On Negative *Yes/No* Questions *

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

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

Abstract. Preposed negation *yes/no (yn)*-questions like *Doesn't John drink?* necessarily carry the implicature that the speaker thinks John drinks, whereas non-preposed negation *yn*-questions like *Does John not drink?* do not necessarily trigger this implicature. Furthermore, preposed negation *yn*-questions have a reading "double-checking" p and a reading "double-checking" $\neg p$, as in *Isn't Jane coming too?* and in *Isn't Jane coming either?* respectively. We present other *yn*-questions that raise parallel implicatures and argue that, in all the cases, the presence of an epistemic conversational operator VERUM derives the existence and content of the implicature as well as the $p/\neg p$-ambiguity.

Keywords: *yes/no*-question, negation, preposed negation, verum, epistemic implicature, epistemic bias.

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. 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.

* 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, Bill Ladusaw, Mark Liberman, Bill Poser, Ellen Prince, Beatrice Santorini, Uli Sauerland, Mark Steedman, Arnim von Stechow, Hubert Truckenbrodt, Alexander Williams, Henk Zeevat, and the audiences of Sinn und Bedeutung 6, Department of Linguistics at Standford, UBC and Tübingen, the Penn-Tübingen meeting, and SALT 12. We would also like to thank the anonymous reviewers for their helpful comments. 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.

© 2003 *Kluwer Academic Publishers. Printed in the Netherlands.*

(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 question, whereas (3S') necessarily conveys an epistemic bias of the speaker.[2] The resulting generalization is stated in (4).

(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) 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) (see also Ladusaw (1980)), a *yn*-question with preposed negation *Aux+n't* p*?* like (5) is 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 (5) an item requiring a positive clause (*too* or a Positive Polarity Item) or an item requiring a negative clause (*either* or a Negative Polarity Item), as illustrated in (6) and in (7). We will call positive items like *too*, *some* and *already* PIs for short, and negative items like *either*, NPI *any* and *yet* NIs.

(5) Isn't Jane coming?

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

S: Isn't Jane coming too?

(7) 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 phonologists in the program.

S: Isn't Jane coming either?

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

The speaker in (6) is trying to confirm or "double-check" the positive proposition p (="that Jane is coming") and presupposes the truth of a parallel *affirmative* proposition ("that Pat is coming"). In (7), the speaker wants instead to double-check $\neg p$ (="that Jane is not coming") and 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 positive items "PI-questions" and *yn*-questions with preposed negation and negative items "NI-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 PI-question and in the NI-question. In the PI-question (6), 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 NI-question (7), the speaker also started with the expectation that p but, after A's utterance, she is trying to double-check the proposition $\neg p$ implied by A.

Ladd's $p/\neg p$ intuitive ambiguity constitutes Generalization 2:

(8) 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 PI versus an NI disambiguates the question towards the p-question reading and 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 PI-questions and in NI-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: the preposing of negation in *yn*-questions contributes an extra epistemic operator VERUM (comparable to Höhle's (1992) 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 (9), the answers to the questions (i)-(iii) are as follows:

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

i'. *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 a genuine scopal ambiguity between negation and the VERUM operator. In PI-questions, with the p-question reading, negation scopes over VERUM. In NI-questions, with the $\neg p$-question reading, VERUM scopes over negation.

iii'. The LFs for the PI-question and the NI-question interact with the general semantics and pragmatics of *yn*-questions to derive the *positive* content p of the epistemic implicature. In the NI-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 PI-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 $\neg p$.

The 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 addresses question (i). It is shown how the presence of the operator VERUM in *yn*-questions in general –often contributed by *really* or by stress on the polarity– triggers the existence of an epistemic implicature. Section 4 answers question (ii). Here, VERUM is used to characterize formally Ladd's intuitive ambiguity. Section 5, which tackles question (iii), derives the right polarity pattern for the epistemic implicatures. Section 6 concludes.

2. Characterization of the data

2.1. CHARACTERIZATION OF THE DATA FOR GENERALIZATION 1

Questions with non-preposed negation can be as epistemically unbiased as regular positive *yn*-questions. Take examples (10) and (11), which present

epistemically unbiased scenarios. In (10), the unbiased speaker asks the positive question *Is Jane coming?* simply because she is interested in Jane's coming after Pat's coming has been asserted. In a parallel way, in (11), the speaker S asks an unbiased negative question simply because she is interested in Jane not coming, after Pat's not coming has been asserted. In the same unbiased scenario of (11), the question with preposed negation (11S') is odd. That is, (11S') necessarily conveys an epistemic bias, rendering the question unsuitable for this unbiased context.

(10) Scenario: S likes Jane and simply wants to find out whether she is coming.

A: Pat is coming.

S: What about Jane? Is she coming?

(11) 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 same point is made by the pair (12)-(13):

(12) 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?

(13) 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 (some/any) poetry in the 70s? And, if she didn't, why not?

Hence, questions with non-preposed negation can be as unbiased as their positive counterparts, but questions with preposed negation are necessarily biased and are thus unsuitable in unbiased scenarios.

This interpretive asymmetry between preposed and non-preposed negation is not an accident of English, but 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]

(14) 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)

(15) 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)

(16) 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)

(17) 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 it has been convincingly argued that, in Spanish and Modern Greek, negation preposed along with the verb is not in C^0 in sentences with Verb-Subject-Object order (Suñer, 1994, Alexiadou and Anagnostopoulou, 1998).

[4] In German, the contrast also arises between the use of *nicht ein* ("not a"), as in (ia), and *kein* ("no"), as in (ib) (M. Kappus, p.c.). The latter can be asked, with no epistemic implicature, by a speaker who is simply making a list of vegetarian-unfriendly 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 (18a), and negation preceding tense (with the subtypes short negation and long negation in (18b-c)). The former type 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.

(18) 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)

The contrast in all the examples above further illustrates Generalization 1: preposed negation *yn*-questions necessarily carry a positive epistemic implicature, whereas non-preposed *yn*-questions do not necessarily do so. Given the standard assumptions about questions and negation, Generalization 1 is puzzling for two reasons. First, it is surprising that a *yn*-question with negation –in any position whatsoever– could force an epistemic implicature at all. Take the denotation of the question morpheme Q in (19), yielding Hamblin (1973)/Karttunen (1977) denotations for *yn*-questions, as exemplified in (20).

(i) 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)

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

(20) a. Is Jane coming?

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

c. $[\![$Jane is coming$]\!] = \lambda w.\text{come}(j, w)$

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

If we add the standard denotation of negation (21) 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 (22). And needless to say, questions cannot be negated, hence the possibility of adding (crosscategorial) negation over Q is ill-formed.[5]

(21) $[\![$not$]\!] = [\![$n't$]\!] = \lambda p_{<s,t>}.\neg p$
(= $\lambda p_{<s,t>}$.W-p, where W is the set of possible worlds)

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

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

c. $[\![$not [Jane is coming]$]\!] = \lambda w.\ \neg\text{come}(j, w)$

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

Second, it is surprising that 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

[5] The lexical entry for the Q-morpheme in (19) yields exactly the same denotation for positive and negative *yn*-questions. An alternative entry is given in (i) (see von Stechow (1981:184, fn.14)). Combining this new Q with negation, still no epistemic implicature arises.

