

Verum Focus in Negative Yes/No Questions and Ladd's $p / \neg p$ Ambiguity

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1 Introduction

This paper is concerned with two generalizations involving negation in *yes/no* (*yn*-)questions. The first generalization captures an interpretational difference correlated with preposed and non-preposed negation in *yn*-questions (Romero and Han, 2001). Preposed negation in *yn*-questions contributes the implicature that the speaker believed or at least expected that the positive answer is correct, as in (1) (Ladd, 1981; Han, 1998; Büring and Gunlogson, 2000).¹ Non-preposed negation, instead, does not necessarily give rise to this implicature (Han, 1999): (2) can be a way of seeking information on whether John is a teetotaler.

- (1) Doesn't John drink?
Positive epistemic implicature: The speaker believes or at least expects that John drinks.
- (2) Does John not drink?
No epistemic implicature necessary.

The contrast can be seen if we take a neutral, epistemically unbiased context like (3) and utter the two types of questions: (3S) can be understood in this context as an epistemically unbiased question, whereas (3S') necessarily conveys an epistemic bias of the speaker.² Example (4) also illustrates this interpretive difference. The resulting generalization is stated in (5).

- (3) Scenario: S hates both Pat and Jane. The prospect of an excursion without them pleases S. S does not have any previous belief about whether either of them is coming or not.
A: Pat is not coming.
S: Great! Is Jane not coming (either)? That would be the best!!!
S': # Great! Isn't Jane coming (either)? That would be the best!!!
- (4) Scenario: Michael has been upset at Sue since yesterday's meeting. The speaker is wondering how this could have been avoided. The speaker has no belief about what Sue should or should not have done.
A: Michael has not been happy with Sue since yesterday's meeting.
S: Should she not have talked to him at the meeting?
S': # Shouldn't she have talked to him at the meeting?
- (5) GENERALIZATION 1: *Yn*-questions with preposed negation necessarily carry the epistemic implicature that the speaker believed or expected that the positive answer is true. *Yn*-questions with non-preposed negation do not necessarily carry this epistemic implicature.

The second generalization, originally formulated in Ladd (1981), states that a *yn*-question with preposed negation *Aux+n't p?* –e.g. (6)– is intuitively ambiguous between two readings: it can be understood as a question about *p* or as a question about $\neg p$. This is suggested by the fact that we can add to (6) a Positive Polarity Item (PPI) or a Negative Polarity Item (NPI), as shown in (7) with *too* and in (8) with *either*. In (7), the intuition is that the speaker is trying to confirm or “double-check” the positive proposition *p* (= “that Jane is coming”). This interpretation is enforced by the presence of the PPI *too*, which cannot be licensed under the immediate scope of negation and which presupposes the truth of a parallel *affirmative* proposition (“that Pat is coming”). In (8), instead, the speaker wants to double-check $\neg p$ (= “that Jane is not coming”). Again, this interpretation is singled out by the use of the NPI *either*, which needs a c-commanding negation and which presupposes the truth of a parallel *negative* proposition (= “that Pat is not coming”). We will refer to these readings as *p*-question (reading) and $\neg p$ -question (reading) respectively. We will call *yn*-questions with preposed negation and PPIs “PPI-questions” and *yn*-questions with preposed negation and NPIs “NPI-questions” for short.

(6) Isn't Jane coming?

(7) A: Ok, now that Stephan has come, we are all here. Let's go!
S: Isn't Jane coming too?

(8) Scenario: Pat and Jane are two phonologists who are supposed to be speaking in our workshop on optimality and acquisition.
A: Pat is not coming. So we don't have any phonologist in the program.
S: Isn't Jane coming either?

It is important to keep in mind that the speaker started with the positive belief/expectation that *p* both in the PPI-question (7) and in the NPI-question (8).³ In fact, the presence of an epistemic implicature *p* is a necessary condition for the *p*-question / $\neg p$ -question ambiguity to arise. Take, for example, a *yn*-question with non-preposed negation like (9). The presence of *too* and the only antecedent proposition “that Pat is coming” forces S's question to be about the positive proposition “that Jane is coming”. As a result, the only way to understand the question, if acceptable at all, is with an epistemic implicature: *Is she not coming too?* in (9) sounds like an archaic rendering of *Isn't she coming too?*:

(9) A: Pat is coming.
S: What about Jane? Is she not coming too?

The contrast in (10) makes again the point that the *p* / $\neg p$ ambiguity arises only if the epistemic implicature is present. The epistemically unbiased scenario in (10) allows for a non-preposed question ((10S), already seen in (4)) and for a non-preposed question with an NPI, as in (10S'). But, as soon as we add a PPI to try to bring out the *p*-question reading, as in (10S''), the question is biased and hence unsuitable in this context. Again, *Should she not have talked to him already?* sounds like an (archaic) rendering of *Shouldn't she have talked to him already?*.⁴

- (10) Scenario: Michael has been upset at Sue since yesterday's meeting. The speaker is wondering how this could have been avoided. The speaker has no belief about what Sue should or should not have done.
 A: Michael has not been happy with Sue since yesterday's meeting.
 S: Should she not have talked to him (at the meeting)?
 S': Should she not have talked to him yet?
 S'': # Should she not have talked to him already?

The intuitive ambiguity between the p -question reading and the $\neg p$ -question reading –as well as the correlation between the ambiguity and the epistemic implicature– is summarized in generalization 2 below.

