these two sentences are resolved in the same sets of states, and not resolved in the same sets of states. Thus, the modified version of *Limited Symmetry* that we considered above, where the equivalent of the $\mathbb{T}$ set is 'states where the issue raised by the sentence is resolved no matter of continuation' and the equivalent of the $\mathbb{F}$ set is 'states where the issue raised by the sentence is not resolved regardless of continuation', will assign exactly the same filtering conditions to both of these sentences. But this is not what we want, as these two cases contrast, (see examples (5b)-(5c)).

What will work: drefs and polarity We take the position that the filtering conditions in the case of polar questions are calculated with respect to the discourse referent introduced by such questions. As seen below, the utility of the discourse referent lies in the fact that it allows comprehenders to calculate whether the resolution of the issue raised by a question is positive or negative: if a state that resolves the issue is also in the denotation of the discourse referent, then the resolution is positive. If, on the other hand, it's in the denotation of the *negation* of the discourse referent, then the resolution is negative. Here's the idea informally. Suppose that you are parsing the conjunctive polar question below:

(39) Is Freedonia located in Europe and is it a nice place?

Once you have access to the 'Is Freedonia located in Europe and' bit, you know that no matter how this continues, all states that support the negation of 'Freedonia is located in Europe' are states where any full resolution of the issue raised by the question is negative. Note that those states do not necessarily resolve the issue raised by the question—to know which of them do that, we need the second conjunct. But for every state that supports the negation of 'Freedonia is located in Europe', if that state ends up in the states that resolve the question fully, the resolution will be of **negative polarity** (informally, in those states our interlocutor will be able to reply with 'No'). And we do not need access to the second conjunct to know that.

Much like the world-sorting into true vs. not true that inspired the original *Limited Symmetry* system, now comprehenders are sorting states into *states which, if they*

[18] Thanks to an anonymous reviewer whose comments helped me clarify this point.

resolve the question, they resolve it positively for all continuations vs. *states which, if they resolve the question, they resolve it negatively for all continuations*.[19]

The line of reasoning here depends on two crucial parts: i) that polar questions introduce discourse referents and ii) that these discourse referents are used by comprehenders to calculate the polarity (positive/negative) of a response to a polar question. Let's justify each of these in turn.

Drefs Let's start with why someone might think that polar questions introduce discourse referents. We follow Roelofsen and Farkas (2015) in taking the following paradigm to provide a compelling argument for this claim (the paradigm here is adapted from Roelofsen and Farkas 2015; see also Krifka 2001, Blutner 2012 for relevant discussion):

(40) a. A: Is Emily married?
B: I (don't) think so.
b. A: Is Emily unmarried?
B: I (don't) think so.
c. A: Does Emily speak French ↑ or German ↑?
B: I (don't) think so.
d. A: Does Emily speak French ↑ or German ↓?
B: *I (don't) think so.

Given that 'so' in the responses needs an antecedent, and the obvious antecedent is the declarative underlying the polar questions in (40a)-(40c), we take it to be the case that polar questions introduce a discourse referent that is predictable from the declarative underlying the question. Note the contrast between (40c) and (40d). The disjunctive question in (40c) is known as 'open', whereas the one is (40d) is known as 'closed'. The contrast between them shows closed disjunctive questions disallow anaphora with 'so'. We put this aside for the moment and come back to it in Sect. 5.

This reasoning receives further support from the following example of a conjunctive polar Q:

(41) A: Is Freedonia located in Europe and is it a nice place?
B: I (?don't) think so.

Without the 'don't', the answer in (41) is clearly interpreted as 'I think that Freedonia is located in Europe and it is a nice place'. This is fully accounted for if the declarative underlying the conjunction of polar questions exists a discourse referent and 'so' is anaphoric to that. The answer with 'don't' is somewhat more awkward, but again the assumption that the underlying declarative is available for anaphora can help here: replying 'I don't think that Freedonia is located in Europe and it is a nice place' is equivalent to 'I think that either Freedonia is not located Europe or it is not a

[19] A potentially alternative line of inquiry here is to assume that comprehenders categorize states into the ones that are in the denotation of the dref (and hence resolve the questions positively) vs. ones that are not in the denotation of the dref (and hence are states that either don't resolve the question, or don't resolve it positively). In the main text, we develop an approach whereby states are categorized into being in the denotation of the dref or in the denotation of its negation, as this will allow us to straightforwardly derive E's tripartition pragmatically (see Sect. 4.2).

nice place'. This response then doesn't settle the issue raised by the question in (41) (recall the quadripartition), and hence appears infelicitous.

Polarity Now for the second ingredient, i.e., that the discourse referent is used to derive the polarity of the responses. Consider again the following coordination of polar questions:

(42) Is Freedonia located in Europe and is it a nice place?

Recall E's data in (25b)-(25d) about the possible answers to a conjunction of polar questions. The point was that knowing that the proposition underlying the first conjunct is false is enough to make someone resolve the question negatively. A way of diagnosing the polarity of a response that a question receives in a state s is to test whether the answer can be prefaced by the polarity particles yes/no. A standard way of understanding 'yes'/'no' responses to a polar question is as agreement (yes) vs. disagreement (no) with the discourse referent introduced by the question (Roelofsen and Farkas 2015; see also Pope 1976, Farkas and Bruce 2010).[20] For example, consider the following paradigm of responses to (42) in different possible states:

(43) a. Yes (**state:** Freedonia is located in Europe and it is a nice place)
b. No/# Yes (**state:** Freedonia is not located in Europe and it is a nice place)
c. No/# Yes (**state:** Freedonia is located in Europe but it is not a nice place)
d. No/# Yes (**state:** Freedonia is not located in Europe and it is not a nice place)

While one-word yes/no answers are slightly weird, the judgment is clear that in each of the described states, there is one 'correct' yes/no response. This data then suggests that the calculus of polarity for a conjunction of polar questions follows a conjunction-style logic. As long as you know that the declarative underlying the first conjunct fails in s (in the sense that s supports the negation of that declarative), then

[20] The exact licensing conditions of polarity particles are not an uncomplicated matter (see Pope 1976, Kramer and Rawlins 2009, Farkas and Bruce 2010, Roelofsen and Farkas 2015, a.o. for more details and references). Polarity particles responses to polar question usually come in the form *pol particle* + *prejacent*, and properties of the prejacent (specifically whether or not the prejacent contains a negation) can affect whether a polarity particle is licensed. Consider the following (taken from Roelofsen and Farkas 2015):

(i) A: Did Peter not call? B: No, he didn't. / Yes, he didn't.

