On Negative *Yes/No* Questions*

Maribel Romero
University of Pennsylvania
romero@ling.upenn.edu

Chung-hye Han
Simon Fraser University
chunghye@sfu.ca

July 25, 2002

1 Introduction

This paper is concerned with two generalizations involving negation in *yes/no* (*yn*-)questions. The first generalization reflects an interpretational difference correlated with preposed and non-preposed negation in *yn*-questions. Preposed negation in *yn*-questions necessarily 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 questions. (3S) can be understood in this context as an epistemically unbiased

*We thank Irene Heim, Angelika Kratzer, Anthony Kroch and Barbara Partee for extensive discussion and criticism of this paper. This version has also benefited from comments from Misha Becker, Tonia Bleam, Nancy Hedberg, Mark Liberman, Bill Poser, Ellen Prince, Uli Sauerland, Mark Steedman, Arnim von Stechow, Hubert Truckenbrodt, Henk Zeevat, and the audiences of Sinn und Bedeutung 6, Stanford's Department of Linguistics, SALT 12, the Penn-Tübingen meeting and Tübingen's Department of Linguistics. All remaining errors are ours.

[1] Although the epistemic effect in (1) has been dubbed "implicature", it is a strong, non-cancellable effect. As we will see, it will be derived from the interaction between the semantics of *yn*-questions and non-violable conversational principles about questions.

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: The speaker is organizing a party and she is in charge of supplying all the non-alcoholic beverages for teetotalers. The speaker is going through a list of people that are invited. She has no previous belief or expectation about their drinking habits.
A: Jane and Mary do not drink.
S: Ok. What about John? Does he not drink (either)?
S':# Ok. What about John? Doesn't he drink (either)?

(4) 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!!!

(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 states an intuitive ambiguity within preposed negation *yn*-questions. According to Ladd (1981), a *yn*-question with preposed negation *Aux+n't* p*?* like (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*:

(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?

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

(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?

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.

It is important to keep in mind that the speaker started with the positive belief or expectation that p both in the PPI-question and in the NPI-question. In the PPI-question (7), the speaker originally believed or expected p (="that Jane is coming") and, after A's utterance, she wants to double-check her original belief p. In the NPI-question (8), the speaker also started with a belief or expectation that p but, after A's utterance, she is trying to double-check the proposition $\neg p$ implied by A.

The intuitive ambiguity between the p-question reading and the $\neg p$-question reading is summarized in Generalization 2 below.

(9) GENERALIZATION 2: Preposed negation *yn*-questions of the shape *Aux n't* 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 following three questions arise concerning these two generalizations:

i. Why does preposed negation force the *existence* of an epistemic implicature, whereas non-preposed negation does not necessarily trigger it?

ii. Why are preposed negation questions ambiguous? In other words, what property of preposed negation interacts with the rest of the elements in the sentence to derive Ladd's p-question / $\neg p$-question ambiguity formally?

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

The goal of this paper is to show that answers to questions (i)-(iii) follow naturally if we make the following assumption: that the preposing of negation in *yn*-questions contributes an extra epistemic operator VERUM (comparable to Höhle (1992)'s VERUM). Although we do not know why negation preposing should be linked to VERUM, we will show that this assumption derives the correct predictions. In a nutshell, once we assume (10), the answers to the questions (i)-(iii) are as follows:

(10) ASSUMPTION:
Negation preposing in *yn*-questions necessarily contributes an epistemic operator VERUM.

i'. *Yn*-questions with preposed negation necessarily have VERUM, whereas *yn*-questions with non-preposed negation do not necessarily have VERUM. *Yn*-questions with VERUM result in partitions where the degree of certainty about a proposition is at issue. They are elicited when the speaker had a previous belief about that proposition but –given some counterevidence implied by the addressee or given the speaker's own doubts– the speaker wants to check the certainty of her original belief. *Yn*-questions without VERUM result in simple partitions with the equivalence classes p and $\neg p$. They are elicited when the speaker had no previous significant belief about p or $\neg p$.

ii'. Ladd's intuitive ambiguity is genuine scopal ambiguity between negation and the VERUM operator. In PPI-questions, with the p-question reading, negation scopes over VERUM. In NPI-questions, with the $\neg p$-question reading, VERUM scopes over negation.

iii'. The LFs for the PPI-question and the NPI-question interact with general semantics and pragmatics of *yn*-questions to derive the *positive* content p of the epistemic implicature. In the NPI-question, the speaker asks the addressee for conclusive evidence

for $\neg p$; hence, $\neg p$ is the addressee's proposition and p is the speaker's original belief. In the PPI-question, the speaker asks the addressee for any possible (weak or strong) doubts about p; hence, the speaker's original belief is p and the addressee's proposition (if any) is $\neg p$.

This paper is organized as follows. Section 2 elaborates on the characterization of the empirical data, adding more examples to support and refine Generalizations 1 an 2 and showing why these generalizations are puzzling. Section 3 tackles question (i). It is shown how the presence of the operator VERUM in *yn*-questions in general –often contributed by expressions like *really* or by explicit focus stress on the polarity– triggers the *existence* of an epistemic implicature. It is then proposed, as a working hypothesis, that the function of preposed negation in *yn*-questions is to signal the presence of this VERUM operator. Section 4 addresses question (ii). Here, VERUM is used to characterize formally Ladd's intuitive ambiguity. Section 5 shows that the Logical Forms (LFs) with VERUM, together with some semantic/pragmatic factors concerning *yn*-questions in general, derive the right polarity pattern for the epistemic implicatures. Section 6 summarizes the conclusions.

2 Characterization of the data

2.1 Characterization of the data for Generalization 1

Let us see some more examples illustrating the epistemic difference between preposed and non-preposed negation in *yn*-questions. First, note that questions with non-preposed negation can be as epistemically unbiased as regular positive *yn*-questions. Take the examples (11) and (12) (=(4)), which present an epistemically unbiased scenario for a positive *yn*-question and for a negative *yn*-question respectively. In (11), the unbiased speaker asks the positive question *Is Jane coming?* simply because she is interested in Jane's coming and because the previous sentence *Pat is coming* prompted the question of whether the property of coming applies to Jane too. In a parallel way, in (12), the speaker S asks an unbiased negative question simply because she is interested in Jane not coming and because the previous sentence *Pat is not coming* prompted the question of whether that also holds of Jane.

(11) Scenario: Speaker likes Jane and simply wants to find out whether she is coming.
A: Pat is coming.
S: What about Jane? Is she coming?

(12) 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!!!

The crucial point is that, if we take the unbiased scenario in (12) and ask the question with preposed negation in (12S'), the question is odd in this context. That is, (12S') necessarily conveys an epistemic bias, rendering the question unsuitable for this unbiased context.

The same point is made by the pair (13)-(14). The preposed negation question in (14S') necessarily carries an epistemic implicature and is inappropriate in this unbiased context.

(13) Scenario: S interviews a literary critic A on TV about the Spanish writer Rosa Montero (born in 1951).
S: Tell us more about Rosa Montero's early literary activities. For example, did she write poetry in the 70s?

(14) Scenario: S interviews A on TV about Rosa Montero.
A: Mrs. Rosa Montero's writing career is closely related to the political episodes that Spain has lived through since 1936. There were times when she simultaneously worked on prose and poetry, but there were other times full of journalistic prose and completely devoid of poetry.
S: Please tell us more about those poetic gaps, and about what exactly caused them. For example, did she not write poetry in the 70s? And, if she didn't, why not?
S': # Didn't she write poetry in the 70s? And, if she didn't, why not?

A last pair is provided in (15)-(16):

(15) 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. Additional fact: Sue didn't talk to Michael at the meeting.
A: Michael has not been happy with Sue since yesterday's meeting.
S: Should she have talked to him then?

(16) 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. Additional fact: Sue talked to Michael at the meeting.

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?

In sum, questions with non-preposed negation can be as unbiased as their positive counterpart, but questions with preposed negation are necessarily biased.

This interpretive asymmetry between preposed and non-preposed negation is not an accident of English, but it is found in a number of languages. The (a)-examples below have preposed negation and carry the corresponding epistemic implicature; the (b)-examples have negation in its non-preposed position and do not necessarily give rise to the implicature.[3]

(17) Modern Greek

a. Den ipie o Yannis kafe?
Neg drank the Yannis coffee
'Didn't Yannis drink coffee?' (yes)

b. O Yannis den ipie kafe?
the Yannis Neg drank coffee
'Did Yannis not drink coffee?' (no)

(18) Spanish

a. ¿No bebe Juan?
Neg drink Juan
'Doesn't Juan drink?' (yes)

b. ¿Juan no bebe?
Juan Neg drink
'Does Juan not drink?' (no)

(19) Bulgarian

a. Ne pie li Ivan kafe?
Neg drink li Ivan coffee
'Isn't Ivan drinking coffee?' (yes)

b. Dali Ivan ne pie kafe?
Dali Ivan Neg drink coffee
'Is Ivan not drinking coffee?' (no)

(20) German[4]

[3]Note that the generation of a positive implicature does not correlate with a specific position of negation, but with relative positions of negation: i.e., non-preposed vs. preposed position. In English and Bulgarian, preposed negation is in C^0, but, in Spanish and Modern Greek, it has been convincingly argued (Suñer, 1994; Alexiadou and Anagnostopoulou, 1998) that the verb along with negation is not in C^0 in sentences with Verb-Subject-Object order.

[4]In German, the contrast also arises between the use of *nicht ein* ("not a"), as in (1a), and *kein* ("no"), as in (1b) (M. Kappus, p.c.). The latter can be asked, with no epistemic implicature, by a speaker who is simply making a list of non-vegetarian-friendly neighborhoods (contra Büring-Gunlogson (2000:9)'s generalization).

a. Hat (nicht) Hans (nicht) Maria gesehen?
has Neg Hans Neg Maria seen
'Didn't Hans see Maria?' (yes)

b. Hat Hans Maria nicht gesehen?
Has Hans Maria Neg seen
'Did Hans not see Maria?' (no)

Similarly, Korean has two (main) types of negation in *yn*-questions: negation following tense, as in (21a), and negation preceding tense (with the subtypes short negation and long negation, as in (21b-c)). The former type of negative *yn*-questions necessarily gives rise to an epistemic bias, and the latter type does not necessarily raise this bias. Given the head-finalness of Korean, we can think of the negation following tense as preposed negation and the one preceding tense as non-preposed negation.

(21) Korean

a. Suni-ka coffee-lul masi-ess-ci anh-ni?
Suni-Nom coffee-Acc drink-Past Neg-Q
'Didn't Suni drink coffee?' (yes)

b. Suni-ka coffee-lul an masi-ess-ni?
Suni-Nom coffee-Acc Neg drink-Past-Q
'Did Suni not drink coffee?' (no)

c. Suni-ka coffee-lul masi-ci anh-ess-ni?
Suni-Nom coffee-Acc drink Neg-Past-Q
'Did Suni not drink coffee?' (no)

In sum, the contrast between preposed and non-preposed negation is stated in Generalization 1, repeated here:

(22) 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.

Generalization 1 is puzzling for two reasons. First, it is surprising how a *yn*-question with negation –in any position whatsoever– could force an epistemic implicature at all.

(1) a. Gibt es nicht ein vegetarisches Restaurant in diesem Viertel?
Gives EXPL not a vegetarian restaurant in this quarter
'Isn't there a vegetarian restaurant in this quarter?' (yes)

b. Gibt es kein vegetarisches Restaurant in diesem Viertel?
Gives EXPL no vegetarian restaurant in this quarter
'Is there no vegetarian restaurant in this quarter?' (no)

Take the denotation of the question morpheme Q in (23), yielding the standard Hamblin (1973)/Karttunen (1977) denotations for *yn*-questions, as exemplified in (24).

(23) $[\![Q]\!] = \lambda p_{<s,t>} \lambda w_s \lambda q_{<s,t>} [q = p \ \vee \ q = \neg p]$

(24) a. Is Jane coming?

b. LF: [$_{CP}$ Q [Jane is coming]]

c. $[\![Jane\ is\ coming]\!] = \lambda w.\ Jane\ is\ coming\ in\ w$

d. $[\![Q\ Jane\ is\ coming]\!](w_o)$
= $\lambda q\ [q = \lambda w.\ Jane\ is\ coming\ in\ w \ \vee \ q = \lambda w.\ \neg(Jane\ is\ coming\ in\ w)]$
= {"that Jane is coming", "that Jane is not coming"}

If we add the standard denotation of negation (25) and we compute it under the Q-morpheme, no epistemic implicature arises (no matter whether negation was preposed or not in the surface syntax), as shown in (26). Needless to say, questions cannot be negated, hence the possibility of adding (crosscategorial) negation over Q is ill-formed.[5]

(25) $[\![not]\!] = [\![n't]\!] = \lambda p_{<s,t>}.\neg p$

(26) a. Is Jane not coming? / Isn't Jane coming?

b. LF: [$_{CP}$ Q [not [Jane is coming]]]

c. $[\![Jane\ is\ coming]\!] = \lambda w.\ Jane\ is\ coming\ in\ w$

d. $[\![not\ [Jane\ is\ coming]]\!] = \lambda w.\ \neg(Jane\ is\ coming\ in\ w)$

[5]The lexical entry for the Q-morpheme in (23) yields exactly the same denotation for positive and negative *yn*-questions. An alternative entry is given in (1) (see also footnotes 16 and 22). With this new Q, still no epistemic implicature arises from the addition of negation.