- (11) GENERALIZATION 2: Preposed negation yn -questions of the shape *Aux n't p?* (more generally, negative yn -questions with the epistemic implicature p) are ambiguous between a question reading double-checking p and a question reading double-checking $\neg p$. The use of a PPI versus an NPI disambiguates the question towards the p -question reading and towards the $\neg p$ -question reading respectively.

The goal of this present paper is to address the two questions below concerning the generalizations 1 and 2. The proposed answers are, in a nutshell, as follows:

- i. What property correlated with the existence of an implicature distinguishes preposed negation from (the non-archaic use of) non-preposed negation?
 ANSWER: Yn -questions with preposed negation necessarily carry Verum Focus (as in Höhle (1992)); yn -questions with non-preposed negation can, but do not need to, have Verum Focus. Verum Focus signals the presence of an epistemic implicature.
- ii. Once we identify the property of preposed negation that gives rise to the epistemic implicature, how can that property interact with the rest of the elements in the sentence to derive Ladd's p -question / $\neg p$ -question ambiguity formally?
 ANSWER: Ladd's ambiguity is a scopal ambiguity between negation and the VERUM operator arising from Verum Focus. In the p -question reading, negation scopes over VERUM. In the $\neg p$ -question reading, VERUM scopes over negation.

Other important questions about the generalizations 1 and 2 are added below. We will not talk about question (iii) here (see Romero and Han (2001) for an account of it). As for question (iv), it is beyond the aim of this paper to work out a formal account of it. However, at the end of this paper, we will speculate on how the proposed LF scopal ambiguity between negation and VERUM may open an avenue to explain it once some semantic/pragmatic factors are taken into account.

- iii. How exactly does Verum Focus enforce the *existence* of an epistemic implicature in negative yn -questions?

- iv. Why is the implicature raised by preposed negation –both in PPI-questions and in NPI-questions– a *positive* implicature? That is, why is the polarity in the question and the polarity in the implicature opposite?

This paper is organized as follows. Section 2 tackles question (i), arguing for a correlation between Verum Focus in *yn*-questions and the presence of an epistemic implicature. Section 3, which addresses question (ii), uses Verum Focus to characterize formally Ladd's intuitive ambiguity. Section 4 presents some speculations about question (iv). Section 5 summarizes the conclusions.

2 Preposed vs. non-preposed negation

In this section, we address the question of what property correlated with the existence of the implicature distinguishes preposed negation as in (1) (repeated below as (12)) from non-preposed negation as in (2) (repeated below as (13)).

- (12) Doesn't John drink?
Positive epistemic implicature: The speaker has the previous belief or expectation that John drinks.
- (13) Does John not drink?
No epistemic implicature necessary.

2.1 Sentential vs. constituent negation will not do it.

A first way to differentiate between preposed and non-preposed negation would maintain that preposed negation in *yn*-questions is sentential negation, whereas non-preposed negation is VP constituent negation, negating the event contributed by the VP. However, this analysis does not cover all the cases. In (14), negation is not just negating the event contributed by the VP and is more like a sentential negation negating the entire modal proposition. Still, (14) does not give rise to a necessary epistemic implicature, in contrast with its preposed negation version in (15):

- (14) Does John not have to go to the meeting? ($\neg\Box$)
No epistemic implicature necessarily.
- (15) Doesn't John have to go to the meeting? ($\neg\Box$)
Epistemic implicature: The speaker had the previous belief that John has to go to the meeting.

One could say that negation in (14) is indeed constituent negation. It is just that it is negating a bigger constituent than VP. But if we make this move, the distinction between constituent and sentential negation becomes murky.

2.2 Focus is relevant

Three facts point towards the conclusion that focus is relevant. First, an epistemic implicature can be reproduced in affirmative questions if we place Focus stress on

the auxiliary: (16) can be used to convey the negative implicature that the speaker believes that John does not drink. The non-stressed auxiliary version (17) is not biased in this way.⁵

(16) DOES John drink?
Negative epistemic implicature: The speaker believes or expects that John does not drinks.

(17) Does John drink?
No epistemic implicature.

Second, if we take a *yn*-question with non-preposed negation and place focus stress on *not*, the epistemic implicature (of $\neg p$ -question type) arises again:⁶

(18) Does John NOT drink?
Positive epistemic implicature: The speaker has the previous belief or expectation that John drinks.

Third, preposed negation questions share some interesting similarities with tag questions, which clearly bear Focus on the auxiliary. Note that the polarity of a question carrying an implicature and the polarity of the implicature itself are opposite:

(19) *Negative yn*-questions with preposed negation give rise to a *positive* epistemic implicature.
Positive yn-questions with focus on the auxiliary give rise to a *negative* epistemic implicature.

This crossed pattern of implicatures is the same as the distributional pattern of tag questions (Sadock, 1971): a negative tag question with *doesn't* follows an affirmative sentence, and a positive tag question follows a negative declarative.

(20) a. John drinks, DOESN'T he?
b. John doesn't drink, DOES he?

In fact, the sequence declarative + tag basically makes the same contribution to the discourse as preposed negation questions of *p*-question type: i.e., they convey that the speaker has a belief *p* and that he wants to confirm *p*, as in (21).⁷

(21) (...) The cowb... Didn't the cowboys even finish... They finished pretty close to 500 last year, didn't ey?