Putting things somewhat loosely here, Roelofsen and Farkas (2015) argue that 'yes' is licensed when the prejacent agrees with the discourse referent introduced by the question (in the sense that the prejacent and the discourse referent express the same proposition) or when the prejacent doesn't contain a negation. 'No' is licensed when the prejacent disagrees with dref or when the prejacent contains a negation. So, in this example, 'yes' is licensed because the response agrees with the content of 'Peter didn't call', but 'no' is also licensed because 'Peter didn't call' contains a negation.

To avoid the confound introduced by whether the prejacent contains a negation, our example in (42) contains no negations; in that case, monolectic yes/no responses appear to care solely about agreement vs. diagreement with the dref introduced by the question.

s can be seen as a state where if the question is resolved, it is resolved negatively.[21] From our point of view this is interesting because it means that we can start reasoning about overall polarity for a given state, even if we do not have access to all the parts of the question. For example, at the point (?p $\wedge$, we can already isolate states which support the negation of p; hence, if any of these states ends up in the final resolution conditions, it resolves the question negatively, regardless of what the second conjunct is (i.e., we might not know in which if these states the issue is resolved, but we do know that any potential resolution in these states is negative).[22]

[21]Note the direction of the logic here: if you can answer 'Yes', or 'No' to a question Q in a given state s, that diagnoses polarity in that state; not being able to give a yes/no response in a given state s tells us nothing about the overall polarity in s.

[22]Since the Roelofsen and Farkas (2015) framework has been quite influential to our thinking here, a few comments on it are warranted. Roelofsen and Farkas (2015) also take polar questions to introduce discourse referents. However, they identify the discourse referents with the **positive and negative highlights** of a question $?\phi$ (see Roelofsen and van Gool 2010), which in turn are *possibilities* associated with the meaning of ϕ. Possibilities/Alternatives are the maximal states in the denotation of ϕ. Therefore, the drefs that Roelofsen and Farkas (2015) use do not have syntactic status, but rather are semantic in nature. For our purposes, it will be more convenient to have access to a syntactic dref so that we can reason about its possible continuations during the parse.

Another aspect of the Roelofsen and Farkas (2015) system is that the discourse referents are marked as positive vs. negative. This is needed because they want to account for the distribution of polarity particles like 'yes' and 'no', which are sensitive to whether the discourse referent introduced by the question contains a negation or not (see fn 20). Since the notion of 'resolving/not resolving a question positively' that is of interest to us cares only about agreement with the discourse referent, and not about the presence/absence of negation, we eschew the more complicated definition of highlights in the interest of keeping things simple.

That said, even if we wanted to use the definitions of highlights to define the relevant notions, there is at least one non-trivial challenge to be overcome. To see this, first consider the definition of highlights:

(i)
- $[\![p]\!]^{+/-} = \langle\{|p|\}, \emptyset\rangle$
- $[\![\neg\phi]\!]^{+/-} = \langle\, \emptyset, \{\overline{\cup[\![\phi]\!]^{+/-}}\}\rangle$
- $[\![\phi \vee \psi]\!]^{+/-} = \langle[\![\phi]\!]^{+} \cup [\![\psi]\!]^{+}, [\![\phi]\!]^{-} \cup [\![\psi]\!]^{-}\rangle$
- $[\![?\phi]\!]^{+/-} = \begin{cases} \langle\, \emptyset, \{\alpha\}\rangle \text{ if } [\![\phi]\!]^{+/-} = \langle\, \emptyset, \{\alpha\}\rangle \\ \langle\{\cup[\![\phi]\!]^{+/-}\}, \emptyset\rangle \text{ otherwise} \end{cases}$

The first coordinate of these pairs represents the positive highlight, whereas the second coordinate represents the negative highlight. If we wanted to extend this to conjunction, a reasonable clause to add would be:

(ii) $[\![\phi \wedge \psi]\!]^{+/-} = \langle[\![\phi]\!]^{+} \cap [\![\psi]\!]^{+}, [\![\phi]\!]^{-} \cap [\![\psi]\!]^{-}\rangle$

This predicts, for instance, that the highlight introduced by $(?p\wedge?q)$ will be positive and can be identified with $\{|p \wedge q|\}$. As we have seen, this is the proposition that 'so' picks up in an example like (41). However, consider the following:

(iii) A: Is Emily unmarried and does she like traveling? B: I think so.

The 'so' here picks up 'Emily is unmarried and she likes traveling' as its referent. But our extension does not predict this. If we represent (iii) as $(?\neg p\wedge?q)$, then $[\![?\neg p]\!]^{+/-} = \langle\emptyset, \{|\neg p|\}\rangle$, and $[\![?q]\!]^{+/-} = \langle\{|q|\}, \emptyset\rangle$. Taking the point-wise intersection, we get $[\![?\neg p\wedge?q]\!]^{+/-} = \langle\emptyset, \emptyset\rangle$. This means that no non-empty possibility is available to be picked up by 'so'. While there may some way to get correct results here, taking the discourse referent to be syntactic simplifies the situation considerably and avoids such complications.

Formalization Our proposal is to make *Limited Symmetry* sensitive to the online polarity calculation analyzed above, and derive the projection facts in this way.