(1) $[\![Q]\!] = \lambda p_{<s,t>} \lambda w_s \lambda q_{<s,t>} [q \ = \ p]$

(2) a. Is Jane coming?

b. $[\![Q\ Jane\ is\ coming]\!](w_o)$
= $\lambda q\ [q = \lambda w.\ Jane\ is\ coming\ in\ w\ ]$
= {"that Jane is coming"}

(3) a. Is Jane not coming? / Isn't Jane coming?

b. $[\![Q\ Jane\ is\ not\ coming]\!](w_o)$
= $\lambda q\ [q = \lambda w.\ \neg(Jane\ is\ coming\ in\ w)]$
= {"that Jane is not coming"}

e. $[\![Q\ Jane\ is\ not\ coming]\!](w_o)$
= $\lambda q\,[q = \lambda w.\,\neg(Jane\ is\ coming\ in\ w)\ \vee\ q = \lambda w.\,\neg\neg(Jane\ is\ coming\ in\ w)]$
= {"that Jane is not coming", "that Jane is coming"}

Second, it is surprising how the surface position of negation can contribute any interpretive difference at all, e.g. in the pair *Is Jane not coming* / *Isn't Jane coming?*. Leaving aside the Q-morpheme, which has widest scope, the only operator here is negation. Hence, a higher or lower position of negation cannot be correlated with any scopal difference with interpretive effects. One could argue that preposed negation in *yn*-questions is sentential negation and that non-preposed negation is constituent negation, negating the event contributed by the Verb Phrase (VP). But, in (27), negation is not just negating the event contributed by the VP and is more like a sentential negation negating the entire modal proposition. Still, (27) does not give rise to a necessary epistemic implicature, in contrast with its preposed negation version in (28):

(27) Does John not have to go to the meeting? ($\neg\Box$)
No epistemic implicature necessarily.

(28) 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.

In sum, if negation simply contributes the denotation in (25), any interpretive difference between preposed negation and non-preposed negation is unexpected.

To sum up, preposed negation in *yn*-questions necessarily carries an epistemic implicature whereas non-preposed negation does not. If we assume that preposed negation only contributes the standard denotation in (25), it is surprising that such epistemic effect arises and that there is a contrast between the two positions of negation.[6]

[6]The epistemic contrast between preposed and non-preposed negation characterized in this section is different from the contextual evidence bias pointed out in Büring and Gunlogson (2000). Their idea is that contextual evidence for p may prompt the speaker to ask the *yn*-question $p?$ rather than $\neg p?$ (or a similar alternative), as in (1):

(1) Scenario: Addressee enters Speaker's windowless computer room wearing a dripping wet raincoat.
S: What's the weather like out there? Is it raining?
S': # What's the weather like out there? Is it sunny?

Note that, though the question in (1S) is prompted by some indicative contextual evidence, it still lacks the strength of the epistemic implicature that we are interested in: *Is it raining?* in (1S) does not have the strong

2.2 Characterization of the data for Generalization 2

Generalization 2 is concerned with Ladd's intuitive $p/\neg p$ ambiguity in *yn*-questions with preposed negation. Recall the examples (7) and (8), repeated here as (29) and (30). Whereas the PPI-question (29) tries to double-check whether it also holds of Jane that she is coming (p-reading), the NPI-question (30) tries to double-check whether it also holds of Jane that she is not coming ($\neg p$-reading):

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

(30) 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?

Note that the two readings correspond to PPI- and NPI-questions *unambiguously*. PPI-questions, on the one hand, can have a p-reading, as in (29), and cannot have a $\neg p$-reading, as shown in (31). *Didn't Karl make it too?* in (31S') cannot be used to double-check if it also holds of Karl that he did *not* make the world record. Similarly, NPI-questions can have a $\neg p$-reading, as in (30), but they lack the p-reading: (32S') cannot be understood as double-checking if it also holds of The New Yorker that they liked the play.

(31) A: Stephan didn't make the expected new world record of 950m under water. Thus nobody has made it that deep yet!
S: Didn't Karl make it either?
S': # Didn't Karl make it too?

(32) A: The NY Times reviewer liked the play!
S: Yeah! And didn't The New Yorker like it too?
S': # Yeah! And didn't the The New Yorker like it either?

epistemic bias that *Isn't it raining?* has. Our epistemic implicature also differs from Büring and Gunlogson (2000)'s contextual evidence in the polarity pattern: whereas the positive epistemic implicature p is linked to the *negative* question *Isn't it raining?*, contextual evidence for p prompts the *positive* question *Is it raining?*. Finally, contextual evidence seems to be a valid reason to ask a *yn*-question in a particular way, but it is not the only one; relevance of p but not of $\neg p$ as a suggested answer to a *wh*-question, interest in the topic p rather than $\neg p$, etc., are also sufficient reasons to prompt the speaker to ask the question in a particular way (see Bolinger (1978) and the related discussion in section 5.1). Still, these reasons do not raise the type of epistemic implicature studied in this paper.

That PPI-questions have a p-reading which NPI-questions lack becomes also clear in the following case. Take a context without contradiction between the speaker's belief and the addressee. If p is relevant as a suggestion or an explanation related to the topic of the conversation but $\neg p$ is not, PPI-questions are elicited but NPI-questions are inappropriate. Witness (33) and (34). In (33), the speakers are looking for some senior semanticist that has reviewed for the journal already. The PPI-question (33S) can be used to suggest Frege as such reviewer, but the NPI-question (33S') cannot:

(33) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody who has experience with our regulations.
S: Hasn't Frege already reviewed for us? He'd be a good one.
S':# Hasn't Frege reviewed for us yet? He'd be a good one.

Similarly, in (34), the speaker S is looking for a reason why Montero's name sounds familiar. The proposition "that Montero wrote some poetry in the 70s", if true, may provide a reason. The PPI-question (34S) can be used to suggest that proposition as a possible explanation, whereas the NPI-question (34S') cannot.

(34) A: I gave your sister a book by Rosa Montero.
S: That name sounds familiar. Didn't she write some poetry in the 70s?
S': # That name sounds familiar. Didn't she write any poetry in the 70s?

In a similar vein, when the speaker states explicitly that she does not accept the addressee's contradicting proposition, the PPI-question is fine but the NPI-question is odd. This is illustrated in (35) and (36). In both cases, the speaker believed p, the addressee implied $\neg p$ and then the speaker explicitly stated that she disagrees with the addressee's proposition. If such explicit disagreement statement is made, the reasons for the speaker's disagreement are relevant. The speaker may suggest one reason by using the PPI-question about p but not by using the NPI-question about $\neg p$, since the truth of p is a reason to disagree with addressee but the truth of $\neg p$ is not.

(35) A: Rosa Montero has not produced any poetic work in the last five years.
S: I think you may be wrong. Didn't she publish some in the *Poetic Review* last MONTH?

S': # I think you may be wrong. Didn't she publish any in the *Poetic Review* last MONTH?

(36) A: Did you hear that the invited speaker is not coming? Two presenters declared themselves sick yesterday, too. And the catering company is giving us trouble. You should tell Patricia about this.
S: I don't think I need to tell her about any of this. Didn't Eric already talk to her?
S': # I don't think I need to tell her about any of this. Didn't Eric talk to her yet?

In sum, in "suggestion" contexts, if the speaker wants to suggest p as a potential explanation or answer to a (possibly implicit) *wh*-question, the PPI-question is elicited but the NPI-question is not.[7]

All these examples illustrate the claim that PPI-questions are questions about p whereas NPI-questions are questions about $\neg p$ and not vice-versa. Is there any further difference between PPI- and NPI-questions? The answer is 'yes'. We saw that PPI-questions are elicited in "suggestion" contexts without contradiction when p is relevant to the conversation. Interestingly, NPI-questions are not adequate in "suggestion" contexts even if $\neg p$ is relevant to the conversation. Witness the contrast in (37)-(38). In (37), the speaker believes p (="that Jane is coming"), no contradiction arises and she simply wants to double-check p as a possible suggestion for who else could help with the computer installation. The PPI-question can be used here:

[7]Observe the difference in acceptability of the NPI-question in the contexts (1) and (2). In (1), we see, as before, that the NPI-question cannot be used to suggest p (= "that there is a Chinese restaurant near here"). In (2), instead, the NPI-question is felicitous and seems to be used to suggest p. But note that, in the latter case, it is crucial that the addressee has already given some answer to the implicit question "Where can we eat tonight?". Since the addressee mentions other restaurant options and does not mention Chinese, the speaker may infer that the addressee believes that Chinese restaurants are out of the question (as a sort of scalar implicature). That contradicts the speaker's original belief p (="that there is a Chinese restaurant near here"). This means that examples like (2) actually involve a tacit contradiction between the speaker's belief and the implicature arising from the addressee's utterance. Pure "suggestion" contexts for p, like (1) or the ones in the main text, do not allow NPI-questions.

(1) A: I need to find out what restaurants there are in this neighborhood.
S: Isn't there some Chinese restaurant in a street near here?
S': # Isn't there any Chinese restaurant in a street near here?

(2) A: There is no vegetarian restaurant near here, so we cannot eat vegetarian.
S: Isn't there any Chinese restaurant either? (C. Creswell, p.c.)

(37) A: John is coming to the meeting, but unfortunately he doesn't know enough to help us set up the computer projector.
S: Isn't Jane coming too? If so, she'll be able to help us.

Let us now build a parallel scenario where the relevant piece of information is who else the negative proposition $\neg p$ holds for. This is done in (38): the speakers are interested in who else hasn't arrived as a possible victim for the boss' anger. The point is that the plain NPI-question in S is still inappropriate. We need a second negative element to achieve the right meaning, as in S'.

(38) Scenario: A is a mean boss whose favorite morning activity is to scold the employees who are not at their offices at 8am. S is his assistant.
A: Smith has not arrived yet, but I can't scold him when he comes because he closed a $ 1M deal for us yesterday.
S: # Hasn't Baker arrived either? If he hasn't, you can scold him instead.
S': Hasn't Baker failed to arrive too? If so, you can scold him instead.

The contrast between (39) (=33) and (40) and between (41) (=34) and (42) illustrate the same point. The NPI-questions (40S) and (42S) cannot have a suggestion use even though the conversation is about finding a person for which $\neg p$ holds. (The PPI-questions (40S") and (42S") are, of course, also inappropriate as suggestions about who $\neg p$ holds for.)

(39) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody who has experience with our regulations.
S: Hasn't Frege already reviewed for us? He'd be a good one.

(40) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody new.
S:# Hasn't Frege reviewed for us yet? He'd be a good one.
S': Hasn't Frege not reviewed for us yet? He'd be a good one.
S": # Hasn't Frege already reviewed for us? He'd be a good one.

(41) A: I gave your sister a book by Rosa Montero.
S: That name sounds familiar. Didn't she write some poetry in the 70s?

(42) A: A student asked me why Rosa Montero wasn't cited in this article, but I didn't know why.

S: # Didn't she write any poetry in the 70s? The author of the article seems to quote only poets that influenced him in his youth, in the 70s.

S': Didn't she not write any poetry in the 70s? The author of the article seems to quote only poets that influenced him in his youth, in the 70s.

S": # Didn't she write some poetry in the 70s? The author of the article seems to quote only poets that influenced him in his youth, in the 70s.

In sum, we have seen more examples showing that *yn*-questions with preposed negation are, in principle, ambiguous: they can be understood as double-checking questions about p –only reading available in PPI-questions– or as double-checking questions about $\neg p$ –only reading in NPI-questions. Furthermore, we have seen that the PPI-questions differ from NPI-questions in yet another respect: in "suggestion" contexts without contradiction, PPI-questions are licit but NPI-questions are inappropriate (even as a suggestion about who $\neg p$ holds for).[8]

All these observations are summarized in Generalization 2, repeated in (43):

(43) GENERALIZATION 2 (revised):

Preposed negation *yn*-questions of the shape *Aux n't* 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.[9] Furthermore, PPI-

[8]Though Ladd (1981) didn't explicitly make this distinction, all his PPI-question examples and none of his NPI-question examples occur in "suggestion" contexts.

[9]Crosslinguistically, not all languages that distinguish between preposed and non-preposed negation make the finer distinction between PPI-questions and NPI-questions in the same way. Spanish patterns like English in that preposed negation questions have a PPI-version and an NPI-version, as in (1). In Korean, instead, in preposed negation *yn*-questions, PPIs are licensed but NPIs are not, and, in non-preposed negation questions, NPIs are licensed but PPIs are not. This is shown in (2)-(3).

(1) Spanish preposed negation *yn*-questions:

a. No ha bebido Paco café ya?
Not has drunk Paco coffee already?
'Didn't Paco already drink coffee?'

b. No ha bebido Paco café todavía?
Not has drunk Paco coffee yet?
'Didn't Paco drink coffee yet?'

questions but not NPI-questions are licit in "suggestion" contexts without contradiction.

Generalization 2 is surprising for several reasons. First, it is puzzling why PPIs can be allowed in preposed negation *yn*-questions at all, since they are disallowed in the corresponding negative declarative versions (Ladusaw, 1980; Progovac, 1994). This is shown in (44). Unless we understand the examples in (44a-c) as metalinguistic negation of a previous statement, they are ill-formed; further, the examples in (44d-e) can only have the interpretation in which *some* has scope over negation.

(44) a. * Jane isn't coming too.

b. * Frege hasn't already reviewed for us.

c. * Eric didn't already talk to her.

d. ?? She didn't write some poetry in the 70s.

e. ?? She didn't publish some poetry in the *Poetic Review* last month.

Second, it is not clear what the $p/\neg p$ ambiguity stems from. Ladd's suspicion was that it involves a difference in the scope of negation: in PPI-questions, negation is somehow outside the scope of the questioned proposition, whereas it is inside the questioned proposition in NPI-questions. But, as Ladd notes, "it is not clear what it means to speak of the NEG [=negation] as being outside the questioned proposition, nor is it clear, if the NEG is indeed outside, what it is doing in the sentence at all" (Ladd (1981):165). Third and

(2) Korean preposed negation *yn*-questions:

a. Suni-ka pelsse coffee-lul masi-ess-ci anh-ni?
Suni-Nom already coffee-Acc eat-Past Neg-Q?
'Didn't Suni already drink coffee?'

b. * Suni-ka acikto coffee-lul masi-ess-ci anh-ni?
Suni-Nom already coffee-Acc eat-Past Neg-Q?
'Didn't Suni drink coffee yet?'

(3) Korean non-preposed negation *yn*-questions:

a. * Suni-ka pelsse coffee-lul masi-ci anh-ass-ni?
Suni-Nom already coffee-Acc eat Neg-Past-Q?
'Did Suni already not drink coffee?'

b. Suni-ka acikto coffee-lul masi-ci anh-ass-ni?
Suni-Nom already coffee-Acc eat Neg-Past-Q?
'Did Suni not drink coffee yet?'

finally, even if we stipulate a $p/\neg p$ ambiguity, it remains unclear why PPI-questions can be used as (double-checking) suggestions about who p holds for, but NPI-questions cannot be used as suggestions about who $\neg p$ holds for. We need some ingredient other than the $p/\neg p$ ambiguity itself to explain this fact.