All this raises the question of whether the existence of epistemic implicatures and the crossed pattern of their polarities is related to focus, in particular to polarity focus (Verum Focus in Höhle (1992)). If so, all the necessary epistemic implicatures above could be given a unified, focus-based treatment. Can we, then, assume that there is Focus-marking on the *aux+n't* cluster in *yn*-questions with preposed negation?

2.3 Phonetic data

In Romero and Han (2001), we looked at phonetic data on *yn*-questions with preposed negation: pitch tracks of naturally occurring data and of contextually controlled sentences in a small experiment. There we showed that preposed negation does involve a special pitch curve different from non-focused, non-negative auxiliaries. See Appendix for a comparison between the pitch track of the regular affirmative question in (22) (low pitch for *did*) and that of the preposed negation question in (23) (higher pitch for *didn't*):

(22) D(i)d-ya see the game Sunday night?

(23) (...) The cowb... Didn't the cowboys even finish... They finished pretty close to 500 last year, didn't ey?

We have also conducted a small experiment that elicits an (unfocused) affirmative *yn*-question and a negative *yn*-question with preposed negation in appropriate contexts. The results are given in Appendix, showing that the negated auxiliary verb has relatively higher pitch than the auxiliary verb in affirmative questions.

How do these pitch tracks map into pitch accents and into semantic Focus-marking? Though the mapping is not quite clear, a couple of possibilities arise that are compatible with Focus-marking on the preposed *aux + n't* cluster.

As a first possibility, the *aux + n't* cluster may have direct F(ocus)-marking. In this case, the pitch track of e.g. *Wasn't he in Hawaii?* can be interpreted as including two accents relevant for us: one on the *aux + n't* cluster and one on *Hawaii*. The first accent gives us F-marking on the *aux + n't* cluster directly. This is what has been suggested in Hedberg and Sosa (2001). They also found that preposed negation in *yn*-questions is characteristically pronounced with a higher pitch, parsed as a L+H* accent, that does not necessarily appear in the auxiliary of a regular affirmative *yn*-question. The authors suggest that the accented negative polarity is part of the focus –not of the topic– of the sentence.

The second accent –falling on *Hawaii*, as clearly signaled by the anchoring of the typical L* H- H% final interrogative contour⁸ is analyzed as Focus associated with negation, which is a focus-sensitive operator (Kratzer, 1989). The analysis of Focus associated with negation in declaratives like (24) simply carries over to preposed negation questions like (25). No further assumptions need to be made.

(24) a. John didn't want to MArRY Bertha.
b. John didn't want to marry BERtha.

(25) a. Didn't John want to MArRY Bertha?
b. Didn't John want to marry BERtha?

As a second possibility, the cluster *aux + n't* may have an indirect Focus-marking. In this case, the pitch track for *yn*-questions with preposed negation consists of a H*+L accent (or a downstepping sequence of them for longer sentences) plus the usual L* H- H% question ending.⁹ No F-marking on preposed negation needs to arise from the H*+L accent, which signals saliency and inferrability according to Pierrehumbert and Hirschberg (1990). As before, the alignment of L*

H- H% signals F-marking on *Hawaii*, and this F-marking is associated with the negation.

Note, though, that semantic Focus-marking in a focus-sensitive operator may sometimes surface as a phonetic stress on the associated item and not on the operator itself. Take, e.g., (26). Here, A is asking a regular *yn*-question, and consequently the main semantic F-marking of the answer is expected to fall on the polarity. This is so in (26B). But what about (26B')? We still need semantic F-marking on the negative polarity. The point is that the main F-marking does not need to surface as the main stress on the negative element *only*, but it can simply surface on its associated item *THEre*.

- (26) A: You saw Susan in Greece in August. Did you see her somewhere else last summer?
B: No, I DIDN'T.
B': No, I only saw her *THEre* (last summer).

In view of these phonetic data and possible analyses, we will assume that *yn*-questions with preposed negation carry focus on the polarity, and that the presence of polarity focus (Verum Focus) is what triggers all the positive and negative epistemic implicatures exemplified in this paper. The assumptions are summarized below:

- (27) i. Polarity focus (Verum Focus, as in Höhle (1992)) in *yn*-questions triggers epistemic implicatures.
ii. Preposed negation in *yn*-questions has the discourse function of Focus-marking the polarity (Verum Focus, as in Höhle (1992)).¹⁰ Given that it necessarily has Verum Focus, an epistemic implicature necessarily arises.
iii. Non-preposed negation can but does not need to be focused. Hence, the implicature does not necessarily arise.

In Romero and Han (2001), the assumptions above are pursued to answer question (iii) from the introduction: the existence of an implicature follows from the role that polarity focus plays in signaling the discourse relation question-superquestion (Roberts, 1996). In the present paper, we will pursue question (ii) instead: How can the property of preposed negation related to the epistemic implicature help us explain Ladd's *p*-question / $\neg p$ -question ambiguity?

3 Ladd's ambiguity in *yn*-questions with Preposed Negation

In this section, we address the question of how the property correlated with the necessary epistemic implicature interacts with the rest of the elements in the sentence to yield Ladd (1981)'s *p*-question / $\neg p$ -question ambiguity, as was illustrated in the introduction (repeated below as (28) and (29)). Another pair of examples is given in (30)-(31).

- (28) A: Ok, now that Stephan has come, we are all here. Let's go!
S: Isn't Jane coming **too**?