The intuition formulated above was that given a polar question ϕ, at parsing point $(\phi)_i$, you try and see if you can isolate states that are positive or negative with respect to the potential resolution of the question, regardless of continuation. To do this, you need access to the discourse referent introduced by the question. We will take this to be equivalent to the declaratives underlying the question, i.e., to the version of S where all the question operators have been removed. Let's denote this version as $Decl(S)$, and define it inductively as follows:

(44) For any $\mathcal{L}$ sentence ϕ:

(i) If $\phi := p$, then $Decl(\phi) = p$
(ii) If $\phi := p'p$, then $Decl(\phi) = p'p$
(iii) If $\phi := \top$, then $Decl(\phi) = \top$
(iv) If $\phi := \bot$, then $Decl(\phi) = \bot$
(v) If $\phi := ?\psi$, then $Decl(\phi) = Decl(\psi)$
(vi) If $\phi := \psi \wedge \chi$, then $Decl(\phi) = Decl(\psi) \wedge Decl(\chi)$
(vii) If $\phi := \psi \vee \chi$, then $Decl(\phi) = Decl(\psi) \vee Decl(\chi)$
(viii) If $\phi := \psi \rightarrow \chi$, then $Decl(\phi) = Decl(\psi) \rightarrow Decl(\chi)$

Now, given a context C and sentence S, the corresponding sets for $\mathbb{T}$ and $\mathbb{F}$ can be defined as follows:

(45) a. $\mathbb{P}(os)$: $\{s \subseteq C \mid \forall d:\ s \vdash Decl(\ (S)_i^\frown d\ )\}$
b. $\mathbb{N}(eg)$: $\{s \subseteq C \mid \forall d:\ s \vdash \neg Decl(\ (S)_i^\frown d\ )\}$[23]

The inquisitive version of *Limited Symmetry* then is that as you are parsing a question from left to right, you try to determine at every parsing point in what sets of worlds (states) of the context any answer to the question will be of positive vs. negative polarity, regardless of continuation. Note that these states are not states where the question is necessarily resolved; rather, they are states which if they end up resolving the question, the resolution will be of positive/negative polarity. The point is that such 'overall polarity' calculations can happen even if the parser doesn't have access to the whole question.

The claim is then that presuppositions matter when making these online polarity calculations. So, a 'lifted' version of our presupposition constraint can be stated:[24]

(46) **Presupposition Constraint:** For all contexts C, sentences S, any i such that $1 \leq i \leq length(S)$, any presuppositional constants $p'p$ in $(S)_i$ (the i-th parsing point of S), it must hold that for all p:

– $\mathbb{P}_i^S \subseteq \mathbb{P}_i^{S_{p'p/p}}$

[23]Note that as in Sect. 3, fn 14, the definition here is not necessarily tied to truth vs. falsity of $Decl(S)$. We could perfectly well define $\mathbb{N}$ to be the set of states that support the non-truth of $Decl(S)$, where non-truth could be falsity or undefinedness in a trivalent system. As with the classical *Limited Symmetry* system, we do not pursue such an alternative here (but see Kalomoiros 2023).

[24]For the constraint in (46) to be fully defined, we need to extend the definition $S_{p'p/p}$ to L^+. Since the extension is routine, we leave it implicit.

  - where $\mathbb{P}_i^S = \{s \subseteq C |\ \forall d: \ s \vdash Decl(\ (S)_i^\frown d\ )\}$
  - and $\mathbb{P}_i^{S_{p'p/p}} = \{s \subseteq C |\ \forall d: \ s \vdash Decl(\ (S_{p'p/p})_i^\frown d\ )\}$
- $\mathbb{N}_i^S \subseteq \mathbb{N}_i^{S_{p'p/p}}$
  - where $\mathbb{N}_i^S = \{s \subseteq C |\ \forall d: \ s \vdash \neg Decl(\ (S)_i^\frown d\ )\}$
  - and $\mathbb{N}_i^{S_{p'p/p}} = \{s \subseteq C |\ \forall d: \ s \vdash \neg Decl(\ (S_{p'p/p})_i^\frown d\ )\}$

Note how everything presupposition-related happens at the level of incrementally computing polarity. The semantics has remained entirely classical, with no asymmetries encoded in it. We now apply *Limited Symmetry$_{inq}$* to E's data.

4.2 Conjoined polar questions

(?p′p ∧ ?q) Consider first $S = (?p'p \wedge ?q)$. The first parsing point where we can start reasoning about the overall polarity of possible responses is $(S)_4 = (?\mathrm{p}'\mathrm{p}\ \wedge$, when we know that we are dealing with a conjunction.[25] To check the presupposition constraint, we must first reason about states which for all d support either $Decl(\ (?p'p \wedge {}^\frown d\ )$ (positive) or $\neg Decl(\ (?p'p \wedge {}^\frown d\ )$ (negative). Since, $Decl$ removes ?-operators, this means finding states that support either $(p'p \wedge {}^\frown d$ or $\neg(p'p \wedge {}^\frown d$, for any good-final d that contains no ?-operators:

(47) For $(S)_4 = (?\mathrm{p}'\mathrm{p}\ \wedge$:

a. $\mathbb{P}_4^S = \{\emptyset\}$ (only the empty set of worlds is such that every world in it makes $|(p'p \wedge d|$ true for any d)[26]

b. $\mathbb{N}_4^S = \{s \subseteq C |\ s \vdash \neg p\ or\ s \vdash \neg p'\}$ (any state that supports the negation of $p'p$ supports the negation of $(p'p \wedge d$ for any d)

We also need access to the corresponding sets for $(?p'p \wedge ?q)_{p'p/p} = (?p \wedge ?q)$ (the version of the sentences with the presuppositions removed), at the corresponding parsing point $(S_{p'p/p})_4 = (?\mathrm{p}\ \wedge$:

(48) For $(S_{p'p/p})_4 = (?\mathrm{p}\ \wedge$:

a. $\mathbb{P}_4^{S_{p'p/p}} = \{\emptyset\}$

b. $\mathbb{N}_4^{S_{p'p/p}} = \{s \subseteq C |\ s \vdash \neg p\}$

We can now check the presupposition constraint, which requires that for all p:

(49) a. $\mathbb{P}_4^S \subseteq \mathbb{P}_4^{S_{p'p/p}}$

b. $\mathbb{N}_4^S \subseteq \mathbb{N}_4^{S_{p'p/p}}$

It is obvious that $\mathbb{P}_4^S \subseteq \mathbb{P}_4^{S_{p'p/p}}$. For the $\mathbb{N}$ sets, we reason as follows: take $p = \top$; Then, $\{s |\ s \vdash \neg\top\} = \{\emptyset\}$, so we can rewrite the $\mathbb{N}$ sets as:

[25] We count ?-operators as a basic parsing unit.