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

(ii) a. Is Jane coming?

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

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

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

cannot be correlated with any scopal difference that has 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 (23), the negation is not just negating the VP event; it is more like sentential negation negating the entire modal proposition. Still, (23) does not give rise to a necessary epistemic implicature, in contrast with its preposed negation version in (24):

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

(24) 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.

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 (21), it is surprising that such an epistemic effect arises, and that the effect depends on the position 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 (i):

(i) 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 (iS) 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 (iS) does not have the strong epistemic bias that *Isn't it raining?* has. Our epistemic implicature also differs from Büring and Gunlogson's (2000) 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 *p?* rather than $\neg p$*?* even when no epistemic bias towards p exists (see Bolinger (1978) and the related discussion in section 5.1). In contrast, preposed negation *yn*-questions necessarily convey a previous epistemic bias.

2.2. Characterization of the data for Generalization 2

Recall Ladd's intuitive $p/\neg p$ ambiguity in *yn*-questions with preposed negation. We saw that the PI-question in (6) has a p-reading (it double-checks whether it also holds of Jane that she is coming) and the NI-question in (7) has a $\neg p$-reading (it double-checks whether it also holds of Jane that she is not coming). In fact, the p- and $\neg p$-readings correspond to PI- and NI-questions *unambiguously*. The PI-question cannot have a $\neg p$-reading in (25): *Didn't Karl reach 950m too?* in (25S') cannot be used to double-check if it also holds of Karl that he did *not* reach 950m. And the NI-question lacks the p-reading in (26): (26S') cannot be understood as double-checking if it also holds that you ate two slices of pizza.

(25) A: Stephan didn't reach 950m under water. Thus nobody has made it that deep yet!

S: Didn't Karl reach 950m either?

S': # Didn't Karl reach 950m too?

(26) A: The salad last night was good, but it wasn't much of a meal. I was hungry all night...

S: Didn't you eat two slices of pizza too?

S': # Didn't you eat two slices of pizza either?

Another difference between PI- and NI-questions surfaces in suggestion contexts without contradiction. Take a context where the speaker believes p or $\neg p$ and where no contradiction between her belief and the addressee arises. If p is relevant as a suggestion or explanation related to the topic of the conversation, the corresponding PI-question is elicited. But if $\neg p$ is relevant to the conversation instead, the NI-question cannot be used to suggest $\neg p$. Observe the contrast between (27) and (28). In (27), A needs a reviewer that has already reviewed for the journal and S uses the PI-question to suggest p (="that Frege has already reviewed for us"). In (28), A needs a new reviewer that has not reviewed for the journal yet, but the plain NI-question (28S) cannot be used to suggest $\neg p$ (="that Frege has not reviewed for us yet"). We need a second negative element to achieve the right meaning, as in (28S').

(27) Dialog between two editors of a journal in 1900:

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.

(28) Dialog between two editors of a journal in 1900:

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.

The contrast between (29) and (30) illustrates the same point. In (29), the addressee A is looking for a reason why Montero's name sounds familiar. The proposition "that Montero wrote poetry in the 70s", if true, may provide a reason. The PI-question (29S) can be used to suggest that proposition as a possible explanation. In contrast, the addressee in (30) is looking for a reason why Montero is not cited in a given anthology. To suggest the proposition "that Montero did not write any poetry in the 70s", the simple NI-question (30S) cannot be used, but a second negative element is needed, as in (30S'):

(29) A: I gave your sister a book by Rosa Montero.

S: That name sounds familiar. Didn't she write some poetry in the 70s?

(30) 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.

That is, in suggestion contexts without contradiction, the speaker can use the PI-question to suggest p as a potential explanation or answer to an (implicit) *wh*-question, but she may not use the NI-question to suggest $\neg p$. [7]

These observations are summarized in the revised Generalization 2 below:

[7] Observe the difference in acceptability of the NI-question in the contexts (i) and (ii). In (i), we see, as before, that the NI-question cannot be used to suggest p (= "that there is a Chinese restaurant near here"). In (ii), however, the NI-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 (ii) actually involve a tacit contradiction between the speaker's belief and the implicature arising from the addressee's utterance. Pure suggestion contexts do not allow NI-questions.

(i) A: I need to find out what restaurants there are in this neighborhood.

S: Aren't there some Chinese restaurants on a street near here?

(31) GENERALIZATION 2 (revised):
Preposed negation *yn*-questions *Aux n't* p*?* are ambiguous between a reading double-checking p and a reading double-checking $\neg p$. The use of a PI versus an NI disambiguates the question towards the p-question reading and the $\neg p$-question reading respectively.[8] PI-questions but not NI-questions are licit in suggestion contexts without contradiction.

Generalization 2 is surprising for several reasons. First, it is puzzling that PIs are allowed in preposed negation *yn*-questions at all, since they are not allowed in the corresponding negative declarative versions (Ladusaw, 1980, Progovac, 1994). This is shown in (32). Unless we understand the examples in (32a-b) as metalinguistic negation of a previous statement, they are ill-formed; further, the example (32c) can only have the interpretation in which *some* has scope over negation.

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

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

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

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 PI-questions, negation is somehow outside the scope of the questioned proposition, whereas it is inside the questioned proposition in NI-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 finally, even if we stipulate a $p/\neg p$ ambiguity, it remains unclear why PI-questions can be used as (double-checking) suggestions about who p holds for, but NI-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.

S': # Aren't there any Chinese restaurants on a street near here?

(ii) A: There is no vegetarian restaurant near here, so we cannot eat vegetarian.

S: Aren't there any Chinese restaurants either? (C. Creswell, p.c.)

[8] Crosslinguistically, not all languages that distinguish between preposed and non-preposed negation make the finer distinction between PI-questions and NI-questions in the same way. Spanish patterns like English in that preposed negation questions have a PI-version and an NI-version. But in Korean, preposed negation *yn*-questions license PIs but not NIs, while non-preposed negation questions license NIs but not PIs.

2.3. The relation between Generalization 1 and Generalization 2

Is the ambiguity reported in Generalization 2 related to the epistemic implicature described in Generalization 1? In other words, can we find the same p- and $\neg p$- readings –disambiguated by the use of PIs and NIs– 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 see this, let us take a *yn*-question with non-preposed negation and, by controlling the context and using PIs, let us enforce the p-reading. This is done in (33). The presence of *too* and the only antecedent proposition "that Pat is coming" forces S's question to be about the positive proposition "that Jane is coming". The result is that the only way to understand the question, if it is acceptable at all, is with an epistemic implicature: *Is she not coming too?* in (33) sounds like an archaic rendering of *Isn't she coming too?*:

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

The contrast in (34) makes the same point. The epistemically unbiased scenario in (34) allows for a non-preposed negation question (34S) with or without NIs. But, as soon as we add a PI to try to bring out the p-question reading, as in (34S'), 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?*.