- (29) Scenario: Pat and Jane are two phonologists who are supposed to be speaking in our workshop on optimality and acquisition.
 A: Pat is not coming. So we don't have any phonologist in the program.
 S: Isn't Jane coming **either**?
- (30) A: You guys must be starving. You want to get something to eat?
 B: Yeah, isn't there **some** vegetarian restaurant around here – Moosewood, or something like that?
- (31) A: I'd like to take you out to dinner while I'm here -we'd have time to go somewhere around here before the evening session tonight, don't you think?
 B: I guess, but there is really no place to go to in Hyde Park.
 A: Oh, really, isn't there **any** vegetarian restaurant around here?
 B: No, about all we can get is hamburgers and souvlaki.

How can we formally characterize the two readings of a *yn*-question with preposed negation, a reading “double-checking” p and a reading “double-checking” $\neg p$? And how can we relate this difference to the use of PPIs vs NPIs? There are three main interacting components in the questions above: (i) the question operator Q present in *yn*-questions in general; (ii) negation present in negative *yn*-questions; and (iii) Verum Focus, which we have argued is necessarily present in preposed negation *yn*-questions. Let us see them in turn.

The Q operator is the outermost operator in *yn*-questions. It takes a proposition as its argument and yields a question meaning, namely, (a function from worlds to) the set consisting of that proposition and its complement, as spelled out in (32)-(33).¹¹ If we understand question denotations as inducing a partition on the set of common background worlds (as in Groenendijk and Stokhof (1984)), the final denotation (33d) induces the partition in two balanced cells in (34).

$$(32) \quad \llbracket Q \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w_s \lambda q_{\langle s,t \rangle} [q = p \vee q = \neg p]$$

- (33) a. Is Jane coming?
 b. LF: [_{CP} Q [Jane is coming]]
 c. $\llbracket \text{Jane is coming} \rrbracket = \lambda w. \text{Jane is coming in } w$
 d. $\llbracket Q \text{ Jane is coming} \rrbracket (w_o)$
 $= \lambda q [q = \lambda w. \text{Jane is coming in } w \vee q = \lambda w. \neg(\text{Jane is coming in } w)]$
 $= \{ \text{“that Jane is coming”}, \text{“that Jane is not coming”} \}$

$$(34) \quad \boxed{p} \quad \boxed{\neg p}$$

The second operator present in all negative *yn*-questions –with preposed or non-preposed negation– is negation itself. We will assume the usual denotation of (unfocused) negation: $\llbracket \text{not} \rrbracket$ or $\llbracket \text{n't} \rrbracket$ takes a proposition and yields its complement, as indicated in (35). Note that, as the computation in (36) illustrates, the interaction of negation with the lexical denotation of Q does not yield any epistemic implicature. This is what we want, since, as we saw, non-preposed (unfocused) negation does not necessarily give rise to an implicature. The resulting partition is the same balanced partition as above.

$$(35) \quad \llbracket \text{not} \rrbracket = \llbracket n't \rrbracket = \lambda p_{\langle s,t \rangle} . \neg p$$

(36) a. Is it not raining?

b. LF: $[_{CP} Q [\text{not} [\text{it is raining}]]]$

c. $\llbracket \text{Jane is coming} \rrbracket = \lambda w . (\text{Jane is coming in } w)$

d. $\llbracket \text{not [Jane is coming]} \rrbracket = \lambda w . \neg (\text{Jane is coming in } w)$

e. $\llbracket Q \text{ Jane is not coming} \rrbracket (w_o)$

$= \lambda q [q = \lambda w . \neg (\text{it is raining in } w) \vee q = \lambda w . \neg \neg (\text{Jane is coming in } w)]$

$= \{ \text{“that Jane is not coming”}, \text{“that Jane is coming”} \}$

(37)

p

$\neg p$

The final element is Verum Focus. We assume, following Höhle (1992), that Verum Focus signals the presence of a truth predicate or operator called VERUM. Furthermore, we assume that, (at least) in the questions at issue, this VERUM operator is not defined as an alethic operator but as an epistemic operator. That is, the denotation of VERUM_i is, roughly, the epistemic operator defined in (38a) and abbreviated as “FOR-SURE_x”, where x is a free variable whose value is (usually) contextually identified with the addressee in our examples. This is in the spirit of (Jacobs, 1986) (cited in Höhle (1992)), for whom the alternatives to a focused VERUM include negation and epistemic expressions like *maybe*, *possibly*, *probably*, etc, defined in (38).^{12 13}

(38) a. $\llbracket \text{VERUM}_i \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w . \forall w' \in \text{Epi}_x(w) [p(w') = 1]$
 $= \text{FOR-SURE}_x$

b. $\llbracket \text{probably}_i \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w . \text{MOST } w' \in \text{Epi}_x(w) [p(w') = 1]$
 $= \text{PROBABLY}_x$

c. $\llbracket \text{maybe}_i \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w . \exists w' \in \text{Epi}_x(w) [p(w') = 1]$
 $= \text{MAYBE}_x$

d. ...

e. $\llbracket \text{NOT}_i \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w . \neg \exists w' \in \text{Epi}_x(w) [p(w') = 1]$
 $= \text{FOR-SURE-NOT}_x$

Given these three operators – Q , negation and VERUM– we can now explain Ladd’s ambiguity as a scopal ambiguity between negation and the VERUM operator. We propose that, in PPI-questions, negation scopes over VERUM, whereas VERUM scopes over negation in NPI-questions. Note that Q operator will not contribute to any scopal ambiguity because it is the outermost operator in questions.