[26] Recall that $|\phi|$ is the classical proposition associated with inquisitive ϕ.

(50) a. $\mathbb{N}_4^S = \{s \subseteq C |\, s \vdash \neg p'\} \cup \{\emptyset\} = \{s \subseteq C |\, s \vdash \neg p'\}$
b. b. $\mathbb{N}_4^{S_{p'p/p}} = \{\emptyset\}$

Recall that the empty state is already a member of $\{s \subseteq C |\; s \vdash \neg p'\}$. Hence $\mathbb{N}_4^S = \{s \subseteq C |\; s \vdash \neg p'\}$. So, for $\mathbb{N}_4^S$ to be a subset of $\mathbb{N}_4^{S_{p'p/p}}$, it needs to hold that $\{s \subseteq C |\; s \vdash \neg p'\} = \{\emptyset\}$. This can only happen if there are no subsets of the contexts where $\neg p'$ is supported, i.e., if $C \models p'$. Hence, the sentence is associated with a presupposition, which must be entailed by the context to make the constraint hold (just like the declarative case).

(?q ∧ ?p′p) Consider now $S = (?q \wedge ?p'p)$. Both $(S)_4$ and $(S_{p'p/p})_4 = (?\text{q} \wedge$, so the subsethood constraint will hold here as $\mathbb{P}$ and $\mathbb{N}$ will not differ between S and $S_{p'p/p}$. The parse then moves on to $(S)_6 = (?\text{q} \;\wedge ?\text{p}'\text{p}$; now we can reason about states where the question receives both a positive and a negative polarity response:

(51) For $(S)_6 = (?\text{q} \;\wedge ?\text{p}'\text{p}$:
a. $\mathbb{P}_6^S = \{s \subseteq C | s \vdash q \textit{ and } s \vdash p \textit{ and } s \vdash p'\}$
b. $\mathbb{N}_6^{S_{p'p/p}} = \{s \subseteq C |\; s \vdash \neg q \textit{ or } s \vdash \neg p'p\}$

(52) For $(S_{p'p/p})_6 = (?\text{q} \;\wedge ?\text{p}$:
a. $\mathbb{P}_6^{S_{p'p/p}} = \{s \subseteq C |\; s \vdash q \textit{ and } s \vdash p\}$
b. $\mathbb{N}_6^{S_{p'p/p}} = \{s \subseteq C |\; s \vdash \neg q \textit{ or } s \vdash \neg p\}$

(53) For all p, we require:
a. $\mathbb{P}_6^S \subseteq \mathbb{P}_6^{S_{p'p/p}}$
b. $\mathbb{N}_6^S \subseteq \mathbb{N}_6^{S_{p'p/p}}$

The subsethood between $\mathbb{P}_6^S$ and $\mathbb{P}_6^{S_{p'p/p}}$ is clear. For the $\mathbb{N}$ sets we reason as follows. The subsethood in (53b) holds iff $|q| \models |p'|$. To see this, suppose first that (53b) holds for all p. Then it must hold for $p = \top$. Then we have:

(54) $\{s \subseteq C |\; s \vdash \neg q \textit{ or } s \vdash \neg p'\top\} \subseteq \{s \subseteq C |\; s \vdash \neg q \textit{ or } s \vdash \neg\top\}$

Only the empty state supports $\neg\top$. Hence we have:

(55) $\{s \subseteq C |\; s \vdash \neg q \textit{ or } s \vdash \neg p'\top\} \subseteq \{s \subseteq C |\; s \vdash \neg q\} \cup \{\emptyset\}$

Note that all the states that support $\neg q$ are in both sets. So, the requirement boils down to:

(56) $\{s \subseteq C |\; s \vdash \neg p'\top\} \subseteq \{s \subseteq C |\; s \vdash \neg q\}$

A state supports $\neg p'\top$ just in case no worlds in it make $|p'|$ true. For every world w in the context that makes $|\neg p'|$ true, $\{w\}$ is in $\{s \subseteq C |\; s \vdash \neg p'\top\}$. Since we assume that (56) holds, then $\{w\}$ is also in $\{s \subseteq C |\; s \vdash \neg q\}$, which means that $|\neg q|$ is true in w. So, all worlds that make $|\neg p'|$ true also make $|\neg q|$ true, which means that $|q| \models |p'|$.

For the other direction, suppose that $|q| \models |p'|$. We can then show that the following condition holds for arbitrary p:

(57) $\{s \subseteq C|\ s \vdash \neg q\ or\ s \vdash \neg p'p\} \subseteq \{s \subseteq C|\ s \vdash \neg q\ or\ s \vdash \neg p\}$

Clearly, all the states that support $\neg q$ are in both sets. The question is whether states that support q and $\neg p'p$ (which are in the left set) are also in the right set. Since they support q, they must also support p' (by assumption). Therefore, they must support $\neg p$ (otherwise they wouldn't support $\neg p'p$, and hence would not be in the left set); thus, they must also be in the right set.

So, we have just derived the fact that conjunctions of polar questions behave asymmetrically modulo presupposition projection while keeping the underlying semantics of polar questions fully symmetric and bivalent!

Finally, note how the parsing-oriented reasoning can **recover** E's tripartition at the pragmatic level: at parsing point $(S)_4 = (?\mathrm{q}\ \wedge$, we know that the question receives a negative polarity answer in $\{s|\ s \vdash \neg q\}$. These states are in $\mathbb{N}$ for both S and $S_{p'p/p}$, no matter the continuation. Therefore, they can be ignored in subsequent calculations (see also fn 16). In fact, we could assume that comprehenders remove them from consideration when going to compute further $\mathbb{P}$ and $\mathbb{N}$ sets. Then, for $(S)_6 = (?\mathrm{q}\ \wedge\ ?\mathrm{p'p}$, we calculate $\{s \subseteq C|s \vdash q\ and\ s \vdash p\ and\ s \vdash p'\}$ as determining a positive polarity answer. Finally, we calculate $\{s \subseteq C|\ s \vdash q\ and\ s \vdash \neg p'p\}$ as determining a negative polarity answer. If we consider the maximal subset for each of these sets, then we get alternatives corresponding to $\{\neg q,\ q \wedge p'p,\ q \wedge \neg p'p\}$, which is exactly E's tripartition.