(34) 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) / (yet)?
S': # Should she not have talked to him already?

(33S) and (34S') are reminiscent of archaic non-preposed negation examples as in the passage from *Merchant of Venice* in (35):

(35) 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's (1953) 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),[9] 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 (35).[10] 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 implicature should be somehow involved in the mechanics of the ambiguity.

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 (PI-questions) and a reading double-checking $\neg p$ (NI-questions). PI-questions may be used in contradiction contexts and simply as suggestions about who p holds for. NI-questions 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 Table 1.

These facts give rise to the three questions that we posed above in section 1, as well as to the additional question in (ii-bis) below, which follows up on (ii). These questions will be addressed in turn.

---

[9] Ellegård's corpus has been made available on-line by Anthony Kroch and Ann Taylor.

[10] Other examples of neg-preposing of *not* from Ellegård (1953) are the following:

(i) 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)

Table I. Summary of the data

Question Type		Unbiased	Biased: epistemic implicature p			
			About p	Suggestion for p	About $\neg p$	Suggestion for $\neg p$
Non-Preposed Neg Qu.		√ (11S) (13S)				
Preposed Neg Qu.	PI-Question	* (13S') (33) (34)	√ (6) (26S)	√ (27S) (29S)	* (25S')	N/A
	NI-Question	* (11S') (13S')	* (26S')	N/A	√ (7) (25S)	* (28S) (30S)

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

ii. Why are preposed negation questions –more generally, negative *yn*-questions with an epistemic implicature– ambiguous? In other words, what property of negation is it that, besides triggering an epistemic implicature, produces Ladd's p-question / $\neg p$-question ambiguity and its correlation with PIs vs. NIs?

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

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

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, in positive *yn*-questions, we will see that VERUM can be overtly spelled out with the English epistemic adverb *really* and we will show how it triggers the existence of an epistemic implicature. Second, the analysis will 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 turn to *yn*-questions with preposed negation.

3.1. VERUM ARISING FROM `really`

Positive *yn*-questions (with neutral intonation) like (36) 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* (inherently focused), as in (37). As happens with negation preposing, the addition of *really* in the positive *yn*-question (37) 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.[11]

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

(37) 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 an epistemically unbiased context, as in (38). Whereas a

[11] Epistemic *really* in (ib) needs to be distinguished from the intensifier adverb *really* in (ia). Also, 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 (ii). The difference between 'in-actuality' and VERUM *really*'s can be seen in (iii). When we have the auxiliary *did* -emphasizing, like VERUM, that the speaker is certain about the truth of the proposition- the VERUM-*really* precedes *did* or follows it as a parenthetical (as in (iiia-b)), whereas the 'in-actuality'-*really* follows *did* as a non-parenthetical (as in (iiic)). Also, languages like Spanish distinguish these two *really*'s lexically, as shown in (iv). All the examples of *really* in the text are intended as VERUM.

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

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

(iii) 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 (ii), A doubts it and S then insists.)

(iv) 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'

regular positive question is felicitous in this context, the corresponding *really*-question is odd, as it necessarily carries a negative epistemic bias. In contexts like (39) with an explicit negative epistemic bias, however, positive *really*-questions are appropriate.

(38) 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?

(39) 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.

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 (40), 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:

(40) $[\![\text{VERUM}_i]\!]^{gx/i} = [\![\text{really}_i]\!]^{gx/i} = [\![\text{be sure}]\!]([\![i]\!])^{gx/i}) =$
$\lambda p_{<s,t>} \lambda w.\forall w' \in \text{Epi}_x(w)[p(w') = 1]$

The function defined in (40) 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 (41a) asserts certainty about the speaker's own inner sensations, which is a bit odd (as if the speaker could be confused about that); (41b), instead, is perfectly fine, and the presence of *really* simply emphasizes or insists that the addressee should take the proposition as true:

(41) a. ? I am sure I am tired.
b. I really am tired.

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 certainty of that witness' assertion without conveying any disbelief. This can be achieved by using the pure epistemic expression *be sure*, as in (42S), but not by using *really*, as in (42S').

(42) 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?[12]

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 p *should* 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 (43), abbreviated as 'FOR-SURE-CG$_x$', where $Epi_x(w)$ is the set of worlds that conform to x's knowledge in w, $Conv_x(w')$ is the set of worlds where all the conversational goals of x in w' (e.g., attain maximal information while preserving truth) 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).

(43) $[\![\text{VERUM}_i]\!]^{gx/i} = [\![\text{really}_i]\!]^{gx/i} =$
$\lambda p_{<s,t>} \lambda w. \forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[p \in \text{CG}_{w''}]]$
$= \text{FOR-SURE-CG}_x$

3.2. VERUM, UNBALANCED PARTITIONS AND THE EXISTENCE OF AN EPISTEMIC IMPLICATURE

To derive the interpretive difference between a positive *yn*-question with VERUM and one without it, let us look at the corresponding denotations. In a regular *yn*-question like (45), the only operator is the Q-morpheme, repeated

[12] Preposed negation *yn*-questions pattern like *really* in law court scenarios:

(i) 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 wasn't in the room at the time of the crime?

S': # This is important, Mr. Beans. Wasn't Mrs. Rumpel in the room at the time of the crime?

in (44). The semantic computation yields the denotation in (45d). Following Groenendijk and Stokhof (1984), question denotations can be viewed as inducing a partition on the set resulting from intersecting the propositions in the Common Ground. The partition corresponding to (45d) is sketched in (46):

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

(45) a. Does John drink?

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

c. $[\![\text{John drinks}]\!] = \lambda w.\text{drink}(j, w)$

d. $[\![Q \text{ John drinks}]\!](w_{\text{o}})$
$= \lambda q\ [q = \lambda w.\text{drink}(j, w) \quad \vee \quad q = \lambda w.\ \neg(\text{drink}(j, w)]$
= {"that John drinks", "that John doesn't drink"}

(46)

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:

(47) a. Does John really drink?

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

c. $[\![CP]\!](w_{\text{o}}) =$
$= \lambda q\ [q = \lambda w.\forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')\ [\lambda w'''.\text{drink}(j, w''') \in \text{CG}_{w''}]] \quad \vee \quad q = \lambda w.\ \neg\forall w' \in \text{Epi}_x(w)\ [\forall w'' \in \text{Conv}_x(w')\ [\lambda w'''.\text{drink}(j, w''') \in \text{CG}_{w''}]]]$
= {"it is for sure that we should add to CG that John drinks", "it is not for sure that we should add to CG that John drinks" }

(48)

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

Let us compare the two resulting partitions.[13] The regular *yn*-question yields a balanced partition between p and $\neg p$, whereas the *really*-question

[13] If we use the lexical entry for the Q-morpheme in footnote 5, take Heim's (1994) meaning for *know* in (i) and 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 as in the text.