2.3 The relation between Generalization 1 and Generalization 2

We have seen that *yn*-questions with preposed negation necessarily carry an epistemic implicature whereas *yn*-questions with non-preposed negation can be epistemically unbiased. We have also seen that *yn*-questions with preposed negation are in principle ambiguous between a p-reading and a $\neg p$-reading, and that the two readings correlate with the presence of a PPI and an NPI respectively. But, is the ambiguity reported in Generalization 2 really related to the epistemic implicature described in Generalization 1? In other words, can we find the same $p/\neg p$ duplicity –disambiguated by the use of PPIs and NPIs– in negative *yn*-questions *without* epistemic bias? The answer to the first question is 'yes' and to the second is 'no'. Generalization 1 and 2 are tightly related: the presence of an epistemic implicature p is a necessary condition for the p-question / $\neg p$-question ambiguity to arise.

To show this, let us see what happens if we have a *yn*-question with non-preposed negation and, by controlling the context and using PPIs, we enforce the p-reading. This is done in (45). The presence of *too* and the only antecedent proposition "that Pat is coming" force S's question to be about the positive proposition "that Jane is coming". The result is that the only way to understand the question, if acceptable at all, is with an epistemic implicature: *Is she not coming too?* in (4) sounds like an archaic rendering of *Isn't she coming too?*:

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

The contrast in (46) makes the same point. The epistemically unbiased scenario in (46) allows for a non-preposed negation question (46S) (=16S) and for a non-preposed question with an NPI, as in (46S'). But, as soon as we add a PPI to try to bring out the p-question reading, as in (46S"), 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?*.

(46) 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?

(45S) and (46S") are reminiscent of archaic non-preposed negation examples as in the passage from *Merchant of Venice* in (47):

(47) 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. In Ellegård (1953)'s corpus –which contains more than 10,000 tokens of negative declaratives, affirmative and negative questions, and negative imperatives collected from texts ranging from late Middle English to the 18th century[10]–, neg-preposing with *n't* first appears in late 17th century. Before the development of *n't*, neg-preposing occurred with *not*, as in *Hath not a Jew eyes?* in (47).[11] In present-day English, only *n't* can prepose, while *not* cannot. But the archaic usage of *not* seems to have survived, making available for modern non-preposed *not* the interpretation corresponding to archaic neg-preposing of *not*.

The crucial point is that the $p/\neg p$ ambiguity arises only if the epistemic implicature is present. That is, the existence of the epistemic implicature carried by preposed negation (or by an archaic version of preposed negation) is a necessary condition for the $p/\neg p$ ambiguity to arise. This means that the property of preposed negation that gives us the

[10] Ellegård's corpus has been made available on-line by Anthony Kroch and Ann Taylor.
[11] Other examples of neg-preposing of *not* from Ellegård (1953) are the following:

(1) a. dyde not our mercyfull lord forgyue all his tespasse? (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)

implicature should be somehow involved in the mechanics of the ambiguity. This leads us to reformulate our question (ii) from the introduction as follows:

ii. Why are preposed negation questions —more generally, *negative yn-questions with an epistemic implicature*– ambiguous? In other words, what property of preposed negation *correlated with the existence of an epistemic implicature* interacts with the rest of the elements in the sentence to derive Ladd's p-question / $\neg p$-question ambiguity formally?

2.4 Summary of the data

The data presented in the section have shown the following. *Yn*-questions with preposed negation (or with its archaic lower version) carry the positive epistemic implicature that the speaker believes p, whereas *yn*-questions with non-preposed negation do not necessarily carry this implicature (Generalization 1). Furthermore, preposed negation *yn*-questions –more generally, negative *yn*-questions with the epistemic implicature p– are ambiguous between a reading double-checking p (PPI-questions) and a reading double-checking $\neg p$ (NPI-questions). PPI-questions double-checking p may be used in contradiction contexts or simply as suggestions about who p holds for. NPI-questions double-checking $\neg p$ may be used in contradiction contexts but they cannot be used as suggestions about who $\neg p$ holds for. These conclusions, and the evidence for them, are summarized in the table below: [12]

[12]Examples (14) and (16) in the text showed that *yn*-questions with preposed negation in general cannot be epistemically unbiased. This judgment, of course, still holds when we insert a PPI or an NPI in these examples, as below:

(1) Scenario: S interviews A on TV about Rosa Montero.
A: Mrs. Rosa Montero's writing career is closely related to the political episodes that Spain has lived through since 1936. There were times when she simultaneously worked on prose and poetry, but there were other times full of journalistic prose and completely devoid of poetry.
S: Please tell us more about those poetic gaps, and about what exactly caused them. For example, did she not write poetry in the 70s? And, if she didn't, why not?
S': # Didn't she write **(any/some)** poetry in the 70s? And, if she didn't, why not?

(2) 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. Additional fact: Sue talked to Michael at the meeting.
A: Michael has not been happy with Sue since yesterday's meeting.
S: Should she not have talked to him yet?
S': # Shouldn't she have talked to him **already/yet**?

Question Type		Unbiased	Biased: epistemic implicature p			
			About p	Suggestion for p	About $\neg p$	Suggestion for $\neg p$
Non-Preposed Neg Qu.		$\surd$ (12) (14) (16)				
Preposed Neg Qu.	PPI-Question	* (1) fn 12 (2) fn 12 (45) (46)	$\surd$ (29)	$\surd$ (33S) (34S) (35S) (36S) (37)	* (32)	* (40S") (42S")
	NPI-Question	* (12) (1) fn 12 (2) fn 12	* (31)	* (33S') (34S') (35S') (36S')	$\surd$ (30)	* (38S) (40S) (42S)

Table 1: Summary of the data

These facts give rise to the three questions that constitute the goal of this paper, repeated here from the introduction, and to a follow-up question to (ii), the additional (ii-bis). They will be addressed in turn. Question (i) is the subject of section 3. Sections 4 is concerned with the original question (ii). Finally, section 5 addresses question (iii) and the new (ii-bis).

i. Why does preposed negation force the *existence* of an epistemic implicature, whereas non-preposed negation does not necessarily trigger it?

ii. Why are preposed negation questions —more generally, negative *yn*-questions with an epistemic implicature– ambiguous? In other words, what property of preposed negation correlated with the existence of an epistemic implicature interacts with the rest of the elements in the sentence to derive Ladd's p-question / $\neg p$-question ambiguity formally and its correlation with PPIs vs. NPIs?

ii-bis. Why are PPI-questions suitable in suggestion contexts for p whereas NPI-questions cannot be used in suggestion contexts for $\neg p$?

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

3 VERUM and the existence of an epistemic implicature

This section shows how the presence of an epistemic VERUM operator in *yn*-questions triggers the existence of an epistemic implicature. First, we will see that, in positive *yn*-questions, VERUM can be overtly spelled out with the English epistemic adverb *really*, giving rise to an epistemic implicature. A lexical entry for *really* or VERUM will be proposed to derive the existence of this epistemic bias. Second, it will be suggested that the same analysis can be extended to *yn*-questions where the presence of VERUM is signaled by phonological stress on a polarity element (Verum Focus in (Höhle, 1992)). Finally, we will propose that the epistemic bias in preposed negation *yn*-questions can be derived in exactly the same way if we assume that the preposing of negation in *yn*-questions signals the presence of the VERUM operator.

3.1 VERUM arising from `really`

Positive *yn*-questions (with neutral intonation) like (48) are epistemically unbiased. If one wants to ask the corresponding positive question but with an epistemic bias, a commonly used strategy is to add the epistemic adverb *really*, as in (49). As happened with negation preposing, the addition of *really* in the positive *yn*-question (49) triggers an epistemic bias of the opposite polarity: it adds the negative epistemic implicature that the speaker believed or expected that the negative answer is true.[13]

[13]Epistemic *really* needs to be distinguished from the intensifier adverb *really* in (1a):

(1) a. Sandra is really clever.
b. Sandra really is clever.

Anthony Kroch (p.c.) pointed out to us that there is also a non-intensifier, non-epistemic use of *really* that roughly means "in the actual world rather than in some other relevant world". This use is illustrated in (2). The difference between 'in-actuality' and VERUM *really*'s can be seen in (3). When we have the auxiliary *did* -emphasizing, like VERUM, that the speaker is certain about the truth of the proposition (see subsection 3.3)- the VERUM-*really* precedes *did* or follows it as a parenthetical (as in (3a-b)), whereas the 'in-actuality'-*really* follows *did* as a non-parenthetical (as in (3c)). Also, languages like Spanish distinguish these two *really*'s lexically, as shown in (4). All the examples of *really* in the text are intended as VERUM.

(2) Gore really won the election though Bush is president.

(3) a. He really did win the election.
b. He did, really, win the election.
c. He did really win the election. (E.g. in a context where S says (2), A doubts it and S then insists.)

(48) Does John drink?
No epistemic implicature necessary.

(49) Does John really drink?
Negative epistemic implicature: The speaker believed or at least expected that John does not drink.

This interpretive difference can be witnessed when we insert the two types of sentences in epistemically unbiased contexts, like (50) and (51). We see that, whereas regular positive questions are felicitous in epistemically unbiased contexts, the corresponding *really*-questions are odd as they necessarily carry a negative epistemic bias:

(50) A: Jorge just visited Birgit and Jorn's newborn boy.
S: Did he bring a present for him?
S': # Did he really bring a present for him?

(51) A: Jens and Claudi are moving to Pliezhausen.
S: Why are they moving there? Do they have relatives there?
S': # Why are they moving there? Do they really have relatives there?

In contexts with an explicit negative epistemic bias, instead, positive *really*-questions are appropriate.

(52) A: The baby got lots of presents.
S: From whom?
A: From Tobi, from Simone, from Jorge, ...
S: Did Jorge really bring a present for the baby? I thought he wouldn't have time to buy anything.

(53) A: Jens and Claudi will be fine in Alaska. They have friends and relatives in the region that can help them with the moving.
S: Do they really have relatives there? I thought all their family lived in Alabama.

---

(4) a. En realidad, ellos ganaron las elecciones.
In reality, they won the elections
'In-actuality' reading: 'They (did) really win the elections.'

b. De verdad que ellos ganaron las elecciones.
Of truth that they won the elections
VERUM reading: 'They really (did) win the elections'

Let us take a closer look at the epistemic operator *really* or VERUM. As a first approximation, consider the run-of-the-mill epistemic operator denotation in (54), where x is a free variable whose value is contextually identified with the addressee (or with the individual sum of the addressee and the speaker) in our examples:

(54) $[\![VERUM_i]\!]^{gx/i} = [\![really_i]\!]^{gx/i} = [\![be\ sure]\!]([\![i]\!])^{gx/i}) =$
$\lambda p_{<s,t>} \lambda w. \forall w' \in Epi_x(w)[p(w') = 1]$

The function defined in (54) is the correct denotation for straightforward epistemic expressions like *be sure*, *be certain* or epistemic *must*. But note that, though *really* or VERUM is often epistemically flavored, it is not interchangeable with pure epistemic expressions like *be sure*. For example, *be sure* in (55a) asserts certainty about the speaker's own inner sensations, which is a bit odd (as if the speaker could be confused about that); (55b), instead, is perfectly fine, and the presence of *really* simply emphasizes or insists that the addressee should take the proposition as true:

(55) a. ? I am sure I am tired.

b. I really am tired.

A similar case is (56). With *be sure*, (56a) could be an information question to find out whether the addressee is entirely certain about his plan p (="that the addressee will stay in bed all day while everybody else works"). The question with *really* in (56b), instead, sounds more like a criticism or a ultimatum and seems to ask whether the addressee is certain that he wants p to be accepted as true by the speaker, with the consequences that that may have:

(56) a. Are you sure you are gonna stay in bed all day while everybody else works?

b. Are you really gonna stay in bed all day while everybody else works?[14]

The difference between a purely epistemic operator and *really* or VERUM also surfaces in law court scenarios. After a witness' assertion, it is often relevant to check the degree of

[14] Ladd's example with preposed negation (1) has the same flavor:

(1) Aren't you gonna lift a finger to help? (Ladd 1981, ex. 10)

certainty of that witness' assertion without conveying any disbelief. This can be achieved using the pure epistemic expression *be sure* but not using *really*. In (57S), the lawyer uses *be sure* to have 100% certainty about the speaker's testimony. In (57S'), instead, the use of *really* suggests doubts about p and cannot be an epistemically unbiased way of seeking certainty.

(57) S: Mr. Beans, did you see anybody leave the house after 11pm the night of the crime?
A: Yes. S: Who did you see? A: I saw Mrs. Rumpel.
S: This is important, Mr. Beans. Are you sure that you saw Mrs. Rumpel leave the house that night?
S': This is important, Mr. Beans. Did you really see Mrs. Rumpel leave the house that night? [15]

The intuition arising from these examples is that *really* or VERUM is used not to assert that the speaker is entirely certain about the truth of p, but to assert that the speaker is *certain* that he *wants* p to be *added to the Common Ground* (CG). That is, rather than a purely epistemic, *really* or VERUM is a conversational epistemic operator. This intuition is modeled in the definition (58), abbreviated as 'FOR-SURE-CG$_x$', where $Bou_x(w')$ is the set of worlds where x's desires in w' are fulfilled, and where $CG_{w''}$ is the Common Ground or set of propositions that the speakers assume in w'' to be true (Stalnaker, 1978; Roberts, 1996).

(58) $[\![VERUM_i]\!]^{gx/i} = [\![really_i]\!]^{gx/i} =$
$\lambda p_{<s,t>} \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[p \in CG_{w''}]]$
= FOR-SURE-CG$_x$

[15] Preposed negation *yn*-questions pattern, again, like *really* or VERUM in law court scenarios:

(1) S: The butler wasn't in the dining room when the crime happened. Is there some guest, Mr. Beans, that also wasn't in the room at the time of the crime?
A: Yes. Mrs. Rumpel wasn't in the room.
S: This is important, Mr. Beans. Are you sure Mrs. Rumpel (also) wasn't in the room at the time of the crime?
S': This is important, Mr. Beans. Wasn't Mrs. Rumpel (also) in the room at the time of the crime?