4.3 Negative polar questions

Consider now the issue of negative polar questions:

(58) #Is Emily unmarried and is her spouse a doctor? $\rightsquigarrow$ $(?(\neg q) \wedge ?p'p)$, $|q| \models |p'|$.

At parsing point $(S)_7 = (?(\neg \mathrm{q})\ \wedge$, we can determine a $\mathbb{N} = \{s \subseteq C|\ s \vdash q\}$, where the question receives a negative polarity response regardless of continuation. We move on to $(S)_9 = (?(\neg \mathrm{q})\ \wedge ?\mathrm{p'p}$:

(59) a. $\mathbb{P}_9^S = \{s \subseteq C|s \vdash \neg q\ and\ s \vdash p\ and\ s \vdash p'\}$
b. $\mathbb{N}_9^S = \{s \subseteq C|\ s \vdash q\ or\ s \vdash \neg p'p\}$

(60) For $(S_{p'p/p})_9 = (?(\neg \mathrm{q})\ \wedge ?\mathrm{p}$:
a. $\mathbb{P}_9^{S_{p'p/p}} = \{s \subseteq C|\ s \vdash \neg q\ and\ s \vdash p\}$
b. $\mathbb{N}_9^{S_{p'p/p}} = \{s \subseteq C|\ s \vdash q\ or\ s \vdash \neg p\}$

For all p, $\mathbb{P}_9^S \subseteq \mathbb{P}_9^{S_{p'p/p}}$. But consider the $\mathbb{N}$ sets:

(61) a. $\mathbb{N}_9^S = \{s \subseteq C|\ s \vdash q\ or\ s \vdash \neg p'p\}$
b. $\mathbb{N}_9^{S_{p'p/p}} = \{s \subseteq C|\ s \vdash q\ or\ s \vdash \neg p\}$

When does it hold that for all p, $\mathbb{N}_9^S \subseteq \mathbb{N}_9^{S_{p'p/p}}$? Following reasoning parallel to that we used in the previous subsection for $(?q \wedge ?p'p)$, we derive the fact that it holds iff $|\neg q| \models |p'|$.

In (58), it holds that $|q| \models |p'|$. But the constraint says that it must also hold that $|\neg q| \models |p'|$. This means that $|p'|$ must hold in every world in the context. We thus derive the fact that (58) comes with a global presuppositional requirement (which makes it different from (5b), which comes with no such requirement). Therefore, in the absence of the right context/out of the blue, the infelicity that (58) shows is expected.

In this way, the asymmetry between positive and negative polar questions in conjunction that E points out falls out in our system. More broadly, the point is that even though $?p$ and $?(\neg p)$ receive the same inquisitive denotation, they are mapped to different $\mathbb{P}$/$\mathbb{N}$ sets: $\mathbb{P}^{?p} = \{s \subseteq C | s \vdash p\}$, but $\mathbb{P}^{?(\neg p)} = \{s \subseteq C | s \vdash \neg p\}$ (and the reverse for the $\mathbb{N}$ sets).

4.4 'Or not' questions

The final conjunction-related piece of data that we need to account for is the case of 'or not' questions:

(62) #Is Emily married or not, and is her spouse a doctor?

The first conjunct could receive an analysis either as $(?p \vee ?(\neg p))$ or $?(p \vee (\neg p))$, depending on what we take 'or not' to elide (a full question or just a declarative). E assumes the former analysis. However, the issue is orthogonal to our purposes, as either analysis leads to the same conclusion; the reason is that $Decl(?(p \vee q)) = Decl((?p \vee ?q)) = (p \vee q)$.

On the $(?p \vee ?(\neg p))$ analysis, the sentence is $S = ((?p \vee ?(\neg p)) \wedge q'q)$, with $|p| \models |q'|$; at parsing point $(S)_{12} = ((?\mathrm{p} \vee ?(\neg \mathrm{p})) \wedge$, we know that we are dealing with a conjunction. Hence we can try to calculate a $\mathbb{N}$, which will be the set of states that support the negation of the declarative underlying the first conjunct:

(63) $\mathbb{N}_{12}^S = \{s \subseteq C |\ s \vdash \neg p \text{ and } s \vdash p\} = \{\emptyset\}$

What (63) says is that only the empty state fixes the polarity to an answer of this question as negative at this point in the parse. The first conjunct carries no presuppositions, so the presupposition constraint is met. We parse the rest, and get access to $(S)_{13} = ((?\mathrm{p} \vee ?(\neg \mathrm{p})) \wedge \mathrm{q}'\mathrm{q}$. Reasoning about the $\mathbb{N}$ is enough to show that (62) is associated with a presupposition:

(64) a. $(S)_{13} = ((?\mathrm{p} \vee ?(\neg \mathrm{p})) \wedge \mathrm{q}'\mathrm{q}$:
b. $\mathbb{N}_{13}^S = \{s \subseteq C |\ (s \vdash \neg(p \vee \neg p)) \text{ or } (s \vdash \neg q'q)\}$

Note that $\{s \subseteq C |\ s \vdash \neg(p \vee \neg p)\} = \{\emptyset\}$, thus:

(65) $\mathbb{N}_{13}^S = \{\emptyset\} \cup \{s \subseteq C |\ s \vdash \neg q'q\} = \{s \subseteq C |\ s \vdash \neg q'q\}$

For $S_{p'p}$, the corresponding $\mathbb{N}$ at $(S_{p'p/p})_{13} = ((?\mathrm{p} \vee ?(\neg \mathrm{p}))\ \wedge \mathrm{q}$ is:

(66) $\mathbb{N}_{13}^{S_{p'p/p}} = \{s \subseteq C \mid s \vdash \neg q\}$

Since now there is a presuppositonal bit, we need to check whether the constraint is met:

(67) For all q: $\mathbb{N}_{13}^{S} \overset{?}{\subseteq} \mathbb{N}_{13}^{S_{p'p/p}}$

There is nothing to guarantee here that $\{s \subseteq C \mid s \vdash \neg q'\}$ contains only the empty state (which would be needed to guarantee subsethood for all q); instead we need the context to entail q'. Thus, (62) is predicted to be associated with a presupposition (and hence infelicitous unless the context satisfies that presupposition) (essentially the same explanation E gives, but derived from the general principles of *Limited Symmetry*).