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

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 context (38)? And why is the unbalanced partition inappropriate in this unbiased context and acceptable in the biased context (39)?

These questions are easily answered once we accept some commonly assumed principles about the dynamics of 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's (1975) Maxim of Quality does not require direct evidence for p, but (at least) indirect evidence for p, as stated in (49) (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 from some trustworthy speaker or they read it in a science book. The requirement to assert only propositions that one has direct evidence for would simply be too strong.

(49) 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 move is subject to an economy constraint:

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

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 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 any previous bias.

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 violate the Principle of Economy in (50). 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, no epistemic conflict would arise and hence the meta-conversational move would be unjustified. Similarly, 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 more economical and the unbalanced partition unmotivated.

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 p should be added 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 justified to question the appropriateness of adding p to the CG. The meta-conversational question is also motivated 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, she can raise the question of whether the interlocutors should make this addition or not.

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 sometimes has a contrastive use. For example, *NOT* in (51) simply contrasts with the positive polarity of the previous clause. But, some other times, 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 in (52)-(53):

(51) Everybody who finished on TIme met with MAry, and everybody who did NOT finish on time met with JOHN.

(52) A: Peter claims / doesn't think Kimiko went to the Himalayas.
S: She DID go to the Himalayas.

(53) a. A: Joe believes / doesn't believe the kids will finish on time.
b. S: They will NOT finish on time.

If we apply our denotation of VERUM in (43) to (52), we obtain the denotation in (55), which seems adequate. Similarly, we define in (54) a negative version of VERUM as the contribution of Verum Focus on *NOT* and we obtain the truth conditions in (56) for (53).

(54) $[\![NOT_i]\!]$ =
$\lambda p_{<s,t>}\lambda w.\forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[\neg p \in \text{CG}_{w''}]]$
= FOR-SURE-CG-NOT$_x$

(55) a. She DID go to the Himalayas.

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

c. $[\![CP]\!]$
= $\lambda w.\forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[\lambda w'''.\text{go}(k, h, w''') \in \text{CG}_{w''}]]$
= "it is for sure that we should add to CG that Kimiko went to the Himalayas"

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

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

c. $[\![CP]\!]$
= $\lambda w.\forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[\lambda w'''.\neg\text{fin}(\text{they}, w''') \in \text{CG}_{w''}]]$
= "it is for sure that we should add to CG that it is not the case that they will finish on time"

Hence, it seems plausible to assume that Verum Focus –i.e., polarity focus whose intuitive effect is to insist on the truth of the proposition– in declaratives stands for the same operator VERUM that we defined in the previous subsection. If polarity stress can signal the presence of VERUM in declaratives, then polarity stress in *yn*-questions is predicted to be able to trigger the existence of an epistemic implicature as well.[14] This prediction is borne out, witness (57)-(59). Example (57) gives us a context that is potentially epistemically unbiased. The speaker can be unbiased if no polarity stress is placed on the verb *study* (or if *study* simply contrasts with *cheat*), as in (57S). But, if we add a heavy stress on *STUDY*, as in (57S'), or on the auxiliary, as

[14] The prediction is that *yn*-questions with polarity stress can but needn't trigger an implicature. In contrast contexts like (i), no epistemic bias is forced. No implicature obtains with *dictum* Focus either, where focal stress simply marks that the question is being re-asked (Creswell, 2000), as in (ii). The prediction is that there will be contexts where polarity focal stress cannot be licensed as anything other than VERUM and that then the epistemic implicature will necessarily arise.

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

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

in (58), the implicature arises that the speaker believed or expected that Tom did not study for the class.

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

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

The same contrast obtains between the unstressed (59S) –no implicature– and the polarity stressed (59S') –with implicature:

(59) 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 denotation and partition for *Did he STUDY for that class?* in (60)-(61). Focus on *STUDY* provides the VERUM operator, and thus an unbalanced partition and the epistemic bias results. 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?*.

(60) a. Did he STUDY for that class?
b. LF: [$_{CP}$ Q VERUM [$_{IP}$ he studied for that class]]
c. $[\![CP]\!](w_{\mathrm{o}})$
$= \lambda q\,[q = \lambda w.\forall w' \in \mathrm{Epi}_x(w)[\forall w'' \in \mathrm{Conv}_x(w')\,[\lambda w'''.\mathrm{study}(t, w''')$
$\in \mathrm{CG}_{w''}]] \quad \vee \quad q = \lambda w.\ \neg\forall w' \in \mathrm{Epi}_x(w)\ [\forall w'' \in \mathrm{Conv}_x(w')$
$[\lambda w'''.\mathrm{study}(t, w''') \in \mathrm{CG}_{w''}]]]$
= {"it is for sure that we should add to CG that Tom studied for that class", "it is not for sure that we should add to CG that Tom studied for that class" }

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

In *Does he NOT drink beer?* in (59), focus on *NOT* signals the presence of the operator "FOR-SURE-CG-NOT$_x$" defined in (54). This gives the denotation and unbalanced partition in (62)-(63). The same partition and epistemic bias obtain if VERUM is spelled with *really* rather than just phonologically, as in *Does he really not drink beer?*.

(62) a. Does he NOT drink beer?

b. LF: [$_{CP}$ Q NOT [$_{IP}$ he drinks beer]]

c. $[\![CP]\!](w_{\mathrm{o}})$
= $\lambda q\,[q = \lambda w.\forall w' \in \mathrm{Epi}_x(w)[\forall w'' \in \mathrm{Conv}_x(w')[\lambda w'''.\neg\mathrm{drink}(h, w''')$
$\in \mathrm{CG}_{w''}]] \quad \vee \quad q = \lambda w.\ \neg\forall w' \in \mathrm{Epi}_x(w)[\forall w'' \in \mathrm{Conv}_x(w')$
$[\lambda w'''.\neg\mathrm{drink}(h, w''') \in \mathrm{CG}_{w''}]]]$
= {"it is for sure that we should add to the CG that it is not the case that Hubert drinks beer", "it is not for sure that we should add to the CG that it is not the case that Hubert drinks beer" }

(63)

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.

3.4. VERUM ARISING FROM NEGATION PREPOSING IN *yn*-QUESTIONS

We have shown how VERUM arising from the lexical item *really* and VERUM arising from polarity focus trigger the existence of an epistemic implicature. 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. Hence, we propose to assume (64) as our working hypothesis. With this assumption, question (i) receives the answer (i') below:

(64) 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 may or may not have VERUM (depending on polarity focus stress and presence/absence of *really*). An

unbalanced partition arising from a *yn*-question with VERUM is a meta-conversational move asking for a fine degree of certainty and is, by the Principle of Economy, felicitous only if a previous epistemic bias exists. *Yn*-questions with normal intonation without VERUM result in simple, economical balanced partitions and are elicited when the speaker has no previous significant belief about p or $\neg p$.