3.2 VERUM, unbalanced partitions and the existence of an epistemic implicature

We saw that *yn*-questions with conversational epistemic *really* necessarily convey a previous epistemic bias of the speaker, whereas regular *yn*-questions do not. To see where this interpretive difference stems from, let us look at the denotations of the two types of questions.

In a regular *yn*-question like (60), the only operator is the Q-morpheme, repeated in (59). The semantic computation yields the denotation in (60d). Following Groenendijk and Stokhof (1984), question denotations can be viewed as inducing a partition on the Context Set or set of background worlds resulting from intersecting the propositions in the Common Ground. The partition corresponding to (60d) is sketched in (61):

(59) $[\![Q]\!] = \lambda p_{<s,t>} \lambda w_s \lambda q_{<s,t>} \, [q = p \;\; \vee \;\; q = \neg p]$

(60) a. Does John drink?

b. LF: [$_{CP}$ Q [John drinks]]

c. $[\![John\ drinks]\!] = \lambda w.\ John\ drink\ in\ w$

d. $[\![Q\ John\ drinks]\!](w_o)$
= $\lambda q\ [q = \lambda w.\ John\ drinks\ in\ w \;\; \vee \;\; q = \lambda w.\ \neg(John\ drinks\ in\ w)]$
= {"that John drinks", "that John doesn't drink"}

(61)

p	$\neg p$

Now, let us add the contribution of *really* or VERUM to obtain the corresponding *really*-question. The resulting semantic computation and partition are as follows:

(62) a. Does John really drink?

b. LF: [$_{CP}$ Q VERUM [$_{IP}$ John drinks]]

c. $[\![CP]\!](w_o)$
= $\lambda q\ [q = \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.drink(j)(w''') \in CG_{w''}]] \vee$
$q = \lambda w.\ \neg\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.drink(j)(w''') \in CG_{w''}]]]$
= {"it is for sure that it is desirable to add to CG that John drinks",
"it is not for sure that it is desirable to add to CG that John drinks" }

(63)

FOR-SURE-CG$_x$ p	$\neg$ FOR-SURE-CG$_x$ p

Let us compare the two resulting partitions.[16] The regular *yn*-question yields a balanced partition between p and $\neg p$, whereas the *really*-question results in an unbalanced partition where the choice is between absolute certainty about adding p to CG (the FOR-SURE-CG p cell) and any other degree of certainty (the $\neg$ FOR-SURE-CG p cell). The questions then are: Why is the balanced partition adequate in the unbiased contexts (50)-(51)? And why is the unbalanced partition inappropriate in those unbiased contexts and acceptable in the biased contexts (52)-(53)?

These questions are easily answered once we accept some commonly assumed principles about the dynamics of the conversation and the epistemic states of the speakers. First, a speaker's epistemic state consists of propositions with different degrees of certainty (cf. probabilistic epistemic models in Gärdenfors (1988)). For example, an epistemic state may include propositions like "for a fact, p" (when the speaker has direct evidence for p), "must p" (when the speaker has indirect evidence for p), "probably p", "possibly p", etc.

Second, Grice (1975)'s Maxim of Quality does not require direct evidence for p, but (at least) indirect evidence for p, as stated in (64) (Landman (1986):60). In other words, speakers often assert propositions that they assume true in the view of indirect evidence, e.g., because they heard it for some trustworthy speaker, they read it in a science book or they inferred it from a set of premises that they have indirect evidence for. The requirement to assert only propositions that one has direct evidence for would simply be too strong.

[16] If we assume the lexical entry for the Q-morpheme in (1), the denotations of *Does John drink?* and *Does John really drink?* are as follows:

(1) $[\![Q]\!] = \lambda p_{<s,t>} \lambda w_s \lambda q_{<s,t>} [q = p]$

(2) a. Does John drink?
b. $[\![John\ drinks]\!] = \lambda w.\ John\ drink\ in\ w$
c. $[\![Q\ John\ drinks]\!](w_o) = \lambda q\ [q = \lambda w.\ John\ drinks\ in\ w\ ]$ = {"that John drinks"}

(3) a. Does John really drink?
b. $[\![CP]\!](w_o)$
$= \lambda q\ [q = \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.drink(j)(w''') \in CG_{w''}]]]$
= {"that it is for sure that it is desirable to add to our CG that John drinks" }

Then, to obtain the right semantics for these questions when embedded under *know*, we can take Heim (1994)'s generalized Karttunen-analysis and assume the following meaning for *know*:

(4) $[\![know]\!](w)(R_{<s,<st,t>>})(x)$ = 1 iff x believes $\lambda w'[R(w') = R(w)]$ in w

Finally, if we assume that the speech act of asking a question R is roughly equivalent to an imperative speech act of the shape CAUSE-that-I-know-R, we obtain the same partitions for the questions *Does John drink?* and *Does John really drink?* as in the text.

(64) Maxim of Quality: Say p only if you have at least indirect evidence that p is true.

Third and finally, we assume the following two conversational "moves". The first move is assertion. Assertion of p is the instruction to add p to the Common Ground (e.g. as in Roberts (1996)) and it is governed by the Maxim of Quality. The second move is to question a move. For example, one of the speakers can question the instruction to add p to the Common Ground. We propose that this second, meta-conversational type of move is subject to an economy constraint:

(65) Principle of Economy: Do not use a meta-conversational move unless necessary (to ensure Quality or to resolve epistemic conflict).

Now we can return to our questions.

Why is the balanced partition with the cells p and $\neg p$ suitable in a context where the speaker has no previous epistemic bias about p? The balanced partition is an invitation to the addressee to assert p or to assert $\neg p$. In other words, this partition is a plan to add p to the CG if the addressee asserts p and to add $\neg p$ to CG if the addressee chooses to assert $\neg p$. This plan is compatible with the speaker not having a previous bias towards p or $\neg p$.

Why is the unbalanced partition with the cells FOR-SURE-CG$_x$ p and $\neg$ FOR-SURE-CG$_x$ p appropriate in epistemically biased contexts? This partition asks whether the addressee is sure that it is desirable to make a move and add p to the CG or not. This question is relevant in a contradiction scenario: if the speaker had a previous belief concerning the truth or falsity of p and the addressee's utterance contradicted it, it is relevant to question the appropriateness of adding p to the CG. The question is also relevant in a suggestion scenario: if the speaker believes in the truth or falsity of p, but she does not have enough (direct or indirect) evidence to assert it directly, she can raise the question of whether it is desirable to make this addition or not.

Why is the unbalanced partition with the cells FOR-SURE-CG$_x$ p and $\neg$ FOR-SURE-CG$_x$ p inappropriate in contexts with no previous bias? The unbalanced partition would be unjustified –and, hence, uneconomical and inappropriate– in a context where the speaker has no previous epistemic bias about p or $\neg p$. For, if the addressee uttered p or $\neg p$, the unbiased speaker would have no reason not to execute the instruction of adding p or $\neg p$ to the CG, and no contradiction scenario would arise. And, in suggestion contexts, if p was relevant to the conversation but the speaker was completely unbiased between p and $\neg p$, the balanced partition would be the correct and most economical move.

In sum, balanced partitions are a strategy to initiate two possible moves, whereas unbalanced partitions question the appropriateness of a particular move and are subject to the Economy Principle in (65). In unbiased contexts, there is no justification for questioning a move, and so unbalanced partitions are uneconomical and infelicitous and balanced partitions are economical and felicitous. In epistemically biased contexts, unbalanced partitions posit relevant questions about a particular move and are, thus, acceptable.

3.3 VERUM arising from Polarity Focus

A similar VERUM operator has been claimed to arise in declaratives in certain cases of focal stress on polarity elements (see Höhle (1992), though he leaves VERUM undefined). Focus stress on the auxiliary (or main verb) or on negation has often a contrastive function with some previous element of the same semantic type. E.g., in (66), *DID* (= "to happen in actuality") contrast with *WANted* (= "to happen in somebody's desire worlds"). Also, *NOT* in (67) simply contrasts with the positive polarity of the previous clause. But, sometimes, polarity focus in declaratives is interpreted as Verum Focus (Höhle (1992)), where the function of the phonological stress is to emphasize or insist on the truth or falsity of the proposition, as illustrated in (68)-(69):

(66) SUsan WANted to go to the Himalaya, EON-suk DID.

(67) Everybody who finishes on TIme will get a PRIce, and everybody who does NOT finish on time will get one POINT off.

(68) A: Peter doesn't think Kimiko went to the Himalaya.
S: She DID go to the Himalaya.

(69) A: Everybody believes the kids will finish on time.
S: They will NOT finish on time.

If we apply our denotation of VERUM in (70a) to (68), we obtain the denotation in (71), which seems adequate. Similarly, we can define a negative version of VERUM as the contribution of Verum Focus in *NOT* –as in (70b)– and obtain the truth conditions in (72) for (69).

(70) a. $[\![VERUM_i]\!]^{g_x/i} = [\![really_i]\!]^{g_x/i} =$
$\lambda p_{<s,t>} \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[p \in CG_{w''}]]$

= FOR-SURE-CG$_x$

b. $[\![NOT_i]\!]$ = $\lambda p_{<s,t>} \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\neg p \in CG_{w''}]]$
= FOR-SURE-CG-NOT$_x$

(71) a. She DID go to the Himalaya.

b. LF: [$_{CP}$ Q VERUM [$_{IP}$ she went to the Himalaya]]

c. $[\![CP]\!]$
= $\lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''. go(h)(k)(w''') \in CG_{w''}]]$
= "it is for sure that it is desirable to add to CG that Kimiko went to the Himalaya"

(72) a. They will NOT finish on time.

b. LF: [$_{CP}$ Q FOR-SURE-CG-NOT [$_{IP}$ they will finish on time]]

c. $[\![CP]\!]$
= $\lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''. \neg finish(thekids)(w''') \in CG_{w''}]]$
= "it is for sure that it is desirable to add to CG that it is not the case that the kids will finish on time"

It seems, hence, plausible to assume that Verum Focus –i.e., polarity focus whose intuitive effect is to insist on the truth of the proposition– stands for the same operator VERUM that we defined in the previous subsection. If so, then the existence of a VERUM interpretation of polarity focal stress makes the following prediction in our account. If polarity stress can signal the presence of VERUM, polarity stress in *yn*-questions is predicted to be able to trigger the existence of an epistemic implicature. Note that this is a uni-directional prediction: *yn*-questions with polarity stress can –but do not need to– give rise to an epistemic implicature. In contrast contexts, e.g. (73) and (74), of course, no such epistemic bias needs to arise. The prediction is that there will be contexts where polarity focal stress cannot be licensed as anything else than VERUM and, then, the epistemic implicature will necessarily arise.[17]

[17]Focus on the (positive) auxiliary does not give rise to the implicature if it simply marks that the question is being re-asked, as in (1) (Creswell (2000) on *dictum* focus):

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

(73) Eon-suk CAN speak French but DOES she?

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

This prediction is borne out. Witness (75) and (77). Example (75) gives us a potentially epistemically unbiased context. The speaker can be unbiased if no polarity stress is placed on the verb *study* (or if *study* simply contrasts with *cheat*), as in (75S). But, if we add a heavy stress on *STUDY*, as in (75S'), or on the auxiliary, as in (76), the implicature arises that the speaker believed or expected that Tom did not study for the class.

(75) A: Tom got an A in Ling106.
S: Did he study for that class? Or did he simply cheat in the exam?
S': Did he STUDY for that class?

(76) A: After all the studying she did, Tom got an A in Ling106.
S': DID he study for that class?

The same contrast obtains between the unstressed (77S) –no implicature– and the polarity stressed (77S') –with implicature:

(77) A: Buy some more non-alcoholic beverages for the grilling. Hubert is coming.
S: Does he not drink beer? 'Cause I also have some beer.
S': Does he NOT drink beer?

We compute the denotations and partitions for *Did he STUDY for that class?* and *Does he NOT drink beer?* in (75) and (77) respectively. In the first case, focus on *STUDY* provides the VERUM operator. This results in the denotation in (78) and unbalanced partition in (79). As before, this unbalanced partition, asking for a fine-grained degree of certainty, is appropriate if the speaker had a previous belief about p or $\neg p$ and inappropriate if the speaker was unbiased. Note that exactly the same partition and epistemic effect would arise if VERUM was spelled out as *really*, as in *Did he really study for that class?*.

(78) a. Did he STUDY for that class?

b. LF: [$_{CP}$ Q VERUM [$_{IP}$ he studied for that class]]

c. $[\![CP]\!](w_o)$
= $\lambda q\,[q = \lambda w.\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.study(t)(w''') \in CG_{w''}]] \vee$
$q = \lambda w.\,\neg\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.study(t)(w''') \in CG_{w''}]]]$
= {"it is for sure that it is desirable to add to CG that Tom studied for that class",
"it is not for sure that it is desirable to add to CG that Tom studied for that class" }

(79) | FOR-SURE-CG$_x$ p | | $\neg$ FOR-SURE-CG$_x$ p |

In *Does he NOT drink beer?*, focus on *NOT* signals the presence of the negative VERUM operator, that is, of "FOR-SURE-CG-NOT$_x$" defined in (70b). This gives the denotation and unbalanced partition below in (80) and (81). Again, since the unbalanced partition asks for the degree of certainty about a proposition (FOR-SURE-CG-NOT$_x$ p is truth-conditionally equivalent to FOR-SURE-CG$_x$ $\neg p$), the partition is only suitable if the speaker had a previous epistemic bias about p or $\neg p$. Note that the same partition and epistemic bias obtain if VERUM is spelled out lexically rather than phonologically, as in *Does he really not drink beer?*.