Let us first look at NPI-questions. Here, VERUM scopes over negation. The LF and the denotation for the NPI-question in (39) are given in (40) (ignoring the presupposition contributed by *either*). The question denotation is schematically rendered as a partition in (41), taking $\neg p$ to be “Jane is not coming”.

(39) Scenario: Pat and Jane are two phonologists who are supposed to be speaking in our workshop on optimality and acquisition.

A: Pat is not coming. So we don’t have any phonologist in the program.

S: Isn’t Jane coming **either**?

- (40) a. Isn't Jane coming either?
 b. LF: $[_{CP} Q \text{ VERUM}_F [\text{not } [_{IP} \text{ Jane is coming}] \text{ either}]]$
 c. $\llbracket CP \rrbracket(w_o)$
 $= \lambda q [q = \lambda w. \forall w' \in \text{Epi}_x(w) [\neg [\text{come}(j)(w')]] \vee$
 $q = \lambda w. \neg \forall w' \in \text{Epi}_x(w) [\neg [\text{come}(j)(w')]]$
 $= \{ \text{"it is for sure that Jane is not coming"},$
 $\text{"it is not for sure that Jane is not coming"} \}$

(41) NPI-question partition:

FOR-SURE _x ¬p	PROBABLY _x ¬p POSSIBLY _x ¬p ... FOR-SURE-NOT _x ¬p
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The resulting denotation and partition allow us to characterize formally the intuitions about the NPI-question presented in the introduction. First, the NPI-question is not a regular question but a **double-checking** question. This is reflected in the shape of the partition. Whereas a regular question like (36a) (with no polarity focus and no VERUM) results in the balanced partition (37), the NPI double-checking question results in the unbalanced partition (41): the *FOR-SURE* option is in one cell, and all the other epistemic options are in the other cell. The second intuition is that the question has the **¬p-question reading**. This is clearly captured in the partition, where ¬p is the argument of all the epistemic operators. Finally, since the double-checked proposition is a negative proposition, **NPIs** are acceptable and **PPIs** (under the scope of negation) are not acceptable (Ladusaw, 1980), as illustrated in (42) for declaratives:

- (42) a. It is certain [that Jane is not coming either].
 b. * It is certain [that Jane is not coming too].

Let us now turn to PPI-questions. In PPI-questions, negation scopes over VERUM. The LF and the denotation for the PPI-question in (43) (ignoring again the presupposition contributed by *too*) are given in (44). The outcoming partition is schematically given in (45), where *p* is taken to be "that Jane is coming".

- (43) A: Ok, now that Stephan has come, we are all here. Let's go!
 S: Isn't Jane coming **too**?

- (44) a. Isn't Jane coming too?
 b. LF: $[_{CP} Q \text{ not } [\text{VERUM}_F [_{IP} \text{ Jane is coming too}]]]$
 c. $\llbracket CP \rrbracket(w_o)$
 $= \lambda q [q = \lambda w. \neg \forall w' \in \text{Epi}_x(w) [\text{coming}(j)(w')]] \vee$
 $q = \lambda w. \neg \neg \forall w' \in \text{Epi}_x(w) [\text{coming}(j)(w')]]$
 $= \{ \text{"it is not for sure that Jane is coming"},$
 $\text{"it is for sure that Jane is coming"} \}$

(45) PPI-question partition:

FOR-SURE _x <i>p</i>

PROBABLY _x <i>p</i>
POSSIBLY _x <i>p</i>
...
FOR-SURE-NOT _x <i>p</i>

As before, this is not a balanced partition for a regular question, but an unbalanced partition for a **double-checking** question: the *FOR-SURE* option is in one cell, and all the other options are in the other cell. In contrast to NPI-questions however, in PPI-questions, the proposition that the speaker wants to double-check is *p* (***p*-question reading**), showing that the two interrogatives really denote different questions, that is, that the *p*-question meaning and the $\neg p$ -question meaning are two truth-conditionally different readings. Finally, since the operator VERUM intervenes between negation and the content of the IP, NPIs are not licensed within the IP (Linebarger, 1980), whereas **PPIs** are. The same pattern is attested for the pair *either/too*. As illustrated in (46) for declaratives, when adjoined to a positive proposition, the NPI *either* is ungrammatical and the PPI *too* is acceptable.¹⁴

- (46) a. * It is not certain [that Jane is coming either].
 b. It is not certain [that Jane is coming too].

Let us summarize what we have seen so far. We showed in the introduction that Ladd's *p*- / $\neg p$ -question ambiguity only arises in negative *yn*-questions that carry an epistemic implicature. Then, in section 2, we argued that all the questions with necessary epistemic implicatures seen in this paper have Verum Focus. Once we assume the presence of a VERUM operator provided by Verum Focus, we can formally account for Ladd's *p* / $\neg p$ ambiguity, its correlation with the presence of PPIs vs. NPIs, and the "double-checking" feeling that all these questions have.¹⁵

4 Some Speculations about the Polarity of the Implicature

Recall question (iv) from the introduction:

- iv. Why is the implicature raised by preposed negation –both in PPI-questions and in NPI-questions– a *positive* implicature? That is, why is the polarity in the question and the polarity in the implicature opposite?