In the next section, we will show how the assumption (64) also helps us explain Ladd's intuitive ambiguity between p- and $\neg p$-readings in preposed negation *yn*-questions (question (ii)). The semantic computation and partition for preposed negation questions will be also spelled out there. But, before we turn to Ladd's ambiguity, let us remind the reader that, so far, we have only derived the *existence* of an epistemic implicature but not the content or *polarity* of this implicature (question iii). We will return to this in section 5.

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

The examples (6) and (7) illustrated Ladd's (1981) 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 PIs and NIs respectively. Furthermore, we saw that the $p/\neg p$ ambiguity in negative *yn*-questions is dependent on the existence of an epistemic implicature. Following Romero and Han (2002), 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 PI-/NI-questions can be derived as a simple scope ambiguity between VERUM and negation. That is, assuming VERUM, we will give the following answer to question (ii): the presence of VERUM, which triggers the existence of an epistemic implicature, is also responsible for the $p/\neg p$ ambiguity and for the PI-/NI-pattern.

There are three main interacting components in *yn*-questions with preposed negation: (i) the question operator Q defined in (19), (ii) (regular unfocused) negation, as defined in (21), and by hypothesis, (iii) the VERUM operator defined in (43).

Out of these three operators, *yn*-questions with non-preposed (unfocused) negation have Q and negation. Unless they contain the conversational epistemic adverb *really* or Verum Focus, they do not contain the operator VERUM. The semantic computation for a *yn*-question with non-preposed negation is illustrated in (65). Note that the resulting partition in (66) 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.

(65) a. Is Jane not coming?

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

c. $[\![$Jane is coming$]\!]$ = λw.come(j, w)

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

e. $[\![Q$ [not [Jane is coming]]$]\!](w_{\mathrm{o}})$
= $\lambda q\ [q = \lambda w.\ \neg\text{coming}(j, w) \quad \vee \quad q = \lambda w.\ \neg\neg\text{coming}(j, w)]$
= {"that Jane is not coming", "that Jane is coming"}

(66) | 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 PI-questions, whereas VERUM scopes over negation in NI-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 NI-questions. Here, VERUM scopes over negation. The LF and the denotation for the NI-question in (67) are given in (68) (ignoring the presupposition contributed by *either*). The question denotation induces the partition in (69), taking $\neg p$ to be "Jane is not coming".

(67) 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 phonologists in the program.

S: Isn't Jane coming either?

(68) a. Isn't Jane coming **either**?

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

c. $[\![CP]\!](w_{\mathrm{o}})$
= $\lambda q\ [q = \lambda w.\forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[\lambda w'''.\neg\text{come}(j, w''')$
$\in \text{CG}_{w''}]] \quad \vee \quad q = \lambda w.\ \neg\forall w' \in \text{Epi}_x(w)\ [\forall w'' \in \text{Conv}_x(w')$
$[\lambda w'''.\neg\text{come}(j, w''') \in \text{CG}_{w''}]]]$
= {"it is for sure that we should add to CG that Jane is not coming", "it is not for sure that we should add to CG that Jane is not coming"}

(69) NI-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 NI-question presented in the introduction and in section 2.2. First, the NI-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 NI-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 in both cells. Finally, since the double-checked proposition is a negative proposition, **NIs** are acceptable, and PIs (under the immediate scope of negation for PPIs) are not acceptable (Ladusaw, 1980, Progovac, 1994, Rooth, 1992). This contrast is illustrated in (70)-(71) for declaratives below:[15]

(70) a. John did not talk to anyone.
b. John did not talk to someone. ??/* $\neg\exists$

(71) 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 PI-questions. In PI-questions, negation scopes over VERUM. The LF and denotation for the PI-question in (72) (ignoring the presupposition contributed by *too*) is spelled out in (73). The resulting partition is in (74), where p equals "that Jane is coming".

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

(73) a. Isn't Jane coming too?
b. LF: [$_{CP}$ Q not [VERUM [$_{IP}$ Jane is coming too]]]
c. $[\![CP]\!](w_0)$
$= \lambda q\ [q = \lambda w.\forall w' \neg \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[\lambda w'''.\text{come}(j, w''')$
$\in \text{CG}_{w''}]] \quad \vee \quad q = \lambda w.\ \neg\neg\forall w' \in \text{Epi}_x(w)\ [\forall w'' \in \text{Conv}_x(w')$
$[\lambda w'''.\text{come}(j, w''') \in \text{CG}_{w''}]]]$
= {"it is not for sure that we should add to CG that Jane is coming", "it is for sure that we should add to CG that Jane is coming"}

[15] If we follow the Focus theory in Rooth (1992), the NI *either* is not technically under the scope of negation, but it selects for a negative clause as its sister, as in (i). A parallel structure holds for the PI *too*. We thank a reviewer for recommending that we make this point explicit.

(i) a. Jane isn't coming either.
b. LF: [[$_{IP}$ [not [Jane$_{Focus}$ is coming]]ˇC] either]

(74) PI-question partition:

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

As before, this is not a balanced partition for an unbiased 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 the NI-partition, though, the PI-partition has p as the argument of the epistemic operators in both cells (**p-question reading**), showing that the two interrogatives (68a) and (73a) really denote different questions; that is, that 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, **PIs** within or adjoined to the IP under VERUM are acceptable, while NIs are not. PPIs like *some* are licensed insofar as clausemate negation does not take scope immediately over them (Ladusaw, 1980, Progovac, 1994), and the PI *too* requires adjunction to a positive IP. As for NIs, they are ruled out because no operator should intervene at LF between an NPI and its licensing negation (Linebarger, 1980, Linebarger, 1987), and because *either* must attach to a negative IP. This behavior is illustrated for PPI/NPIs in declaratives in (75). The PPI *would rather* in (75a) is licensed if negation scopes over the CAUSE operator at LF and not immediately over the PPI (and it is illicit otherwise). In contrast, the NPI *budge an inch* (75b) is only licensed when negation scopes immediately over the NPI.

(75) a. George wouldn't rather go because you are there.
* q CAUSES $\neg p$: "George wouldn't rather go, and that is because you are there."
$\surd$ $\neg$(q CAUSES p): "It's not because you were there that he would rather go; it's because ..."

b. George didn't budge an inch because you were there.
$\surd$ q CAUSES $\neg p$: "George didn't budge an inch, and that is because you were there."
* $\neg$(q CAUSES p): "It's not because you were there that he budged an inch; it's because ..."

The same pattern is attested for the pair *either*/*too* in declaratives, as illustrated in (76). When adjoined to an IP (or VP) denoting a positive proposition, the PI *too* is acceptable and the NI *either* is ungrammatical:

(76) a. It is not certain [that Jane is coming too].

b. * It is not certain [that Jane is coming either].