4.5 Interim summary

Summing up, we have shown how *Limited Symmetry* can be naturally extended to an inquisitive version, capturing the asymmetry of filtering in conjunctions of polar questions: presuppositions in the second conjunct of a conjoined polar question can be filtered if entailed by the (declarative underlying) the first conjunct; presuppositions in the first conjunct of a conjoined polar questions must be entailed by the global context. At the same time, we have shown how negative polar questions, $?(\neg p)$, and 'or not' questions, $?p \vee ?(\neg p)$, do not behave equivalently to their positive counterpart, $?p$, in terms of presupposition filtering, even though they have the same inquisitive denotations. Whereas $?p$ as a first conjunct can lead to filtering of a presupposition of $?q$ in $(?p \wedge ?q)$, this is not so for $?(\neg p)$ and $(?p \vee ?(\neg p))$. Instead, both $(?(\neg p) \wedge ?q)$ and $((?p \vee ?(\neg p)) \wedge ?q)$ need the presuppositions of q to be established in the context, otherwise they are infelicitous. So, we have derived all of E's conjunction data within the inquisitive extension of *Limited Symmetry* without baking any asymmetries into the semantics. We now turn to our final topic: the system's predictions for disjunctions.

5 Disjoined polar questions

The data E points out that the phenomenon of projection in coordinations of polar questions extends to disjunctions; he gives a judgment whereby projection from disjunctions follows the same pattern as projection form conjunction (see also fn 2):

(68) a. ***Context:*** We have no idea whether or not Emily is married, but whenever we see her, she's alone.
b. Is Emily unmarried or is her spouse away?
c. ??Is Emily's spouse away or is she unmarried?

The judgment for (68b) is uncontroversial and parallels the judgment for the declarative version of such disjunctions, where a presupposition in the second disjunct is filtered if the negation of the first disjunct entails that presupposition (Karttunen 1973). However, as it has been discussed extensively in the literature on projection, disjunctions appear symmetric: it doesn't matter whether or not it is the first or second disjunct whose negation entails the presuppositions of the other disjunct; both cases in (69) appear to be fine (cf. Partee's 'Bathroom sentences'; see also Hausser 1976, Schlenker 2009):

(69) a. ***Context:*** We have no idea whether or not the house we are in has a bathroom, but we can't seem to find one.
b. ✓Either there is no bathroom or the bathroom is in a weird place.
c. ✓Either the bathroom is in a weird place or there is no bathroom.

In this respect, declarative disjunctions differ from conjunctions modulo their projection properties, with this conclusion recently receiving experimental support (Kalomoiros and Schwarz Accepted). To the extent that we are dealing with parallel phenomena, we would expect this difference to carry over to disjunctions of polar questions; nevertheless, E reports an asymmetry in judging (68c) infelicitous, and builds this asymmetry in his trivalent semantics for disjunction (although he acknowledges the complexity of the issue, and points out that we could move to a Strong Kleene truth table that would give symmetric disjunction).[27] The results of our own informal survey of native speakers suggest no difference between (68b) and (68c) (although more fine-grained experimental data of the kind found in Kalomoiros and Schwarz (Accepted) would be needed to bolster this point). So for the purposes of this paper, we proceed on the assumption that disjunction indeed behaves symmetrically.

Varieties of disjunctive polar Qs Our aim is to spell out the predictions of our system for disjunction. A complicating factor is that disjunctive polar questions come in two sorts: *open* and *closed* (see Roelofsen and Farkas 2015, a.o.):

(70) a. Does Mary like cats$^{\uparrow}$ or does she like dogs$^{\uparrow}$? (Open)
b. Does Mary like cats$^{\uparrow}$ or does she like dogs$^{\downarrow}$? (Closed)

Open disjunctive questions have rising intonation on both disjuncts. The issue they raise can be resolved by affirming the first disjunct, the second disjunct, or the negation of both disjuncts: Mary likes cats, Mary likes dogs, Mary likes neither. Closed disjunctive questions on the other hand, have rising intonation on the first disjunct, but falling intonation on the second; they are taken to presuppose *exhaustiveness* (i.e., that Mary liking cats or dogs are the only two possibilities in the context), and *exclusivity* (i.e., that Mary doesn't like both cats and dogs) (see Biezma and Rawlins 2012). Since E argues that the presupposition facts do not vary across these two types, we apply our system to both of them.

[27] Of course the issue here is the justification. The Strong Kleene truth table for conjunction is also symmetric, but experimental results suggest that projection is rigidly asymmetric in conjunction (Mandelkern et al. 2020). This is exactly the justification that *Limited Symmetry* aims to provide by deriving symmetric disjunction, but asymmetric conjunction. That said, there are ways to systematically derive trivalent truth tables where conjunction is asymmetric but disjunction is symmetric. George (2008b) proposes the so-called 'disappointment' algorithm which derives a symmetric trivalent truth table for disjunction, but an asymmetric one for conjunction. We could state E's resolution conditions in terms of this system and thus get the right (a-)symmetries in a principled way. Thanks to Patrick Elliot (p.c.) for discussion on this point.