This question can be formulated in another way. Given the fact that both PPI-questions and NPI-questions carry the positive epistemic implicature *p*, the choice of double-checking *p* or double-checking $\neg p$ correlates with whose proposition (i.e., speaker's or addressee's) is being double-checked: when the speaker asks the PPI-question about *p* in (7), she is double-checking her original belief, whereas, when she asks the NPI question about $\neg p$ in (8), she is double-checking A's implied proposition. The question then is: is there anything in the syntax/semantics/pragmatics of a PPI-question that forces its content *p* to be the speaker's belief, and is there anything in the syntax/semantics/pragmatics of an NPI-question that forces its content $\neg p$ to be the addressee's proposition?

If we assume the semantics and partitions in the previous section, there is nothing in the semantics of PPI/NPI-questions per se that can help us derive this result. For compare the two partitions in (41) and (45). If we forge an account to derive the speaker's epistemic implicature p from the mathematical object that constitutes the PPI partition (45), wouldn't that account wrongly derive the epistemic implicature $\neg p$ for the parallel NPI partition in (41)? Even more dramatically, take the positive *yn*-question *IS Jane coming?* in (47), with Verum Focus on the auxiliary. If we compute its denotation (in (48)) and its partition (in (49)), we obtain *exactly* the same mathematical partition that we had for the PPI-question (in (45)). But, contrary to the PPI-question, the positive question *IS Jane coming?* has the *negative* epistemic implicature $\neg p$ and not the positive epistemic implicature p .

(47) *IS Jane coming?*

Negative epistemic implicature: The speaker believed or expected that Jane is not coming.

(48) a. *IS Jane coming?*

b. LF: $[_{CP} Q \text{ VERUM}_F [_{IP} \text{ Jane is coming}]]$

c. $[[CP]](w_o)$
 $= \lambda q [q = \lambda w. \forall w' \in \text{Epi}_x(w)[\text{coming}(j)(w')]] \vee$
 $q = \lambda w. \neg \forall w' \in \text{Epi}_x(w)[\text{coming}(j)(w')]]$
 $= \{ \text{"it is not for sure that Jane is coming"},$
 $\text{"it is for sure that Jane is coming"} \}$

(49) Positive question: *IS Jane coming?*

FOR-SURE _x p	PROBABLY _x p POSSIBLY _x p ... FOR-SURE-NOT _x p
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Hence, either we change the standard semantics of *yn*-questions, or we find a difference somewhere else. Here, we would like to briefly speculate about how the pragmatics of *yn*-questions may help (although, if the semantics of *yn*-questions is modified appropriately, the same idea may be stated in the semantics). First, let us note that, even if two questions yield exactly the same mathematical partition over the set of worlds in the common ground, they may differ in acceptability depending on the context (see also Bolinger (1978)). Take scenario (50) and imagine that the speaker is interested in talking about coffee if it turns out that Carlos drank coffee and not tea. In this situation, it is natural for the speaker to ask (51a) and it is unnatural for her to ask (51b). Let us say that, even though (51a) and (51b) induce the same partition, their pragmatic "intent" is different.

(50) Scenario:

Carlos is unusually nervous and irritable this morning. The speaker knows that this can be due to exactly one of the following two reasons: either he drank an overdose of coffee this morning, or he drank an overdose of tea. The speaker does not know which of the two possible explanations is true and she wants to find out. Furthermore, the speaker happens to have a scientific interest on the effects of coffee on people.

- (51) a. S: Carlos, did you drink coffee this morning?
 b. S: Carlos, did you drink tea this morning?

Let us turn to our epistemically biased questions: the NPI-question, the PPI-question, and the positive question. We saw that they differ on the proposition they are trying to double-check. But they also differ in the cell of the partition that is chosen to be pronounced, that is, they also differ in the “intent” of the question. When we cross the two parameters (double-checked proposition and pronounced cell), we obtain an interesting pattern: the intent of the question is only compatible with the desired polarity of the epistemic implicature.

Let us see each case in turn. First, take the NPI-question in (52). The pronounced cell is singled out in (53) by a double line. Given that this is the pronounced cell, the paraphrase of the intent of question is roughly as in (52c): “Can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?”

- (52) a. Isn’t Jane coming either?
 b. LF: $[_{CP} Q \text{ VERUM}_F [\text{not } [_{IP} \text{ Jane is coming}] \text{ either }]]$
 c. “Do you have **complete evidence** for $\neg p$?”, or
 “Can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?”

(53) NPI partition and pronounced cell:

FOR-SURE _x $\neg p$	PROBABLY _x $\neg p$ POSSIBLY _x $\neg p$... FOR-SURE-NOT _x $\neg p$
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We see in (54a) that the intent of this question is compatible with the speaker’s belief p and with the addressee’s proposition $\neg p$. Furthermore, it is incompatible with the opposite state of affairs, described in (54b):

- (54) a. Given that I assume p and that you implied $\neg p$, can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?
 b. # Given that I assume $\neg p$ and that you implied p , can you provide information –and, if so, what info–that would make me **conclude** $\neg p$?