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 PIs vs. NIs, and its dependence on the existence of an epistemic implicature. Our question (ii) from the introduction receives the following answer:

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, PIs are licensed under VERUM while NIs are not, given that VERUM intervenes between them and negation. The $\neg p$-reading arises when VERUM scopes over negation; in this LF, PIs are deviant under the immediate scope of negation whereas NIs are licit.[16]

Before concluding this section, note that other types of *yn*-questions that we saw contain VERUM –*yn*-questions with *really*, with Verum focused auxiliaries and with non-preposed focused *NOT*– do not display the $p/\neg p$ ambiguity, as the examples (77)-(80) demonstrate. 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.[17]

[16] 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 (1992:124-6) proposes the same scopal ambiguity for German declaratives with Verum Focus: VERUM scopes over negation in (i), and negation scopes over VERUM in (ii).

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

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

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

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."

[17] 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 $p/\neg p$

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

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

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

(80) 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 PI-questions with the p-reading or NI-questions with the $\neg p$-reading– have a positive epistemic implicature.

ambiguity? The answer is 'no'. As (i)-(ii) show, the only reading available is the $\neg p$-reading, that is, the only possible scope is the surface scope: VERUM over negation.

(i) A: Ok, now that Stephan has come, we're all here. Let's go!
S: * Is Jane really not coming too?

(ii) 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. Höhle (1992) observes that, while negation can scope over VERUM spelled out in V^0 –as in example (ii) in footnote 16–, it cannot scope over the more distant VERUM in C^0, as shown in (iii). We leave the reasons that trigger scope rigidity between VERUM and negation for future research.

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

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."

Positive *yn*-questions with *really* or Verum Focus give rise to a negative implicature. And negative *yn*-questions with non-preposed (Verum-)focused *NOT* trigger a positive implicature. This raises our question (iii): Why is the implicature raised by preposed negation –both in PI-questions and in NI-questions– a *positive* implicature? More generally, why is the polarity in the question opposite from that in the implicature?

Furthermore, there is a difference between PI-questions and NI-questions that has not yet received an explanation: PI-questions can be used in non-contradiction scenarios to suggest p, but NI-questions cannot be used in a similar way to suggest $\neg p$. This gives rise to our final question (ii-bis): Why are PI-questions but not NI-questions suitable in suggestion contexts?

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, to positive *yn*-questions with *really* and Verum Focus, and finally to negative *yn*-questions with *NOT*.

5.1. THE "INTENT" OF A *yn*-QUESTION

Let us consider preposed negation *yn*-questions. In this case, our question (iii) can be re-formulated in the following way. Both PI-questions and NI-questions carry the positive epistemic implicature p, as repeated in (81)-(82). 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 PI-question about p in (81), she is double-checking her original belief. When the speaker asks the NI-question about $\neg p$ in (82), she is double-checking the addressee's implied proposition. The question then is: is there anything in the syntax/semantics/pragmatics of a PI-question that forces its content p to be the speaker's belief, and is there anything in the syntax/semantics/pragmatics of an NI-question that forces its content $\neg p$ to be the addressee's proposition?

(81) 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.

(82) 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 PI/NI-questions per se that can help us derive this result. For compare the two partitions in (83) and (84). If we forge an account to derive the speaker's epistemic implicature p from the mathematical object that constitutes the PI partition (84), wouldn't that account wrongly derive the epistemic implicature $\neg p$ for the parallel NI partition in (83)? Even more dramatically, take the positive *yn*-question *Is Jane really coming?*, with VERUM coming from the lexical item *really*. Its partition, repeated under (85), is *exactly* the same mathematical object that we have for the PI-question in (84). But, contrary to the PI-question, the positive question *Is Jane really coming?* has the *negative* epistemic implicature $\neg p$ and not the positive epistemic implicature p.

(83) NI-question partition: *Isn't Jane coming either?*

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

(84) PI-question partition: *Isn't Jane coming too?*

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

(85) *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 questions with an epistemic implicature 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 (86)-(87) show, *yn*-questions and alternative questions are not interchangeable. In (86), a request can be formulated with a *yn*-question but not with an alternative question. In (87), to suggest a possible answer for a *wh*-question, the speaker can use a *yn*-question but not an alternative question:

(86) Request:

a. Will you help me?

b. # Will you help me or not?

(87) 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's (1978) 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. For example, if the speaker wants to make a request for help, she will use the positive (88a) but not the negative (88b). If she wants to suggest as a possible explanation that you are tired, she will use (89a) but not (89b):

(88) Request for help:

a. Will you (please) help me?

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

(89) 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?

Another context where the pronunciation choice matters is when it is made explicit which of the two cells the speaker is interested in pursuing a conversation about, with possible follow-up questions:

(90) Scenario: S and A know that, every morning, Carlos drinks either coffee or tea. S has no previous bias about which Carlos drank this morning. S is interested in studying coffee consumption and its effects on people and 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)?

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*?*, asking *not* r*?* and asking r *or not?* may be strictly semantic or may be pragmatic in nature. We will remain agnostic about this issue. What is important for the purposes of this paper is that

the pronunciation choice is a crucial ingredient of the overall meaning of a *yn*-question. 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.[18]

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 (91). We also assume that epistemic states are consistent, that is, that they do not contain nor entail contradictory propositions and that (92) holds:

(91) 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.

[18] Using Decision Theory, Nilsenova and van Rooy (2003) present a formal pragmatic characterization of the effect of the pronunciation choice that is compatible with our notion of "intent". (They assume the lexical entry for Q in (19), but they point out that the definition (i) in footnote 5 could be used too.) In a nutshell, the speaker pronounces the cell whose utility value is higher (both cells have equal utility values in *r or not?*). A proposition p has a high utility value if its addition to the speaker's epistemic state would trigger a wide revision of it (see also (Han, 1998), (Romero and Han, 2001)) or its becoming true brings the speaker closer to her goal. We thank a reviewer for pointing out the implementation of Nilsenova and van Rooy (2003). Note, though, that the "intent" or utility value of a question cannot derive the facts in the present paper by itself. We need VERUM in order to: (a) distinguish between the mild (contextual evidence) bias arising for the pronunciation choice in a *yn*-question without VERUM and the strong epistemic implicature triggered by a question with VERUM, as in (i), (b) to account for the different polarity pattern between the question and the content of the bias (same polarity in (ia) and opposite polarity in (ib)), and (c) to derive the $p/\neg p$-readings and contextual uses (contradiction vs. suggestion) of PI- and NI-questions. (See also footnote 6.)

(i) a. Is today the seventeenth? $\Rightarrow$ Mild bias towards p

b. Isn't today the seventeenth? $\Rightarrow$ Epistemic implicature that p

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

e. ...

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

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

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

(94) 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 PI- and the NI-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. Let us evaluate the two parameters (double-checked proposition and pronounced cell) for each type of question.

We start with NI-questions. Why are NI-questions felicitous in a contradiction context where the speaker believes p, as in (82), and unacceptable in a contradiction context where the speaker believes $\neg p$, as in (95)?

(95) Scenario: Pat and Jane are two phonologists who are supposed to be speaking in our workshop on optimality and acquisition. S originally believes that Jane is not coming.

A: Pat is not coming. But fortunately for the phonologists we still have Jane...

S: #Isn't Jane coming either?