Open Let's start with the open disjunctions. While the syntax of (68) might suggest a translation like $(?p \vee ?q)$, it has been argued that this gives the wrong resolution conditions (Hoeks and Roelofsen 2020). $(?p \vee ?q)$ suggests that being (for instance) in a state that supports 'Mary doesn't like cats' would be enough to resolve the issue raised by (70a). As Hoeks and Roelofsen (2020) point out, this doesn't seem correct. Instead they contend that the correct resolution conditions are given by $?(p \vee q)$: the issue is resolved by states that support p, states that support q and states that support neither p nor q. However, this debate is orthogonal to our approach, since $Decl((?p \vee ?q)) = Decl(?(p \vee q)) = Decl((p \vee q)) = (p \vee q)$.[28] In all cases, a prediction of symmetric filtering is made (as long as the negation of the non-presuppositional disjunct entails the presuppositions of the other disjunct). We illustrate with $S = (?p'p \vee ?q)$:

(71) At $(S)_4 = (?\mathrm{p'p} \vee$, $\mathbb{P}$ look at follows:
a. $\mathbb{P}_4^S = \{s \subseteq C \mid s \vdash p \; and \; s \vdash p'\}$
b. $\mathbb{P}_4^{S_{p'p/p}} = \{s \subseteq C \mid s \vdash p\}$

Since for all p, $\mathbb{P}_4^S \subseteq \mathbb{P}_4^{S_{p'p/p}}$, our presupposition constraint holds.

(72) At $(S)_4 = (?\mathrm{p'p} \vee$, $\mathbb{N}$ look as follows:
a. $\mathbb{N}_4^S = \mathbb{N}_4^{S_{p'p/p}} = \{\emptyset\}$ (only the empty state supports $\neg(p'p \vee d$, for any good final d)

Moving on with the parse, we have:

(73) At $(S)_5 = (?\mathrm{p'p} \vee ?\mathrm{q}$
a. $\mathbb{P}_5^S = \{s \subseteq C \mid s \vdash p'p \; or \; s \vdash q\}$
b. $\mathbb{P}_5^{S_{p'p/p}} = \{s \subseteq C \mid s \vdash p \; or \; s \vdash q\}$

Clearly, for all p, $\mathbb{P}_5^S \subseteq \mathbb{P}_5^{S_{p'p/p}}$; hence, no violation of the constraint. Let's move on to the $\mathbb{N}$ sets:

(74) At $(S)_5 = (?\mathrm{p'p} \vee ?\mathrm{q}$:
a. $\mathbb{N}_5^S = \{s \subseteq C \mid s \vdash \neg p'p \; and \; s \vdash \neg q\}$
b. $\mathbb{N}_5^{S_{p'p/p}} = \{s \subseteq C \mid s \vdash \neg p \; and \; s \vdash \neg q\}$

The required subsethood is, for all p:

(75) $\{s \subseteq C \mid s \vdash \neg p'p \; and \; s \vdash \neg q\} \subseteq \{s \subseteq C \mid s \vdash \neg p \; and \; s \vdash \neg q\}$

[28] As pointed out by an anonymous reviewer, this feature of the system means that the filtering properties of conjunctions/disjunctions of questions are forced to be the same as the filtering properties of conjunctions/disjunctions below an ?-operator. In a theory where the filtering properties of conjunctions/disjunctions below an ?-operator can be derived by a different mechanism from the one that derives the filtering properties of conjunctions/disjunctions of questions, we might expect less tight filtering parallelisms between the two kinds of constructions. We leave further consideration of this point and its potential empirical consequences for future research.

Suppose that this holds. Then it holds for $p = \top$, in which case we have:

(76) $\{s \subseteq C |\ s \vdash \neg p'\top\ \textit{and}\ s \vdash \neg q\} \subseteq \{s \subseteq C |\ s \vdash \neg\top\ \textit{and}\ s \vdash \neg q\}$

The latter is equivalent to:

(77) $\{s \subseteq C |\ s \vdash \neg p'\ \textit{and}\ s \vdash \neg q\} \subseteq \{\emptyset\}$

This holds iff there are no worlds in C such that $|\neg p'|$ is true and $|\neg q|$ is true; so, all worlds should be worlds that make $|p' \vee q|$ true, which can be rewritten as $C \models |\neg q| \rightarrow |p'|$. For the other direction, it's easy to see that if $C \models |\neg q| \rightarrow |p'|$, then (75) holds.

Very similar reasoning derives the same result for a disjunction like $(?q \vee ?p'p)$.

Closed Regarding closed disjunctive questions, Hoeks and Roelofsen (2020) analyze them as $(p \vee q)$ in an inquisitive framework; E analyzes them as a species of $(?p \vee ?q)$, where a positivity operator applies and gets rid of the negative answers. Either way, since $Decl(p \vee q) = Decl((?p \vee ?q))$ the calculation for open disjunctions above works in exactly the same way, predicting symmetry.[29]

Back to drefs The reasoning around the disjunction cases depends on having the *Decl* dref available. However, recall the following paradigm:

(78) a. A: Does Emily speak French ↑ or German ↑?
B: I (don't) think so.
b. A: Does Emily speak French ↑ or German ↓?
B: *I (don't) think so.

The dref seems available in the case of open disjunctive polar questions, but not in the case of closed ones. However, recall that closed disjunctive questions come with presuppositions of exhaustiveness and exclusivity. If we assume that dref inherits these, then the unacceptability of (78b) will fall out.

If someone replies 'I think so' to the question in (78b), then they are affirming that they think it's the case that Mary speaks French or German, when it's already presupposed that these are the only two possibilities in the context (exhaustiveness). So, the response is trivial.

If, on the other hand, someone replies 'I don't think so', they are saying that they don't think it's the case that Mary speaks French or German, i.e., they think Mary speaks neither French nor German. But again by exhaustiveness, one of the two options is the case, so this response leads to a contradiction.

Therefore, the contrast in (78) is perfectly intelligible even under the assumption that closed disjunctive questions introduce a dref.

[29] I take no position here on the correct analysis for closed disjunctive questions, as it is beyond the scope of the projection facts.

6 Discussion: trade offs

We could view the problem posed by the challenge identified by E in terms of the following opposition:[30]

(79)
- Questions denote resolution conditions which are symmetric
- The filtering behavior of a connective should fall out of the semantics of the connective plus the semantics of the expressions it connects.