Let us now turn to the PPI-question in (55). This time, the pronounced cell – with a double line– is the opposite one. The paraphrase of the intent of the question is given in (55c). Again, this pragmatic intent gives us the right result in (57): it is compatible with the speaker believing p and the addressee implying $\neg p$, but not vice-versa.¹⁶

- (55) a. Isn’t Jane coming too?
 b. LF: $[_{CP} Q \text{ not } [\text{VERUM}_F [_{IP} \text{ Jane is coming}] \text{ too }]]$
 c. “Do you have any (weak or strong) **doubts** about p ?”, or
 “Can you provide information –and, if so, what information– that would make me **doubt** p ?”

(56) PPI partition and pronounced cell:

FOR-SURE _x <i>p</i>	PROBABLY _x <i>p</i> POSSIBLY _x <i>p</i> ... FOR-SURE-NOT _x <i>p</i>
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- (57) a. Given that I assume *p* and that you implied $\neg p$, can you provide information –and, if so, what information– that would make me **doubt** *p*?
- b. # Given that I assume $\neg p$ and that you implied *p*, can you provide information –and, if so, what information– that would make me **doubt** *p*?

Finally, the same reasoning applies to the positive biased question *IS Jane coming?*. Crucially, although the partitions in (56) and in (59) are exactly the same, the pronounced cells are opposite. This choice makes the pragmatic intent of the two questions different: the PPI-question asks for reasons to doubt *p*, whereas the positive question asks for reasons to conclude that *p*. As a result, shown in (60), the intent of the positive question is compatible with the speaker’s belief $\neg p$ and with the addressee’s proposition *p* and not vice-versa. This is the opposite pattern from the one obtained from the PPI-question.

- (58) a. IS Jane coming too?
- b. LF: [_{CP} *Q* VERUM_F [_{IP} Jane is coming]]
- c. “Do you have **complete evidence** that *p*?”, or
 “Can you provide information –and, if so, what information– that would make me **conclude** *p*?”

(59) Positive question partition and pronounced cell:

FOR-SURE _x <i>p</i>	PROBABLY _x <i>p</i> POSSIBLY _x <i>p</i> ... FOR-SURE-NOT _x <i>p</i>
--------------------------------	---

- (60) a. # Given that I assume *p* and that you implied $\neg p$, can you provide information –and, if so, what info– that would make me **conclude** *p*?
- b. Given that I assume $\neg p$ and that you implied *p*, can you provide information –and, if so, what info– that would make me **conclude** *p*?

In sum, in this section, we have sketched some speculations about how to derive the polarity of the epistemic implicature from the scopal ambiguity proposed for PPI-/NPI-questions. In a nutshell, when the intent of a question is to ask for conclusive evidence for a proposition *q*, that proposition *q* is the addressee’s implied proposition and the complement proposition is the epistemic implicature of the speaker; when the intent of a question is to ask for any possible (weak or strong) doubts about a proposition *q*, *q* is the original belief of the speaker and its complement is the addressee’s proposition. This idea, combined with polarity of the “double-checked” proposition, points towards the correct implicature pattern.¹⁷

5 Conclusions

We have argued that Verum Focus (Höhle, 1992) in *yn*-questions signals the presence of an epistemic implicature. Preposed negation in *yn*-questions necessarily carries Verum Focus, and hence the epistemic implicature necessarily arises. Non-preposed negation in *yn*-questions may or may not be Focus-marked, and hence the implicature does not necessarily arise.

Ladd's $p/\neg p$ -question ambiguity arises only in negative *yn*-questions with an epistemic implicature. The Verum Focus related to the implicature provides an epistemic operator VERUM. The scope of VERUM and negation accounts for Ladd (1981)'s ambiguity: in PPI-questions, negation scopes over VERUM and we obtain the p -question reading; in NPI-questions, VERUM scopes over negation and we obtain the $\neg p$ -question reading.

We have also provided some speculations as to why the polarity of the epistemic implicature is opposite from the polarity of the question. By taking in the pragmatic intent of the speaker, we argued that this implicature pattern may fall out from the interaction between the syntax/semantics of biased questions and general pragmatics of questions. The speaker will choose to pronounce the proposition that is compatible with her pragmatic intent for asking that question.

Endnotes

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¹Although the epistemic effect in (1) has been dubbed "implicature", it may rather be a presupposition. We will not discuss this issue in this paper.

²Throughout this paper, S is short for *speaker*, and A is short for *addressee*.

³The example (3) showed that a $\neg p$ -question with preposed negation cannot be epistemically unbiased. (61) shows the same for p (= "that Jane is coming (too)").

(61) Scenario: S is very fond of both Pat and Jane. The prospect of an excursion with them pleases S. S does not have any previous belief about whether either of them is coming or not.

A: Pat is coming.

S: Great! Is Jane coming (too)? That would be the best!!!

S': # Great! Isn't Jane coming (too)? That would be the best!!!

⁴(9S) and (10S") are reminiscent of archaic non-preposed negation examples as in the passage from *Merchant of Venice* in (62):

(62) Shylock, Act III, Scene 1: (*Merchant of Venice*)

I am a Jew. Hath not a Jew eyes? hath not a Jew hands, organs, dimensions,

senses, affections, passions? (...) If you prick us, do we **not** bleed? if you tickle us, do we **not** laugh? if you poison us, do we **not** die? and if you wrong us, shall we **not** revenge? If we are like you in the rest, we will resemble you in that.

It turns out that neg-preposing with *n't* is a late development in the history of English, first appearing in late 17th century. Before the development of *n't*, neg preposing occurred with *not*, as in *Hath not a Jew eyes?* in the passage from *Merchant of Venice* in (62), and examples in (63) from corpus assembled by Ellegård (1953) (made available on-line by Anthony Kroch and Ann Taylor).