(80) a. Does he NOT drink beer?
b. LF: [$_{CP}$ Q NOT [$_{IP}$ he drinks beer]]
c. $[\![CP]\!](w_o)$
= $\lambda q\,[q = \lambda w.\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.\neg drink(b)(h)(w''') \in CG_{w''}]] \vee$
$q = \lambda w.\,\neg\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.\neg drink(b)(h)(w''') \in CG_{w''}]]]$
= {"it is for sure that it is desirable to add to the CG that it is not the case that Hubert drinks beer",
"it is not for sure that it is desirable to add to the CG that it is not the case that Hubert drinks beer" }

(81) | FOR-SURE-CG-NOT$_x$ p | | $\neg$ FOR-SURE-CG-NOT$_x$ p |

Note, as an important aside, that the discussion in this subsection allows us now to make sharper our original claim about non-preposed negation *yn*-questions in Generalization 1.

We saw that *yn*-questions with non-preposed negation can be epistemically unbiased, but we did not exclude the possibility that, given some special circumstances, they may give rise to an epistemic implicature as well. In this subsection, we have seen two such circumstances: Verum Focus and the addition of *really* necessarily trigger an epistemic bias in non-preposed negation *yn*-questions. There may be other means –possibly unrelated to VERUM– to convey an epistemic implicature as well (e.g., a particular sequence of pitch accents (see Pierrehumbert and Hirschberg (1990)), or the final intonational curve conveying some attitude of the speaker (see Bartels (1999) and Gunlogson (2001)), to name two possibilities). But it seems correct to assume that, in non-preposed *yn*-questions with neutral intonation and without an element signaling VERUM, no implicature arises. We modify our Generalization 1 accordingly (though this revision does not affect the arguments in this paper):

(82) GENERALIZATION 1 (revised):
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, *when they have normal intonation and no element signaling VERUM, do not carry this epistemic implicature.*

3.4 VERUM arising from negation preposing in yn-questions

We have seen that VERUM arising from the lexical item *really* and VERUM arising from polarity focus trigger the existence of an epistemic implicature. We have defined VERUM as a conversational epistemic operator that, once added to a *yn*-question, induces an unbalanced partition unsuited for epistemically unbiased contexts and adequate for biased scenarios. If we now assume that VERUM arises from the preposing of negation in *yn*-questions too, we can derive the existence of an epistemic implicature in preposed negation *yn*-questions in exactly the same way: an unbalanced partition arising from VERUM in preposed negation asks for a fine degree of certainty and is, thus, felicitous only if a previous epistemic bias exists. Hence, we propose to assume (83) as our working hypothesis. With this assumption, question (i) from the introduction receives the answer below:

(83) ASSUMPTION:

Negation preposing in *yn*-questions necessarily contributes an epistemic operator VERUM.

i QUESTION:
Why does preposed negation force the *existence* of an epistemic implicature, whereas non-preposed negation does not necessarily trigger it?

i'. ANSWER:
Yn-questions with preposed negation necessarily have VERUM, whereas *yn*-questions with non-preposed negation may or may not have VERUM (depending on polarity focus stress and presence/absence of *really*). *Yn*-questions with VERUM result in partitions where the degree of certainty about a proposition is at issue. They are elicited only when the speaker had a previous belief about that proposition but – given some counterevidence implied by the addressee or given the speaker's own doubts– the speaker wants to check the appropriateness of adding (one of) the proposition(s) involved to the Common Ground. *Yn*-questions with normal intonation without VERUM result in simple partitions with the equivalence classes p and $\neg p$. They are elicited when the speaker had no previous significant belief about p or $\neg p$.

In the next section, we will show how the assumption (83) also helps us explain Ladd's intuitive ambiguity between p- and $\neg p$-readings in preposed negation *yn*-questions. This is question (ii) from the introduction. The semantic computation and partition for preposed negation questions will be also spelled out in the next section.

But, before turning to Ladd's ambiguity, let us remind the reader that, so far, we have only derived the *existence* of an epistemic implicature from the presence of VERUM. We have not yet tackled the content or *polarity* of this implicature. That is, we have motivated that positive *really*-questions have an implicature, but we have not derived that the implicature is $\neg p$. And, similarly, though we provided a hypothesis for the existence of an epistemic implicature in *yn*-questions with preposed negation, it still needs to be explained why that implicature is p, both in PPI- and in NPI-questions. This part of the enterprise, formulated in question (iii) from the introduction, belongs to section 5.

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

Recall the examples (7) and (8), repeated here as (84) and (85). They illustrate Ladd (1981)'s observation that *yn*-questions with preposed negation are, in principle, ambiguous between a p-reading and a $\neg p$-reading, and that the two readings are disambiguated by the presence of PPIs and NPIs respectively:

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

(85) 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**?

Furthermore, we saw that the $p/\neg p$ ambiguity in negative *yn*-questions is dependent on the existence of an epistemic implicature. We concluded this in view of examples with low negation like (45), repeated below in (86). Here the PPI forces a p-reading and this, in turn, forces the existence of an epistemic implicature, making the sentence feel like an archaic rendering of *Isn't she coming too?*.

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

These facts gave rise to our question (ii):

ii. Why are preposed negation questions —more generally, negative *yn*-questions with an epistemic implicature– ambiguous? In other words, what property of preposed negation correlated with the existence of an epistemic implicature interacts with the rest of the elements in the sentence to derive Ladd's p-question / $\neg p$-question ambiguity formally and its correlation with PPIs vs. NPIs?

In this section, we will show that, if we assume that negation preposing in *yn*-questions contributes a VERUM operator, Ladd's $p/\neg p$ ambiguity and its disambiguation in PPI-/NPI-questions can be derived as simple scope ambiguity between VERUM and negation. That is, assuming VERUM, we have the answer to question (ii): the presence of VERUM

is responsible both for the existence of an epistemic implicature -as we saw in section 3– and for the $p/\neg p$ ambiguity –as we will see in the present section.

There are three main interacting components in *yn*-questions with preposed negation: (i) the question operator Q present in *yn*-questions in general; (ii) negation present in negative *yn*-questions; and, by hypothesis, (iii) VERUM, which we have assumed is necessarily present in preposed negation *yn*-questions.

The Q-morpheme or Q-operator is the outermost operator in *yn*-questions. Its denotation, repeated below, is a function that 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.[18]

(87) $[\![Q]\!] = \lambda p_{<s,t>} \lambda w_s \lambda q_{<s,t>} [q = p \vee q = \neg p]$

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: $[\![not]\!]$ or $[\![n't]\!]$ takes a proposition and yields its complement, as indicated in (88).

(88) $[\![not]\!] = [\![n't]\!] = \lambda p_{<s,t>}.\neg p$

The final element present in *yn*-questions with preposed negation is the VERUM operator, repeated here:

(89) $[\![VERUM_i]\!]^{gx/i} = [\![really_i]\!]^{gx/i} =$
$\lambda p_{<s,t>} \lambda w. \forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[p \in CG_{w''}]]$
= FOR-SURE-CG$_x$

Out of these three operators, *yn*-questions with non-preposed negation have Q and negation. Unless they contain the conversational epistemic adverb *really* or Verum Focus (or perhaps some other means to signal VERUM), they do not contain the operator VERUM. The semantic computation for a *yn*-question with non-preposed negation is illustrated in (90). Note that the resulting partition in (91) is a balanced partition with the cells p and $\neg p$. Such partition is felicitous in contexts when the speaker has no epistemic bias, as argued in section 3. This is what we want, since non-preposed negation questions with normal intonation that do not have an element signaling VERUM (polarity stress or *really*) and that do not have any archaic flavor do not give rise to an epistemic implicature.

[18] See footnote 5 and 16 for a relevant alternative to this denotation.

(90) a. Is Jane not coming?

b. LF: [$_{CP}$ Q [not [Jane is not coming]]]

c. $[\![Jane\ is\ coming]\!]$ = $\lambda w.\ Jane\ is\ coming\ in\ w$

d. $[\![not\ [Jane\ is\ coming]]\!]$ = $\lambda w.\ \neg(Jane\ is\ coming\ in\ w)$

e. $[\![Q\ Jane\ is\ not\ coming]\!](w_o)$
= $\lambda q\,[q = \lambda w.\ \neg(Jane\ is\ coming\ in\ w)\ \vee\ q = \lambda w.\ \neg\neg(Jane\ is\ coming\ in\ w)]$
= {"that Jane is not coming", "that Jane is coming"}

(91)

p	$\neg p$

Yn-questions with preposed negation have Q, negation and, by hypothesis, VERUM. Given these three operators, we propose to explain Ladd's ambiguity as a scopal ambiguity between negation and the VERUM operator: negation scopes over VERUM in PPI-questions, whereas VERUM scopes over negation in NPI-questions. Note that the 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 (92) are given in (93) (ignoring the presupposition contributed by *either*). The question denotation is schematically rendered as a partition in (94), taking $\neg p$ to be "Jane is not coming".

(92) 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?

(93) a. Isn't Jane coming either?

b. LF: [$_{CP}$ Q VERUM$_F$ [not [$_{IP}$ Jane is coming] either]]

c. $[\![CP]\!](w_o)$
= $\lambda q\ [q = \lambda w.\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.\neg come(j)(w''') \in CG_{w''}]]\ \vee$
$q = \lambda w.\ \neg\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.\neg come(j)(w''') \in CG_{w''}]]]$
= {"it is for sure that it is desirable to add to CG that Jane is not coming",
"it is not for sure that it is desirable to add to CG that Jane is not coming" }

(94) NPI-question partition:

FOR-SURE-CG$_x$ $\neg p$	$\neg$ FOR-SURE-CG$_x$ $\neg p$

The resulting denotation and partition allow us to characterize formally the intuitions about the NPI-question presented in the introduction and in section 2.2. First, the NPI-question is a **biased question** with an epistemic implicature. This is reflected in the shape of the partition: we obtain an unbalanced partition, with the *FOR-SURE-CG* option in one cell and all the other degrees of certainty about the move in the other cell. The second intuition is that the NPI-question is a double-checking question about $\neg p$, that is, that it has the $\neg p$**-question reading**. This is clearly captured in the partition, where $\neg p$ is the argument of the epistemic operator. Finally, since the double-checked proposition is a negative proposition, **NPIs** are acceptable, and PPIs (under the immediate scope of negation) are not acceptable (Ladusaw, 1980; Progovac, 1994). This contrast is illustrated in (97)-(96) for declaratives below:

(95) a. John did not talk to anyone.

b. John did not talk to someone. ??/* $\neg\exists$

(96) a. John has not yet arrived.

b. * John has not already arrived. (* unless meta-linguistic negation)

(97) 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 (98) (ignoring again the presupposition contributed by *too*) are given in (99). The outcoming partition is schematically given in (100), where p is taken to be "that Jane is coming".

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

(99) a. Isn't Jane coming too?

b. LF: [$_{CP}$ Q not [VERUM$_F$ [$_{IP}$ Jane is coming too]]]

c. $[\![CP]\!](w_0)$

= $\lambda q\ [q = \lambda w.\forall w' \neg \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.come(j)(w''') \in CG_{w''}]] \vee$

$q = \lambda w.\ \neg\neg\forall w' \in Epi_x(w)[\forall w'' \in Bou_x(w')[\lambda w'''.come(j)(w''') \in CG_{w''}]]]$

= {"it is not for sure that it is desirable to add to CG that Jane is coming",

"it is for sure that it is desirable to add to CG that Jane is coming" }

(100) PPI-question partition:

FOR-SURE-CG$_x$ p	$\neg$ FOR-SURE-CG$_x$ p

As before, this is not a balanced partition for a regular question, but an unbalanced partition for a **biased** question with an epistemic implicature: the *FOR-SURE-CG* option is in one cell, and all the other epistemic degrees 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 Ladd's intuitive p/$\neg p$ ambiguity corresponds to two truth-conditionally different readings. Finally, since the operator VERUM intervenes between negation and the content of the IP, **PPIs** are licensed within the IP whereas NPIs are not. PPIs are licensed insofar as clausemate negation does not take scope immediately over them (Ladusaw, 1980; Progovac, 1994). As for NPIs, no operator should intervene at LF between an NPI and its licensor (Linebarger, 1980; Linebarger, 1987). These two points are illustrated for declaratives in (101). The PPI *would rather* in (101a) is licensed if negation scopes over the CAUSE operator at LF and not immediately over the PPI (and illicit otherwise). In contrast, the NPI *budge an inch* is not licensed when negation scopes above CAUSE at LF and not immediately over the NPI (and it is licit if immediate scope obtains).

(101) a. George wouldn't rather go because you are there.

*"George wouldn't rather go, and that is because you are there."

q CAUSES $\neg p$

"It's not because you were there that he would rather go; it's because ..."

$\neg(q$ CAUSES $p)$

b. George didn't budge an inch because you were there.

"George didn't budge an inch, and that is because you were there."

q CAUSES $\neg p$

*"It's not because you were there that he budged an inch; it's because ..."
$\neg(q$ CAUSES $p)$

The same pattern is attested for the pair *either*/*too* in declaratives, as illustrated in (102). When adjoined to an IP or VP denoting a positive proposition, the NPI *either* is ungrammatical, as in (102a), whereas the PPI *too* is acceptable, as in (102b).[19]

(102) a. * It is not certain [that Jane is coming either].

b. It is not certain [that Jane is coming too].

In sum, once we assume the presence of a VERUM operator provided by the preposing of negation, we can formally account for Ladd's $p/\neg p$ ambiguity, its correlation with PPIs vs. NPIs, and its dependence on the existence of an epistemic implicature. Our question (ii) from the introduction, repeated here, receives the following answer:

ii. Why are preposed negation questions —more generally, negative *yn*-questions with an epistemic implicature– ambiguous? In other words, what property of preposed negation correlated with the existence of an epistemic implicature interacts with the rest of the elements in the sentence to derive Ladd's p-question / $\neg p$-question ambiguity formally?

ii'. A necessary ingredient for the $p/\neg p$ ambiguity is VERUM, which we saw triggers the existence of an epistemic implicature. Ladd's intuitive $p/\neg p$ ambiguity is genuine scope ambiguity between negation and VERUM. The p-reading arises when negation scopes over VERUM; in this LF, PPIs are licensed under VERUM while NPIs are not, given that VERUM intervenes between them and negation (Linebarger (1980)'s intervention effect). The $\neg p$-reading arises when VERUM scopes over negation; in

[19]The (un)grammaticality of the NPI/PPI in (102) is independent of whether negation and the NPI/PPI are in the same clause or not. It equally obtains in (1), where all the relevant elements are clausemates:

(1) 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)

this LF, PPIs are deviant under the immediate scope of negation whereas NPIs are licit (Ladusaw, 1980; Progovac, 1994).[20]

Before concluding this section, let us briefly recall other *yn*-questions that we saw include VERUM: positive *yn*-questions with *really* or with Verum Focus, and negative *yn*-questions with non-preposed focused *NOT*. Although they have VERUM and the corresponding epistemic implicature, they do not display the $p/\neg p$ ambiguity, as the examples (103)-(106) show. This is expected under our account. If the reader has the patience to go back to their LFs and semantic denotations in section 3, he will notice that, besides VERUM for positive questions and negative VERUM for questions with *NOT*, there is no negation that VERUM can interact with. Hence, the $p/\neg p$ ambiguity does not obtain.[21]

[20]The 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 with Verum Focus: in (1), VERUM scopes over negation, and, in (2), negation scopes over VERUM.