Take the NI-question *Isn't Jane coming either?*, with the LF in (96b) and the partition in (97), where the pronounced cell is highlighted by a double line.

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

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

(97) NI-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 we should 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 (98).

(98) Intent of the NI-question:
"Are you certain we should 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 (99a) that the intent of this question is compatible with the speaker's belief p and with the addressee's proposition $\neg p$, as in scenario (82). Furthermore, it is incompatible with the opposite state of affairs described in (99b), as in scenario (95):

(99) Intent of NI-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. Simply put, the addressee cannot possibly provide conclusive evidence for $\neg p$ if he uttered and thus believed p.[19] Hence, for the "intent" of the question to be felicitous, the addressee's proposition must

[19] A uttered p. By Quality, A believes *For a fact* p or *Must* p. By (91b), A has at least sufficient indirect evidence for p and no evidence against p. By (92), A does not have evidence for $\neg p$. Hence, A does not have conclusive evidence for $\neg p$.

be $\neg p$ and the speaker's original bias must be p. Therefore, the NI-question has the positive epistemic implicature that the speaker believed p.

Let us now turn to the PI-questions. Why are PI-questions are acceptable in contradictions contexts if the speaker assumes p, as in (81), but infelicitous if the speaker assumes $\neg p$, as in (100):

(100) Scenario: S originally believes that Jane is not coming.

A: Pat already came, but we still have to wait for Jane.

S: # Isn't Jane coming too?

Take *Isn't Jane coming too?*, with the LF in (101b) and partition in (102). This time, the pronounced cell is the opposite one:

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

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

(102) PI partition and pronounced cell:

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

Since the pronounced cell is the $\neg$ 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 (103):

(103) Intent of the PI-question:
"Are you not sure that we should 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?"

The intent gives us the result in (104) for contradiction scenarios:

(104) Intent of PI-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, 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 or more convincing evidence for doubting p if he uttered and thus believed p.[20] Therefore, PI-questions have the positive epistemic implicature that the speaker believed p.

In sum, in contradiction scenarios, the speaker can ask the addressee to provide conclusive evidence for the addressee's proposition or to give reasons to doubt the speaker's proposition. But, assuming that the addressee has a coherent epistemic state along the guidelines in (91) and (92) and that he obeys the Maxim of Quality, the speaker cannot ask the addressee to provide conclusive evidence for the speaker's proposition or reasons to doubt the addressee's proposition. This derives the positive epistemic implicature p for both NI- and PI-questions.

Our account of the polarity of the epistemic implicature based on the intent of the question also explains why PI-questions are possible in suggestion contexts without contradiction while NI-questions are not, as we saw in (27) and (28), repeated below:

(105) Dialog between two editors of a journal in 1900:

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.

(106) Dialog between two editors of a journal in 1900:

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 scenarios, the addressee posits (implicitly or explicitly) a *wh*-question R (e.g. "who has/hasn't reviewed for us?"). Since the addressee does not provide any partial answer to R himself, by the Maxim of Quantity, the speaker is entitled to infer that the addressee does not know any answer to R, i.e., that, for all possible answers p to R, the addressee's epistemic state does not entail p.[21] Once we combine this conversational inference with the intents of the PI- and NI-questions, we obtain the following pattern:

[20] A uttered or implied p. By Quality, A believes at least *Must* p. By (91b), 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. Now assume, contrary to fact, that S had an epistemic bias towards $\neg p$. Then S would have strong evidence for $\neg p$ (by (91b,c)) and against p (by (92)). Hence, S would have more evidence to doubt p than A and S's request to A for evidence to doubt p would be inconsequent.

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

(107) Intent of PI-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 and would prevent us from adding p to CG?

(108) Intent of NI-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** $\neg p$?

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 PI-question, whose intent is to ask for reasons to doubt p (if any), is compatible with the premises of the conversation. But the assumption that the addressee does not know any answer to R *does* preclude the possibility that, for some possible answer $\neg p$ to R, the addressee's epistemic state entails $\neg p$. This gives us the desired result: PI-questions asking for doubts about a possible answer to R are appropriate in suggestion contexts, whereas NI-questions asking for conclusive evidence for a possible answer to R are inconsistent with the conversational assumptions.[22]

Furthermore, the PI-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 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, as in (107), but it violates the spirit of the Maxim of Quality if the speaker believes $\neg p$, as in (109):

(109) Intent of PI-question, content of the implicature and suggestion scenario:
Given that I assume $\neg p$, that you do not know any answer to R

(i) a. $[\![[wh\ i_e\ Q\ \phi]]^g(w_o) = \lambda p[\ \exists x_e[p(w_o) = 1\ \wedge\ p = [\![\phi]\!]^{gx/i}]\ ]$
b. $\text{Answer1}(R)(p)(w_o) = 1$ iff $p \in R(w_o)$

[22] This reasoning rules out NI-questions in suggestion contexts no matter whether the speaker originally believed p, as in (108), or $\neg p$, as in (i):

(i) # Given that I assume $\neg p$, 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** $\neg p$?

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 would prevent us from adding p to CG?

In sum, the "intent" of the PI-question and of the NI-question determines, together with general epistemic and conversational principles, the positive polarity of their implicatures and their (un)acceptability in suggestion contexts.[23]

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

Let us now derive the polarity of the epistemic implicature in positive biased questions. We will illustrate it for the *really*-question in (110):

(110) A: Pat already came, but we still have to wait for Jane.
S: Is Jane really coming?
Negative epistemic implicature: S believes or expects that Jane is not coming.

Is Jane really coming? has the LF in (111) and the partition in (112). We noted that the PI-partition (102) and this partition are exactly the same math-

[23] Our account based on the intent of the question can be used to explain another difference between PI- and NI-questions. In contradiction contexts, both PI- and NI-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 (i). The PI-question (ib) can convey several attitudes of the speaker, ranging from strong conviction about her original belief p to genuine puzzlement and indecision between her original belief p and the addressee's implied proposition $\neg p$. The NI-question (ia) 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, they are "tilted" towards opposite ends and can sometimes convey different attitudes.

(i) 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 NI-question in (ia), asking for conclusive evidence for the addressee' proposition $\neg p$, may be used when the speaker is seriously considering switching to $\neg p$. The PI-question (ib), asking for any doubt about her previous belief p, can convey that the speaker is still entertaining or pondering her original belief p.

ematical object. Crucially, although the two partitions are the same, the pronounced cells are opposite. The PI-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 PI-question asks for reasons to doubt p, whereas the *really*-question asks for reasons to conclude that p, as specified in (113). In fact, the "intent" of the *really*-question is parallel to that of the NI-question in (98), except that the former has p under VERUM and the latter has $\neg p$:

(111) a. Is Jane really coming?

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

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

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

(113) Intent of *really*-question:
"Are you sure we should add to CG that Jane is coming?", or
"Do you have **complete evidence** that p?", or
"Can you provide information –and, if so, what information– that would make me **conclude** p?"