E shows that these two statements are not compatible, and chooses to resolve the issue by dropping the assumption of symmetric resolution conditions of polar question; in his system, polar questions are asymmetric in the semantics, where positive resolutions are mapped to 1, negative to 0, and other states to #. This 'semanticization' of kinds of resolution allows for the usual Middle Kleene definition of conjunction/disjunction to be used without change, managing to preserve the second bullet point above.

Our approach is similar to E's in that it postulated that polar questions introduce a positive/negative dichotomy. But this dichotomy was put into the pragmatics, thus allowing the resolution conditions of polar questions to remain symmetric in the semantics. However, in doing so, we had to take the filtering properties of questions to be derived from the declarative that underlies them. In this way, we drop the assumption that when we are computing the filtering conditions of a polar question, we are making reference only to the resolution conditions of that question. As noted by an anonymous reviewer, there is a conceptual limitation to dropping the second bullet point, in the sense that some filtering properties are derived directly from the semantics of an expression, while others are derived indirectly after some 'transformation' has been applied to that expression (in the present case, the 'transformation' consists in recovering the declarative).[31] We can then ask whether there is something that predicts when to go or not to go for a 'transformation' in recovering the filtering properties of some expression, or if this simply needs to be stipulated.

Here, we grounded the abandonment of the second bullet point in the case of questions on two things: first, putting the asymmetry in the semantics leads to problematic empirical predictions with respect to what answers resolve a conjunctive polar question (Sect. 2.5); second, a desire to have parallel (Stalnaker-inspired) mechanisms apply to both declaratives and questions.

As regards the issue of predicting when a 'transformation' is needed, the present approach doesn't suggest an algorithm, but it does suggest a reduction of the problem to the problem of when something introduces a discourse referent. The idea is that if certain complex expressions introduce (simpler) discourse referents, then filtering properties in those cases are derived on the basis of the dref. The problem then becomes predicting when a dref is introduced. Some support for this way of thinking

[30]Thanks to an anonymous reviewer for suggesting this way of looking at the issues.

[31]The same reviewer also points out that once we move away from the semantics of the question to essentially the semantics of the declarative, we could have applied a theory like *Transparency* to $Decl(?\phi)$ and get good results. We chose *Limited Symmetry* as it offered an interesting hypothesis about what comprehenders go about computing incrementally when parsing polar questions and their conjunctions/disjunctions, and also made interesting predictions about (a-)symmetries between conjunction vs. disjunction.

comes from the fact that the filtering patterns we examined in this paper are in fact an instance of a more general problem: the problem of filtering in modal subordination environments (van Rooij 2005). Consider the following paradigm:

(80) a. #It's possible that John stopped smoking.
b. #It's possible that John stopped smoking and it's possible he was a smoker.
c. ✓It's possible that John was a smoker and it's possible that he stopped smoking.

The pattern here is conceptually the same as the one we encountered with polar questions: a sentence S is embedded under an operator (question operator, modal etc.); in simple cases like (80a) the presuppositions of S project. Embedded in a conjunction, the presuppositions of S project, (80b), unless they are entailed not by the first conjunct, but by the operator-free version of the first conjunct, (80c).

So, again, we are faced with an asymmetry in conjunction, and we can replay the debate of whether it should be put in the semantics or derived pragmatically. From our point of view, it's interesting that modal subordination has been analyzed as a construction where discourse referents are introduced (Roberts 1989), some of which have been argued to be propositional in nature (Kibble 1994; Geurts 1995).[32] We could then try to solve the filtering problem by making reference to the drefs introduced, or try to revise the semantics of modals to encode the relevant asymmetries.[33]

In view of the generality of the patterns though, a potential conceptual advantage of the dref approach (apart from the empirical advantages we discussed for the case of questions) would be that there is some common property unifying the constructions where filtering seems to care about the part of the sentence that is below some operator (namely, all these construction would introduce drefs). This would explain why they behave like a natural class. On the approach where these effects are semanticized, the generality appears accidental, emerging only because constructions like polar questions ($?\phi$) and modals ($\Diamond\phi$) —and perhaps other constructions— just happen to give a certain 'privileged' semantic status to p-worlds/states.

[32] For example:

(i) It's possible that Mary speaks French, but I don't think that's the case.

The 'that' in the second conjunct refers to 'Mary speaks French'.

[33] van Rooij (2005) proposes a dynamic solution that eschews discourse referents, but the asymmetry is essentially introduced by the update effect that modals have. Simplifying quite a bit, updating with a sentence like 'It's possible that John used to smoke' makes the worlds where 'John used to smoke' preferred. In a conjunction then like (80c), the second conjunct is sensitive to these 'preferred' worlds. van Rooij's solution is stated in a dynamic framework where what is presupposed is analyzed as a propositional attitude. The differences between his system and the systems we have been discussing in the present paper are sufficiently large that a detailed comparison will have to await another occasion. See his paper for more details.

7 Conclusion

This paper presented a response to the challenge identified by Enguehard (2021) regarding the generalization of projection patterns to coordinations of polar questions. We argued, contra Enguehard (2021), that the data should not be handled by moving to a trivalent inquisitive denotation for questions that semanticizes the various (a-)symmetries of projection, as this leads to theoretical and (especially) empirical problems. Instead, it is enough to generalize the *Limited Symmetry* approach to classical inquisitive question denotations, by reasoning about the overall polarity of a response to a given question. Seen from a high-level perspective, the idea was that polar questions introduce discourse referents that are used by comprehenders to reason about polarity to possible responses during incremental interpretation: for a conjunction, knowing that the declarative underlying the first conjunct is false determines the overall polarity of the response as negative, no matter the second conjunct. If we take presuppositions to be operative at this level of reasoning (as formalized with our extension of *Limited Symmetry*), then the conjunction data fall out. Furthermore, we make a prediction that disjunctions of polar questions should show symmetry (just like their declarative counterparts—although, as noted, the issue is empirically complex). Thus, *Limited Symmetry* represents an approach to presupposition projection that scales nicely to questions in a way that is fully general and predictive.

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Declarations

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