(1) a. A: Karl hat bestimmt nicht gelogen.
Karl has for-sure not lied.
"Karl surely didn't lie."

b. B: Karl HAT nicht gelogen.
Karl HAS not lied.
"It is **true** that Karl did**n't** lie."

(2) a. A: Ich hoffe, dass Karl ihr zuhoert.
I hope, that Karl her-DAT listens.
"I hope that Karl listens to her."

b. 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."

[21]The question arises what happens if we have a *yn*-question with *really* and negation, e.g., *Is Jane really not coming?*. Do *really* (=VERUM) and negation interact here to yield the $p/\neg p$ ambiguity? The answer is 'no'. As (1)-(2) show, the only reading available is the $\neg p$-reading, that is, the only possible scope is the surface scope: VERUM over negation.

(1) A: Pat already came, but we still have to wait for Jane.
S: * Is Jane really not coming too?

(2) A: Pat is not coming. And we don't need to wait for Jane either...
S: Is Jane really not coming either?

We do not know why scope is rigid when VERUM and negation are spelled out as different words in English. But note that a comparable scope freezing effect also arises in German declaratives when Verum Focus is spelled out more distant from negation, in C^0 rather than in V^0. While negation can scope over VERUM spelled out in V^0 –as in example (3), repeated from footnote 20–, negation cannot scope over the more distant VERUM in C^0, as shown in (4). We leave the reasons that trigger scope rigidity between VERUM and negation for future research.

(103) A: Pat already came, but we still have to wait for Jane.
S: Is Jane really coming too?

(104) A: Pat is not coming. And we don't need to wait for Jane either.
S: * Is Jane really coming either?

(105) A: Pat already came, but we still have to wait for Jane.
S: * Is Jane NOT coming too?

(106) A: Pat is not coming. And we don't need to wait for Jane...
S: Is Jane NOT coming either?

5 The Polarity of the Epistemic Implicature

In all the cases examined in this paper, the polarity of the question and the polarity of the epistemic implicature are opposite. Preposed negation *yn*-questions –no matter whether they are PPI-questions with the p-reading or NPI-questions with the $\neg p$-reading– have a positive epistemic implicature (section 2). Positive *yn*-questions with *really* or Verum Focus give rise to a negative epistemic implicature (section 3). And negative *yn*-questions with non-preposed (Verum-)focused *NOT* trigger a positive implicature (section 3). This raises our third question:

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

---

(3) a. A: Ich hoffe, dass Karl ihr zuhoert.
I hope, that Karl her-DAT listens.
"I hope that Karl listens to her."

b. S: 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."

(4) a. A: Ich hoffe, dass Karl ihr zuhoert.
I hope, that Karl her-DAT listens.
"I hope that Karl listens to her."

b. # S: Aber Hanna denkt, DASS er ihr nicht zuhhoert.
But Hanna thinks, THAT he her-DAT not PART-listens
#"But Hanna thinks that it is **true** that he does **not** listen to her."

Furthermore, there is a difference between PPI-questions and NPI-questions that has not yet received an explanation. As we saw in section 2, PPI-questions can be used in non-contradiction scenarios to suggest p as the answer to an (implicit) *wh*-question, whereas NPI-questions cannot be used in a similar way to suggest the answer $\neg p$. This gives rise to our final question:

ii-bis. Why are PPI-questions suitable in suggestion contexts for p whereas NPI-questions cannot be used in suggestion contexts for $\neg p$?

These two questions are addressed in the present section at the same time. First, beyond the standard denotations for *yn*-questions, the "intent" of a question will be shown to be a necessary factor to determine the overall meaning (truth-conditions and felicity) of *yn*-questions in general. Second, a few general assumptions about epistemic states and Gricean principles will be made explicit. Third, the notion of "intent", combined with these general epistemic and conversational assumptions, will be applied to preposed negation *yn*-questions. Next, we will extend the analysis to positive *yn*-questions with *really* and Verum Focus. And, finally, we will account for negative *yn*-questions with *NOT*.

5.1 The "intent" of a yn-question

Let us consider preposed negation *yn*-questions. In this case, question (iii) can be reformulated in the following way. Both PPI-questions and NPI-questions carry the positive epistemic implicature p, as seen in (107)-(108). Given this, 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 (107), she is double-checking her original belief. When the speaker asks the NPI-question about $\neg p$ in (108), she is double-checking the addressee'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?

(107) A: Ok, now that Stephan has come, we are all here. Let's go!
S: Isn't Jane coming too?
Positive epistemic implicature: The speaker believed or expected that Jane is coming.

(108) 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?
Positive epistemic implicature: The speaker believed or expected that Jane is coming.

If we assume the semantics and partitions in the last sections, 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 (109) and (110). If we forge an account to derive the speaker's epistemic implicature p from the mathematical object that constitutes the PPI partition (110), wouldn't that account wrongly derive the epistemic implicature $\neg p$ for the parallel NPI partition in (109)? Even more dramatically, take the positive *yn*-question *Is Jane really coming?*, with VERUM coming from the lexical item *really*. Its partition, repeated under (111), is *exactly* the same mathematical object that we have for the PPI-question in (110). But, contrary to the PPI-question, the positive question *Is Jane really coming?* has the *negative* epistemic implicature $\neg p$ and not the positive epistemic implicature p.

(109) NPI-question partition: *Isn't Jane coming either?*

FOR-SURE-CG$_x$ $\neg p$	$\neg$ FOR-SURE-CG$_x$ $\neg p$

(110) PPI-question partition: *Isn't Jane coming too?*

FOR-SURE-CG$_x$ p	$\neg$ FOR-SURE-CG$_x$ p

(111) *Really*-question partition: *Is Jane really coming (too)?*

FOR-SURE-CG$_x$ p	$\neg$ FOR-SURE-CG$_x$ p

The problem here is that the question denotations and partitions that we have compositionally derived are not enough to characterize the complete meaning of these questions. In fact, this problem does not concern preposed negation questions and their implicatures only, but *yn*-questions in general. Bolinger (1978) noted that *yn*-questions are not the same as alternative questions with *or not*; that is, he noted that the complete meaning (truth conditions and felicity) of a *yn*-question cannot be characterized by the same dual partition generated by an alternative question with *or not*. As Bolinger's examples (112)-(113) show, *yn*-questions and alternative questions are not interchangeable. In (112), a request can be

formulated with a *yn*-question but not with an alternative question. In (113), to suggest a possible answer for a *wh*-question, the speaker can use a *yn*-question but not an alternative question:

(112) Request:

a. Will you help me?

b. # Will you help me or not?

(113) Suggested answer for a *wh*-question:

a. What's the matter? Are you tired?

b. # What's the matter? Are you tired or not?

Bolinger (1978)'s point can be extended to a related contrast: a *yn*-question "pronouncing" one cell of the partition is not equivalent to a *yn*-question "pronouncing" the other cell of the same partition. This is illustrated for requests in (114)-(115). If the speaker wants to make a request for help, she will use the positive (114a) but not the negative (114b). If she wants to make the request that the cup remain in her reach, she will ask the negative but not the positive *yn*-question in (115):

(114) Request for help:

a. Will you (please) help me?

b. # Will you (please) not help me?

(115) Request from a short person :

a. Will you (please) not put that cup too high in the cupboard?

b. # Will you (please) put that cup high in the cupboard?

The same distinction obtains for *yn*-questions functioning as suggested answer for a *wh*-question:

(116) Suggested answer for a *wh*-question:

a. What's the matter? Why aren't you working? Are you tired?

b. # What's the matter? Why aren't you working? Are you not tired?

(117) Suggested answer for a *wh*-question:

a. Why wasn't he working? Was he not feeling well?

b. # Why wasn't he working? Was he feeling well?

Yet another context where the pronunciation choice makes a difference occurs when it is made explicit which of the two propositions or cells the speaker is interested in pursuing a conversation about, with possible follow-up questions:

(118) Scenario: Speaker and Addressee know that, every morning, Carlos drinks either coffee or tea. The speaker has no previous bias about which of the two Carlos drank this morning. The speaker is interested in studying coffee consume and its effects on people, and she does not care about tea.

a. Back to my coffee study... Did Carlos drink coffee this morning? And, if so, how much?

b. # Back to my coffee study... Did Carlos drink tea this morning? And, if not, how much coffee (did he drink)?

In sum, the standard denotations and partitions cannot characterize completely, by themselves, the meaning and felicity conditions of *yn*-questions in general. When a speaker wants to make a request r, a suggestion r or she simply is interested in talking about r, the *yn*-question must be spelled out by pronouncing the r cell of the partition.

It is beyond the aim of this paper to give a formal account of Bolinger's observation and of the pronunciation choice in *yn*-questions in general. The difference between asking r*?* instead of r *or not?*, or between asking r*?* instead of *not* r*?* may be strictly semantic or may be pragmatic in nature. We will remain agnostic about this issue.[22] What is important for the purposes of this paper is that the pronunciation choice is a crucial ingredient –through the semantic denotation or through pragmatics– for the overall meaning (truth-conditions and felicity) of a *yn*-question. That is, independently of whether the regular *yn*-questions *Are you tired?* and *Are you not tired?* have the same denotation and partition or not, the "intent" of the two questions in (116) is different: *Are you tired?* suggests the proposition "that you are tired" as a possible answer to a *wh*-question, whereas *Are you not tired?*

[22] To build the difference in the semantics, we need the lexical entry for the Q-morpheme given in footnotes 5 and 16 and a theory that maps the new question denotations into conversational moves and possible derived speech acts. To implement the difference in the pragmatics, we need the standard entry for the Q-morpheme, the notion of Topic applied to propositions, and a theory where question denotations and Topic interact to yield conversational moves and possible derived speech acts.

suggests the proposition "that you are not tired" as such answer. Similarly, the questions *Did Carlos drink coffee this morning?* and *Did Carlos drink tea this morning?* have a different "intent" in (118): the former introduces (or continues) the conversation topic of "drinking coffee", which is further pursued in the follow-up question *How much coffee?*; the latter oddly introduces the topic of "drinking tea" into the conversation, which is not part of the announced topic (in *Back to my coffee study...*) nor is pursued by follow-up questions. We will talk about the "intent" of a question to refer to the combination of its semantic denotation and whatever the pronunciation choice adds to it, without committing ourselves to a semantic or pragmatic implementation of it.

5.2 Epistemic States and Conversational Principles

Before we go back to our epistemically biased questions, let us briefly summarize the principles governing epistemic states and conversation exchange that we will use in interaction with the "intent" of *yn*-questions.

As indicated in subsection 3.2, we assume that a conversationalist's epistemic state consists of a set of propositions with different degrees of certainty. The degree of certainty of each proposition is not gratuitous, but motivated by the amount of evidence accumulated within the epistemic state in support of that proposition, as roughly indicated in (119). We also assume that epistemic states are consistent, that is, that they do not contain nor entail contradictory propositions and that (120) holds:

(119) a. A conversationalist C believes *For a fact* p iff C has direct evidence for p.

b. A conversationalist C believes *Must* p iff C has at least indirect evidence for p and no evidence against p.

c. A conversationalist C believes *Probably* p iff C has much more evidence for p than against p.

d. A conversationalist C believes *Likely* p iff C has more evidence for p than against p.

e. ...

(120) r is evidence for p iff r is evidence against $\neg p$.

As for Gricean conversational principles, we will use the following:

(121) Maxim of Quality: Say p only if you have at least indirect evidence that p is true.

(122) Maxim of Quantity: Make your contribution as informative as is required (for the current purposes of the exchange).

5.3 The Polarity of the Implicature in Yn-Questions with Preposed Negation

Let us now go back to *yn*-questions with preposed negation. We saw that the PPI- and the NPI-question 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 *Isn't Jane coming either?* in (123), with the LF in (124b) and the partition in (125), where the pronounced cell is highlighted in by a double line.

(123) 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?
Positive epistemic implicature: The speaker believed or expected that Jane is coming.

(124) a. Isn't Jane coming either?

b. LF: [$_{CP}$ Q VERUM$_F$ [not [$_{IP}$ Jane is coming] either]]

(125) NPI-question partition and pronounced cell:

FOR-SURE-CG$_x$ $\neg p$	$\neg$ FOR-SURE-CG$_x$ $\neg p$

Given that the FOR-SURE-CG$_x$ $\neg p$ cell is the pronounced cell, the "intent" of the question is concerned with the proposition "that you are certain that you want to add to CG that Jane is not coming". Commonly, the certainty about the appropriateness of adding a proposition to CG depends on the certainty or conclusive evidence that the speakers have for the proposition at issue. Hence, the "intent" of the question is concerned with the proposition "that you have complete evidence for $\neg p$". Finally, if the "intent" introduces the topic "you

have complete evidence about $\neg p$" to pursue in some possible follow-up questions, the "intent" of the question can be paraphrased as follows: "Do you have **complete evidence for** $\neg p$? And, if so, what evidence?", or "Can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?". This is indicated in (126).

(126) Intent of the NPI-question:
"Are you certain that it is desirable to add to CG that Jane is not coming?", or
"Do you have **complete evidence for** $\neg p$? And, if so, what evidence?", or
"Can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?"

Now, we can see how this intent meshes with contradiction scenarios, where the speaker had an original belief and the addressee's utterance contradicted her belief. We see in (127a) 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 (127b):

(127) Intent of NPI-question and contradiction scenario:

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 information–that would make me **conclude** $\neg p$?