- (63) a. dyde not our mercyfull lord forgyue all his trespasse? (225-32)
b. Did not Moses geve you a lawe, and yet none off you kepeth the lawe? (jn7-19)
c. Did not I se the in the garden with hym? (jn18-26)

In present-day English, only *n't* can prepose, while *not* cannot. But the archaic usage of *not* may have survived, making available the interpretation corresponding to *not*-preposing.

⁵Focus on the (positive) auxiliary does not give rise to the implicature if it simply marks that the question is being re-asked, as in (64) (Creswell (2000) on *dictum* focus):

- (64) I was wondering whether Sue visited you last week. So, DID she visit you last week?

⁶If the focus on *NOT* is simply contrasting with a previous question, as in (65), the implicature does not need to arise. As argued in Romero and Han (2001), the implicature is necessarily triggered if focus is licensed in a particular way (namely, marking the relation between superquestions and subquestions).

- (65) A: Does John drink coffee?
B: No, he doesn't.
A: Does John NOT drink TEA?

⁷As noted in Ladd (1981), *p*-question type and tag questions even share some grammatical properties: a negative declarative + post-nuclear tag allows for PPIs despite negation, as we saw *p*-questions do: (66).

- (66) Jane's not coming too=is she?

⁸See also Bartels (1997) and Gunlogson (2001) for the interpretation of rising and falling contours in interrogatives and declaratives.

⁹This analysis was suggested to us as a possibility by H. Truckenbrodt.

¹⁰In this respect, preposed negation behaves like other constructions with non-canonical syntax that also encode particular discourse functions, like topicalization, Focus preposing, etc (Kiss, 1981; Ward, 1988; Prince, 1998)

¹¹The denotation of *Q* in the text gives Hamblin (1973) style question meanings. Alternatively, we could follow Karttunen (1977) or Groenendijk and Stokhof (1984)

to obtain a function that assigns to each world the (set containing the) true answer in that world, or we could adopt Larson (1985)'s syntax for the *Q/whether* operator. The choice of one implementation over the other is irrelevant for this paper.

¹²The negative epistemic operator FOR-SURE-NOT_x in (38e) is the denotation of focused *NOT*.

¹³The denotation of VERUM is probably not exactly the regular epistemic operator defined in (38a), but some –usually epistemically flavored– attitude operator relating the speakers, the proposition at issue and the Common Background. E.g., Ladd's example (67) is not so much asking the addressee whether he is entirely certain about the truth of $\neg p$ (= "that the addressee will not lift a finger to help"); rather, it seems to ask whether the addressee really wants $\neg p$ to be added to the Common Ground, with the consequences that that may have.

(67) Aren't you gonna lift a finger to help?

¹⁴The (un)grammaticality of the NPI/PPI in (46) is independent of whether negation and the NPI/PPI are in the same clause or not. It equally obtains in (68), where all the relevant elements are clausemates:

- (68) a. * Jane doesn't need [to have come either]
(But ok: Jane doesn't need [to have come] either)
b. Jane doesn't need [to have come too]
(But: * Jane doesn't need [to have come] too)

¹⁵The scope relations between VERUM and negation that we have proposed here are independent of the *Q* operator, and hence one would expect for them to surface in constructions other than questions. In fact, Höhle (1992) pp 124-6 proposes the same scopal ambiguity for German declaratives: in (69), VERUM scopes over negation, and, in (70), negation scopes over VERUM.

- (69) a. Karl hat bestimmt nicht gelogen.
Karl has for-sure not lied.
"John surely didn't lie."
b. Karl HAT nicht gelogen.
Karl HAS not lied.
"It is **true** that Karl didn't lie."

- (70) a. Ich hoffe, dass Karl ihr zuhoert.
I hope, that Karl her-DAT listens.
"I hope that Karl listens to her."
b. Aber Hanna denkt, er HOERT ihr nicht zu.
But Hanna thinks, he LISTENS her-DAT not PART
"But Hanna thinks that it is **not true** that he listens to her."

¹⁶PPI questions are also possible in a context where the addressee did not imply $\neg p$. This context is again compatible with the speaker's intent expressed with the PPI question, as in (71).

- (71) a. Given that I assume p , can you provide information –and, if so, what information– that would make me **doubt** p ?
- b. # Given that I assume $\neg p$, can you provide information –and, if so, what information– that would make me **doubt** p ?

¹⁷Besides the p -/ $\neg p$ -ambiguity, PPI-questions and NPI-questions perhaps also differ in the attitude that the speaker takes with respect to the dynamics of the on-going information exchange. If so, the intent of the questions can also be used to convey that. Take e.g. (72). The NPI-question in (72a), asking for conclusive evidence for the addressee's proposition $\neg p$, may be used when the speaker is seriously considering switching to $\neg p$. The PPI-question (72b), asking for any doubt about her previous belief p , can convey that the speaker is still entertaining/pondering her original belief p .

- (72) A: This is the new poetic anthology of the 60s. Do you want to take a look?
 S: Let me see... Impressive collection of authors... Let me look at the famous Rosa Montero. (Searching the table of contents and being surprised that her name is not there.) ...
- a. Didn't she write any poetry in the 60s?
- b. Didn't she write some poetry in the 60s?

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Appendix: Pitch Tracks