That is, if the intent of the question is to ask the addressee to provide conclusive evidence (if he has it) for $\neg p$, $\neg p$ must be the addressee's implied proposition and p cannot be the addressee's implied proposition. Simply put, the addressee cannot possibly provide conclusive evidence for $\neg p$ if he uttered and, thus (by Maxim of Quality), believed p.[23] Being able to provide conclusive evidence for $\neg p$ requires, in a coherent epistemic state, to believe $\neg p$ and to not believe p. Hence, for the "intent" of the question to be felicitous, the addressee's implied proposition must be $\neg p$ and it cannot be p. This in turn means that the speaker's original epistemic bias that conflicted with the addressee's proposition must be p and not $\neg p$. Therefore, the NPI-question has the positive epistemic implicature that the speaker believed p.

[23] Sketch of a proof: A uttered p. By Quality, A believes *For a fact* p or *Must* p. By (119b), A has at least sufficient indirect evidence for p and no evidence against p. By (120), A does not have evidence for $\neg p$. Hence, A does not have conclusive evidence for $\neg p$.

Let us now turn to the PPI-question in (128), with the LF in (129b) and partition in (130). This time, the pronounced cell –with a double line– is the opposite one:

(128) A: Ok, now that Stephan has come, we are all here. Let's go!
S: Isn't Jane coming too?
Positive epistemic implicature: The speaker believed or expected that Jane is coming.

(129) a. Isn't Jane coming too?

b. LF: [$_{CP}$ Q not [VERUM$_F$ [$_{IP}$ Jane is coming] too]]

(130) PPI partition and pronounced cell:

FOR-SURE-CG$_x$ p	¬ FOR-SURE-CG$_x$ p

Since the pronounced cell is the ¬ FOR-SURE-CG$_x$ p cell, the intent of the question is concerned with pursuing the topic "lack of complete certainty about p" or "possible (weak or strong) doubts about p". The paraphrase of the intent of the question is given in (131):

(131) Intent of the PPI-question:
"Are you not sure that it is desirable to add to CG that Jane is coming?", or
"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?"

Again, the intent gives us the right result in (132): it is compatible with the speaker believing p and the addressee implying $\neg p$, but not vice-versa:

(132) Intent of PPI-question and contradiction scenario:

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?

Since the intent of the question is to ask the addressee to provide reasons –if any– to doubt p, $\neg p$ must be the addressee's implied proposition and p must be the original belief of the speaker, and not vice-versa. If the speaker believed p and the addressee implied $\neg p$, the

addressee can be expected to provide evidence to doubt p that is new to the speaker and useful to resolve the contradiction. In contrast, the opposite assignment of beliefs makes the "intent" of the question infelicitous. If, contrary to fact, the speaker believed $\neg p$ to a high degree, the speaker would already have evidence to doubt p. The addressee could not possibly provide further evidence for doubting p if he uttered and, thus (by Maxim of Quality), believed p. That is, assuming that the addressee has a coherent epistemic state, if the addressee had substantial reasons to doubt p (other than not being 100% sure), then, by the Maxim of Quality, he would not have uttered or implied p to begin with.[24] This means that, under this assignment of beliefs, the addressee cannot possibly be expected to provide more convincing evidence to doubt p than the evidence the speaker already has, and, thus, that the "intent" of the question is infelicitous. Hence, the speaker believed p and the addressee implied $\neg p$. Therefore, PPI-questions have the positive epistemic implicature that the speaker believed p.

In sum, in contradiction scenarios, the speaker can ask the addressee to provide evidence to conclude the addressee's proposition or to doubt the speaker's proposition. But, assuming that the addressee has a coherent epistemic state and that he obeys the Maxim of Quality, the speaker cannot ask the addressee to provide evidence to conclude the speaker's proposition nor to doubt the addressee's proposition. This derives the positive epistemic implicature p for both NPI- and PPI-questions.

Our account of the polarity of the epistemic implicature based on the intent of the question also explains why PPI-questions are possible in "suggestion" contexts without contradiction while NPI-questions are not, as we saw in section 2.2. For example, (39), repeated as (133), shows that a PPI-question can be used felicitously to suggest the answer p (="Frege has already reviewed for us") to the implicit question "Which senior reviewers have experience with our regulations?". The example (40) (repeated as (134)) shows that an NPI-question cannot be used to suggest the answer $\neg p$ (="Frege has not reviewed for us yet") to the parallel question "Which senior reviewers are new for our journal?".

(133) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody who has experience with our regulations.

[24] Sketch of proof: A uttered or implied p. By Quality, A believes at least *Must* p. By (119b), A has sufficient indirect evidence for p and no evidence against it, that is, A has no evidence to doubt p. Hence, the only reason to doubt p that A can offer is her possible lack of 100% certainty for p.

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

(134) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody new.
S:# Hasn't Frege reviewed for us yet? He'd be a good one.

In these "suggestion" without contradiction scenarios, the addressee posits (implicitly or explicitly) a *wh*-question R. Since the addressee does not provide any partial answer to R himself, by Quantity, the speaker is entitled to infer that the addressee does not know any answer to R, that is, that, for all possible answers p to R, the addressee's epistemic state does not entail p.[25] Once we combine this conversational inference with the intents of the PPI- and NPI-questions, we obtain the following pattern. The intent of the PPI-question is consistent with the conversational assumptions, as shown in (135), whereas the intent of the NPI-questions is inconsistent with them, as displayed in (136):

(135) Intent of PPI-question and suggestion scenario:
Given that I assume p, that you do not know any answer to R and that p is a possible answer to R, can you provide information –and, if so, what information– that would make me **doubt** p?

(136) Intent of NPI-question and suggestion scenario:
Given that I assume p, that you do not know any answer to R and that $\neg p$ is a possible answer to R, can you provide information –and, if so, what information– that would make me **conclude** $\neg p$?

Note that the assumption that the addressee does not know any answer to R does not preclude that, for some possible answer p to R, the addressee's epistemic state entails the negation of p or at least contains reasons to doubt p. Thus, the PPI-question, whose intent is to ask for reasons to doubt the possible answer p, if any, is compatible with the premises of the conversation. But, the assumption that the addressee does not know any answer to R

[25] Here we use the notion of Answer1 from Heim (1994):

(1) a. $[\![[wh\ 1_e\ Q\ \phi]]\!]^g(w_0) = \lambda p[\ \exists x_e[p(w_0) = 1\ \wedge\ p = [\![\phi]\!]^{g^{x/1}}]\ ]$
b. Answer1$(R)(p)(w_0) = 1$ iff $p\ \in\ R(w_0)$

does preclude the possibility that, for some possible answer $\neg p$ to R, the addressee's epistemic state entails $\neg p$. In other words, if it is conversationally assumed that the addressee does not know any answer to R, then it is also assumed that the addressee does not have conclusive evidence for the truth of any possible answer $\neg p$. This gives us, in sum, the desired result: PPI-questions asking for doubts about a possible answer to R are appropriate in suggestion contexts, whereas NPI-questions asking for conclusive evidence for a possible answer to R are inconsistent with the conversational assumptions.

Furthermore, the PPI-question in a suggestion scenario is only compatible with the speaker's epistemic implicature p and not with the epistemic implicature $\neg p$. The "intent" of the question, refined in (137) (with irrelevant parts within parentheses), is to suggest that p be added to the Common Ground unless the addressee has reasons to doubt p. This is a licit suggestion if the speaker endorses p, but it violates the spirit of the Maxim of Quality if the speaker believes $\neg p$.

(137) Intent of PPI-question and suggestion scenario:

a. Given that I assume p, (that you do not know any answer to R and that p is a possible answer to R,) can you provide information –and, if so, what information– that would make me **doubt** p and thus would **prevent us from adding** p **to CG**?

b. # Given that I assume $\neg p$, (that you do not know any answer to R and that p is a possible answer to R,) can you provide information –and, if so, what information– that would make me **doubt** p and thus would **prevent us from adding** p **to CG**?

In sum, the "intent" of the PPI-question and of the NPI-question determines, together with the general epistemic and conversational principles stated in subsection 5.2, the positive polarity of the implicature and the (un)acceptability in "suggestions" contexts. [26]

[26] Our account based on the intent of the question can be used to explain another difference between PPI- and NPI-questions. In contradiction contexts, both PPI- and NPI-questions are acceptable. However, a subtle difference in the attitude of the speaker sometimes arises in relation to the on-going information exchange. Compare the two questions in (1). The PPI-question (1b) can convey several attitudes of the speaker, ranging from strong convincement about her original belief p to genuine puzzlement and indecision between her original belief p and the addressee's implied proposition $\neg p$. The NPI-question (1a) ranges from indecision between p and $\neg p$ to almost acceptance of the addressee's proposition $\neg p$. That is, although the two questions overlap on the possible attitudes of the speaker and are, hence, hard to distinguish many times, they are "tilted" towards opposite ends and can sometimes convey very different attitudes.

5.4 The Polarity of the Implicature in Positive Biased Yn-Questions

Let us now consider the polarity of the epistemic implicature in positive biased questions with *really* or with Verum Focus stress, like *Is Jane really coming?* in (138) or *Did he STUDY for that class?* in (139). Here we will only illustrate it for the *really*-question.

(138) A: Pat already came, but we still have to wait for Jane.
S: Is Jane really coming?

(139) A: Tom got an A in Ling106.
S': Did he STUDY for that class?

Is Jane really coming? has the LF in (140) and the partition in (141). We noted that the PPI-partition (130) and this partition are exactly the same mathematical object. Crucially, although the two partitions are the same, the pronounced cells are opposite. The PPI-question pronounces the $\neg$ FOR-SURE-CG$_x$ p cell, whereas the *really*-question pronounces the FOR-SURE-CG$_x$ p cell. This choice makes the intent of the two questions completely different: the PPI-question asks for reasons to doubt p, whereas the positive question asks for reasons to conclude that p, as specified in (142):

(140) a. Is Jane really coming?
b. LF: [$_{CP}$ Q VERUM$_F$ [$_{IP}$ Jane is coming]]

(141) *Really*-question partition and pronounced cell:

FOR-SURE-CG$_x$ p	$\neg$ FOR-SURE-CG$_x$ p

(142) Intent of *really*-question:
"Are you certain that it is desirable to add to CG that Jane is coming?", or
"Do you have **complete evidence** that p?", or

(1) A: This is the new poetic anthology of the 70s. 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 70s?
b. Didn't she write some poetry in the 70s?

This potential difference in the speaker's attitude can be captured by our account based on the intent of the question. The NPI-question in (1a), asking for conclusive evidence for the addressee' proposition $\neg p$, may be used when the speaker is seriously considering switching to $\neg p$. The PPI-question (1b), asking for any doubt about her previous belief p, can convey that the speaker is still entertaining or pondering her original belief p.

"Can you provide information –and, if so, what information– that would make me **conclude** p?"

As a result, as shown in (143), the intent of the positive question is compatible with the speaker's belief $\neg p$ and with the addressee's proposition p in contradiction scenarios, and not vice-versa. This is the opposite pattern from the one obtained for the PPI-question.

(143) Intent of *really*-question and contradiction scenario:

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** 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 **conclude** p?

By the same reasoning used for NPI-questions, the addressee can be expected to possibly provide conclusive evidence for p if he uttered p but not if he uttered and, hence (by Quality), believed $\neg p$. This, in turn, means that the speaker's belief is $\neg p$. Therefore, *yn*-questions with *really* have a *negative* epistemic implicature: the speaker believed or expected that $\neg p$.

Our account predicts that positive biased *yn*-questions cannot be used felicitously in suggestion contexts without any contradiction. This is due to the same reasoning that precludes the suggestion use for NPI-questions: the speaker cannot ask whether the addressee has conclusive evidence for p if p is a possible answer to the question R and it is assumed that the addressee does not know any possible answer to R.

(144) Intent of *really*-question and suggestion scenario:

Given that I assume $\neg p$, that you do not know any answer to R and that p is a possible answer to R, can you provide information –and, if so, what information– that would make me **conclude** p?

The prediction is correct. As illustrated in (145), *Has Frege really reviewed for us already?* cannot be used to suggest that Frege has already reviewed for us and that the paper be sent to Frege in a suggestion without contradiction context.

(145) Dialog between two editors of a relatively new journal:

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

S: # Has Frege really reviewed for us already? He'd be a good one.

5.5 The Polarity of the Implicature in Negative Yn-Questions with NOT

Finally, we address why negative *yn*-questions with polarity focus on *NOT* have the positive epistemic implicature p. Take the example in (146).

(146) A: Pat is not coming. And we don't need to wait for Jane...
S: Is Jane NOT coming either?

Is Jane NOT coming? has the LF in (147) and the partition in (148). This partition and the pronounced cell are the same as in the NPI-question, as in (125).

(147) a. Is Jane NOT coming either?

b. LF: [$_{CP}$ Q VERUM$_F$ [not [$_{IP}$ Jane is coming] either]]

(148) NPI-question partition and pronounced cell:

FOR-SURE-CG$_x$ $\neg p$	$\neg$ FOR-SURE-CG$_x$ $\neg p$

We can now take the same reasoning that we used to account for the positive polarity of the epistemic implicature in the NPI-question *Isn't Jane coming either?* and apply it here. By pronouncing the FOR-SURE-CG$_x$ $\neg p$ cell, the topic that the intent of the question brings in is "complete or conclusive evidence for $\neg p$". This intent is paraphrased in (126), repeated here below.

(149) Intent of NOT-question:
"Are you certain that it is desirable to add to CG that Jane is not coming?", or
"Do you have **complete evidence** for $\neg p$? And, if so, what evidence?", or
"Can you provide information –and, if so, what information–that would make me **conclude** $\neg p$?"

As with the NPI-questions, the intent of *Is Jane NOT coming?* is compatible with the speaker's belief p and with the addressee's proposition $\neg p$ and not vice-versa, as illustrated in (127), repeated below as (150). Hence, the question has the positive epistemic implicature p.

(150) Intent of *NOT*-question and contradiction scenario:

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 information–that would make me **conclude** $\neg p$?

Further, our analysis predicts that non-preposed negation with Verum Focus on *NOT* cannot be used in a suggestion context, for the same reason that NPI-questions cannot, as seen in (136), repeated below. That is, the speaker cannot ask the addressee for conclusive evidence for a possible answer $\neg p$ to question R if the addressee is not supposed to know any answer to R. Our prediction is borne out, as illustrated in (152).

(151) Intent of *NOT*-question and suggestion scenario:
Given that I assume p, that you do not know any answer to Q and that $\neg p$ is a possible answer to Q, can you provide information –and, if so, what information– that would make me **conclude** $\neg p$?

(152) Dialog between two editors of a relatively new journal:
A: I'd like to send this paper out to a senior reviewer, but I'd prefer somebody new who has not yet reviewed for us.
S:# Has Frege NOT reviewed for us yet? He'd be a good one.[27]

5.6 Summary

In this section, we have outlined an account of the polarity of the epistemic implicature in *yn*-questions with preposed negation, in positive *yn*-questions with *really* or Verum Focus, and in negative *yn*-questions with non-preposed (Verum-)focused *NOT*. A crucial observation, which can be traced back to Bolinger (1978), is that the standard denotations and dual partitions for *yn*-questions are not sufficient to characterize completely the meaning and felicity conditions of *yn*-questions in general. A necessary ingredient to their overall meaning is related to the pronunciation choice, that is, to which cell of the partition is pronounced in uttering the question. We refer to the combination of the standard denotation of a question plus whatever its pronunciation choice contributes as the "intent" of that question.

We have proposed that the opposite polarity pattern between the implicature and the question is determined by the interplay between the "intent" of the question and general

[27](152S) cannot be used in this suggestion scenario if the (heavy) focus on *NOT* is understood as contributing VERUM. That is, (152S) cannot at the same time carry the epistemic implicature p and be used as a suggestion.

conversational principles. In a nutshell, our question (iii) from the introduction receives the answer below:

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

iii'. The "intent" of the question interacts with general conversational principles to allow only for certain distribution of beliefs between the speakers. When the intent of a question is to ask the addressee for conclusive evidence for a proposition p, that proposition p is the addressee's implied proposition and the complement proposition $\neg p$ is the epistemic implicature of the speaker. When the intent of a question is to ask the addressee for any possible (weak or strong) doubts about a proposition p, p is the original belief of the speaker and its complement $\neg p$ is the addressee's proposition. This idea, combined with polarity of the "double-checked" proposition, yields the correct implicature pattern. PPI-questions ask the addressee for any doubt about p, and, hence, p is the speaker's original belief. NPI-questions and *NOT*-questions ask the addressee for conclusive evidence for $\neg p$; thus, the complement proposition p is the content of the speaker's epistemic implicature. Finally, *really*-questions and positive *yn*-questions with Verum Focus ask the addressee for conclusive evidence for p; in consequence, the complement proposition $\neg p$ is the original belief of the speaker. In sum, in all cases, the polarity in the question and the polarity in the implicature are opposite.

Furthermore, we have used the "intent" of the question to explain why PPI-questions are suitable in suggestion contexts without contradiction whereas NPI-questions are not. We have proposed the answer to question (ii-bis) stated below:

ii-bis. Why are PPI-questions suitable in suggestion contexts for p whereas NPI-questions cannot be used in suggestion contexts for $\neg p$?

ii-bis'. If the addressee posits a question R in search of a suggestion, the speaker infers that the addressee does not know any answer to R. A PPI-question, whose intent is to ask the addressee for any doubt about the possible answer p, is compatible with this conversational assumption. An NPI-question, whose intent is to ask the addressee for

complete evidence for the possible answer $\neg p$, is inconsistent with this conversational assumption. More generally, *yn*-questions whose intent is to ask the addressee for complete evidence are not suitable in suggestion contexts without contradiction.

6 Concluding Remarks

We started the present paper by proposing to entertain the following assumption: that preposing of negation in *yn*-questions contributes a VERUM operator. VERUM, often spelled out with the lexical item *really* or with polarity focus in English declarative and interrogative sentences, has been defined as a conversational epistemic operator. Roughly, VERUM p means "it is certain that it is desirable to add p to Common Ground (CG)".

With the assumption that negation preposing contributes VERUM in *yn*-questions, we have shown that a wide range of otherwise puzzling facts follow concerning preposed negation *yn*-questions and other comparable questions.

First, preposed negation *yn*-questions necessarily carry an epistemic implicature, whereas *yn*-questions with non-preposed negation do not. We showed that a *yn*-question with VERUM returns an unbalanced partition where the degree of certainty about the appropriateness of a given conversational move (e.g. adding p to CG) is at issue. Such questions are subject to an economy constraint and are elicited only if a fine-grained degree of certainty is at stake, e.g., when the speaker had a previous belief and the addressee contradicted her, or when the speaker had a previous belief but she is not sure enough to simply assert it. Such questions are uneconomical and, hence, inappropriate in contexts where the speaker had no previous epistemic bias and where the issue of the certainty about a given move does not arise. This derives the fact that *yn*-question with VERUM (spelled out with *really*, with Verum Focus or, by hypothesis, with negation preposing) imply the *existence* of an epistemic implicature on the speaker's side.

Second, Ladd (1981) observed that preposed negation *yn*-questions are ambiguous between a p-reading and a $\neg p$-reading. The presence of VERUM explains this $p/\neg p$ ambiguity as scope ambiguity between VERUM and negation. The correlation of the two readings with the presence of PPIs vs. NPIs follows from the standard licensing conditions of PPIs and NPIs.

Third, in all *yn*-questions with an epistemic implicature, the polarity of the implicature and the polarity of the question are opposite. We saw that the "intent" of questions with

VERUM interacts with general conversational principles to determine the distribution of beliefs between the speakers. Given a contradiction between speaker and addressee, the speaker can ask the addressee to provide conclusive evidence for p only if the addressee endorses p and the speaker believes $\neg p$. In the same contradiction context, the speaker can ask the addressee for any possible doubts about p only if the addressee believes $\neg p$ and the speaker maintains p. This, combined with the polarity of the proposition under VERUM, gives us the correct polarity of the implicature for all the questions at issue: the polarity of the implicature and the polarity of the question are always opposite.

Fourth and finally, the "intent" of a question, together with general conversational principles, derives the use of PPI-questions as suggestions in context without contradiction. It precludes the use of NPI-questions, *really*-questions and *NOT*-questions as suggestions.

In sum, all these facts follow if we assume that preposed negation in *yn*-questions necessarily contributes the operator VERUM. It remains an open question why preposed negation should contribute VERUM while non-preposed negation does not (unless focused). Although we do not have an answer to this question, we would like to point out that the peculiar property associated with preposed negation discussed in this paper is not restricted to *yn*-questions, but is also attested in declaratives with neg-inversion. Witness the pattern in (153) and (154):

(153) a. Never has John lied.

b. John never lied.

(154) a. Never would Mary reveal the secret.

b. Mary would never reveal the secret.

The (a) examples in (153-154) carry the similar kind of VERUM as in preposed negation *yn*-questions. They can be paraphrased as *It is for sure that it is desirable to add to CG that John never lied* and *It is for sure that it is desirable to add to CG that Mary would never reveal the secret.* In contrast, (b) examples in (153-154) do not carry VERUM and lack this conversational emphasis (unless *never* is focused), just as in non-preposed negative *yn*-questions.

We can relate the different behavior of preposed and non-preposed negative elements to the difference in discourse function between forms with canonical and non-canonical order, which is a pervasive phenomenon in language. That is, languages in general associate

a fixed discourse function with sentences with non-canonical order, such as scrambling in Korean and Japanese, left-dislocation, topicalization, VP fronting in English, and focus movement in Yiddish and Hungarian (Kiss, 1981; Prince, 1984; Ward, 1988; Prince, 1998; Prince, 1999; Choi, 1999). On the other hand, discourse functions of sentences with canonical order are more flexible, allowing for usage in a wider range of discourse contexts. We think that the different behavior of negative elements in preposed vs. canonical position is part of a much wider phenomenon having to do with how languages in general associate non-canonical syntactic forms with particular discourse functions. When a negative element is preposed, this non-canonical syntactic structure has the fixed function of contributing VERUM. But, when it occupies its canonical position, it doesn't contribute VERUM, unless polarity focus is involved. This state of affairs in turn implies that, in the syntactic environments where the grammar does not allow for the non-canonical order, the canonical order should be ambiguous or, at least, vague. This is exactly what we find in embedded negative *yn*-questions as in (155). The embedded question in (155) can be understood as reporting / pondering the unbiased question *Is Jane not coming?* or the biased question *Isn't Jane coming?*.

(155) Sue asked me / I wonder whether Jane isn't coming.

Taking all these facts together, it is not surprising that preposed negation in *yn*-questions is associated with a specific discourse function, namely signaling VERUM, which in turn restricts the use of preposed negation *yn*-questions in the ways explained in this paper.

References

Alexiadou, Artemis and Elena Anagnostopoulou. 1998. Parametrizing Agr: word order, V-movement and EPP-checking. *Natural Language and Linguistic Theory*, 16:491–539.

Bartels, Christine. 1999. *Intonation of English Statements and Questions*. Garland Publishing, New York.

Bolinger, Dwight. 1978. Yes-no questions are not alternative questions. In H. Hiz, editor, *Questions*. Reidel, Dordrecht, pages 87–105.

Büring, Daniel and Christine Gunlogson. 2000. Aren't positive and negative polar questions the same? ms. UCSC.

Choi, Hye-Won. 1999. *Optimizing Structure in Context: Scrambling and Information Structure*. CSLI, Stanford.

Creswell, Cassandre. 2000. The discourse function of verum focus in wh-questions. In *Proceedings of North Eastern Linguistics Society*, volume 30. GLSA.

Ellegård, Alvar. 1953. *The Auxiliary Do: the Establishment and Regulation of its Use in English*, volume II of *Gothenburg Studies in English*. Göteborg, Stockholm, Almqvist, Wiksell.

Gärdenfors, Peter. 1988. *Knowledge in Flux*. The MIT Press, Cambridge, London.

Grice, H. P. 1975. Logic and conversation. In P. Cole and J. L. Morgan, editors, *Speech Acts*, volume III of *Syntax and Semantics*. Academic Press, NY, pages 41–58.

Groenendijk, Jeroen and Martin Stokhof. 1984. *Studies in the Semantics of Questions and the Pragmatics of Answers*. Ph.D. thesis, University of Amsterdam.

Gunlogson, Christine. 2001. *True to Form: Rising and Falling Declaratives as Questions in English*. Ph.D. thesis, UC Santa Cruz.

Hamblin, C. L. 1973. Questions in montague grammar. *Foundations of Language*, 10:41–53.

Han, Chung-hye. 1998. Deriving the interpretation of rhetorical questions. In Emily Curis, James Lyle, and Gabriel Webster, editors, *Proceedings of West Coast Conference in Formal Linguistics*, volume 16, pages 237–253, Stanford. CSLI.

Han, Chung-hye. 1999. *The Structure and Interpretation of Imperatives: Mood and Force in Universal Grammar*. Ph.D. thesis, University of Pennsylvania.

Heim, Irene. 1994. Interrogative semantics and Karttunen's semantics for *know*. In *Proceedings of the Israeli Association for Theoretical Linguistics*.

Höhle, T. 1992. Ueber verum fokus in deutschen. *Linguistische Berichte*.

Karttunen, Lauri. 1977. Syntax and semantics of questions. *Linguistics and Philosophy*, 1:3–44.

Kiss, K. É. 1981. Structural relations in hungarian, a 'free' word order language. *Linguistic Inquiry*, 12:185–213.

Ladd, Robert D. 1981. A first look at the semantics and pragmatics of negative questions and tag questions. In *Papers from the Seventeenth Regional Meeting of the Chicago Linguistic Society*. Chicago Linguistics Society, pages 164–171.

Ladusaw, William. 1980. *Polarity Sensitivity as Inherent Scope Relations*. Outstanding Dissertations in Linguistics. Garland Publishing, New York.

Landman, Fred. 1986. *Towards a theory of Information. The Status of Partial Objects in Semantics*. Foris, Dordrecht.

Linebarger, Marcia C. 1980. *The Grammar of Negative Polarity*. Ph.D. thesis, MIT.

Linebarger, Marcia C. 1987. Negative polarity and grammatical representation. *Linguistics and Philosophy*, 10(3):325–387.

Pierrehumbert, Janet and Julia Hirschberg. 1990. The meaning of intonational contours in the interpretation of discourse. In Jerry Morgan Philip R. Cohen and Martha E. Pollack, editors, *Intentions in Communications*. MIT Press, pages 271–311.

Prince, Ellen. 1984. Topicalization and left-dislocation: a functional analysis. In S. J. White and V. Teller, editors, *Discourses in reading and linguistics*, volume 433 of *Annals of the New York Academy of Sciences*. New York Academy of Sciences, NY, pages 213–25.

Prince, Ellen. 1998. On the limits of syntax, with reference to topicalization and left-dislocation. In P Culicover and L Mcnally, editors, *The Limits of Syntax*. Academic Press, NY, pages 281–302.

Prince, Ellen. 1999. How not to mark topics: 'topicalization' in english and yiddish. ms. University of Pennsylvania.

Progovac, Ljiljana. 1994. *Negative and Positive Polarity: a Binding Approach*. Cambridge Studies in Linguistics. Cambridge University Press, Cambridge.

Roberts, Craige. 1996. Information structure in discourse: Towards an integrated formal theory of pragmatics. In J.H. Yoon and Andreas Kathol, editors, *OSU Working Papers in Linguistics 49: Papers in Semantics*. Ohio State University, Dept. of Linguistics, pages 91–136.

Stalnaker, Robert C. 1978. Assertion. In Peter Cole, editor, *Pragmatics*, volume 9 of *Syntax and Semantics*. Academic Press, New York, pages 315–322.

Suñer, Margarita. 1994. V-movement and the licensing of argumental wh-phrase in spanish. *Natural Language and Linguistic Theory*, 12:335–372.

Ward, Gregory. 1988. *The Semantics and Pragmatics of Preposing*. Garland Publishing, Inc., New York, London. 1985 Univ. of Pennsylvania Ph.D. Disserattion.