As a result, we obtain the conditions in (114):

(114) 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 NI-questions, the addressee can be expected to possibly provide conclusive evidence for p if he uttered p but not if he uttered $\neg p$. 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. This is due to the same reasoning that precludes the suggestion use for NI-questions: the speaker cannot ask whether the addressee has conclusive evidence for p if p is a possible answer to question R and it is assumed that the addressee does not know any answer to R, as indicated in (115). This prediction is borne out. (116S) cannot be used to

suggest Frege as a possible reviewer (unless cues other than this dialog are provided):

(115) 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?

(116) Dialog between two editors of a journal in 1900:

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 (117):

(117) 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 (118) and the partition in (119):

(118) a. Is Jane NOT coming either?

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

(119) NI-question partition and pronounced cell:

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

This partition and pronounced cell are exactly the same as for the NI-question, as the reader can easily check comparing (97) and (119). Hence, by the same reasoning that we followed for the NI-question, 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 (see (98) and (99)).

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 NI-questions cannot, as we saw in (108). Our prediction is borne out, as illustrated in (120).

(120) Dialog between two editors of a journal in 1900:

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.[24]

5.6. SUMMARY

We have seen 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 (Bolinger, 1978). 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. This ingredient gives us the "intent" of the 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 conversational principles. In a nutshell, our question (iii) from the introduction receives the answer below:

iii'. 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. PI-questions ask the addressee for any doubt about p, and, hence, p is the speaker's original belief. NI-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 PI-questions are suitable in suggestion contexts without contradiction whereas NI-questions are not. We have proposed the answer to question (ii-bis) stated below:

[24] Unless other cues than this dialog are provided, (120S) cannot be used in this suggestion scenario if the (heavy) focus on *NOT* is understood as contributing VERUM. That is, (120S) cannot at the same time carry the epistemic implicature p and be used as a suggestion.

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 PI-question, whose intent is to ask the addressee for any doubt about the possible answer p, is compatible with this conversational assumption. An NI-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. With this assumption, 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 that questions the appropriateness of a given conversational move (e.g. adding p to CG). This type of meta-conversational move is elicited only when necessary to resolve some epistemic conflict or to ensure Quality, e.g., when the speaker had a previous belief and the addressee contradicted her, or when the speaker had a previous belief but she was not sure enough to simply assert it. This derives the fact that *yn*-questions with VERUM 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 p-reading obtains when negation scopes over VERUM; then, *too* and PPIs are licensed within the IP under VERUM. The $\neg p$-reading results when VERUM scopes over negation; then, *either* and NPIs can occur within the negative IP under VERUM.

Third, in all *yn*-questions with an epistemic implicature, the polarity of the implicature and the polarity of the question are opposite. Here, the "intent" or pronunciation choice of a question becomes central. 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 $\neg p$, and 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.

Fourth and finally, a question whose intent is to ask A for possible doubts about p (if any) is acceptable as a suggestion that p may be an answer to A's background question, but a question whose intent is to ask A for complete evidence for p is infelicitous in these conditions.

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 a full 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 (121) and (122):

(121) a. Never has John lied.

b. John never lied.

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

b. Mary would never reveal the secret.

The (a) examples in (121)-(122) carry the similar kind of VERUM as in preposed negation *yn*-questions. E.g., (121) can be paraphrased as *It is for sure that we should add to CG that John never lied*. In contrast, the (b) examples in (121)-(122) 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, 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. Alternatively, given that non-canonical orders having to do with special discourse functions involve displacement to left-periphery in general, it could be that there is a functional projection for VERUM in the CP domain (in the spirit of (Rizzi, 1997)) which triggers

preposing of negation. In any case, 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 (123). The embedded question in (123) can be understood as reporting / pondering the unbiased question *Is Jane not coming?* or the biased question *Isn't Jane coming?*.[25]

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

A final point that we would like to mention is the relation between the questions studied in this paper and tag questions. The two constructions share some interesting similarities. First, we saw that, in questions with an epistemic implicature, the polarity of the question and the polarity of the implicature are opposite. This crossed pattern of polarities is the same as the distributional pattern of a type of tag questions which can be referred to as 'reversed polarity' tag questions (Sadock, 1971, Millar and Brown, 1979), as illustrated in (124).

(124) a. John drinks, doesn't he?

b. John doesn't drink, does he?

Second, the sequence 'positive declarative + negative tag' basically makes the same contribution to the discourse as preposed negation questions of the p-question type: i.e., it conveys that the speaker has a belief p and that s/he wants to double-check p. And the sequence 'negative declarative + positive tag' makes a similar contribution to the discourse as positive questions with VERUM: i.e., it conveys that the speaker has a belief $\neg p$ and that s/he wants to confirm this. This suggests that our analysis of biased *yn*-questions can be extended to reversed polarity tag questions. If we postulate a VERUM operator in tag questions (with an elliptical or pro-form VP), their polarity pattern and discourse effect will follow exactly in the same way as in our epistemic implicature questions. The only difference is that, in the tag sequence, the epistemic implicature is not implicit but overtly expressed by the preceding clause.

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*. New York: Garland Publishing.

[25] We thank W. Ladusaw (p.c.) for reminding us of this fact.

Bolinger, Dwight: 1978, 'Yes-No Questions are not Alternative Questions'. In: H. Hiz (ed.): *Questions*. Dordrecht: Reidel, pp. 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*. Stanford: CSLI.

Creswell, Cassandre: 2000, 'The Discourse Function of Verum Focus in Wh-Questions'. In: *Proceedings of North Eastern Linguistics Society*, Vol. 30. GLSA.

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

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

Grice, H. P.: 1975, 'Logic and conversation'. In: P. Cole and J. L. Morgan (eds.): *Speech Acts*, Vol. III of *Syntax and Semantics*. NY: Academic Press, pp. 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: E. Curis, J. Lyle, and G. Webster (eds.): *Proceedings of West Coast Conference in Formal Linguistics*, Vol. 16. Stanford, pp. 237–253, 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. E.: 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, pp. 164–171.

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

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

Linebarger, M. 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.

Millar, Martin and Keith Brown: 1979, 'Tag Questions in Edinburgh Speech'. *Linguistische Berichte* **60**, 24–45.

Nilsenova, Marie and Robert van Rooy: 2003, 'NO's no Good Alternative'. ms. ILLC, University of Amsterdam.

Pierrehumbert, Janet and Julia Hirschberg: 1990, 'The Meaning of Intonational Contours in the Interpretation of Discourse'. In: J. M. Philip R. Cohen and M. E. Pollack (eds.): *Intentions in Communications*. MIT Press, pp. 271–311.

Prince, Ellen: 1998, 'On the limits of syntax, with reference to Topicalization and Left-Dislocation'. In: P. Culicover and L. Mcnally (eds.): *The Limits of Syntax*. NY: Academic Press, pp. 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: Cambridge University Press.

Rizzi, Luigi: 1997, 'The fine structure of the left periphery'. In: L. Haegeman (ed.): *Elements of Grammar*. The Netherlands: Kluwer Academic Publishers, pp. 281–337.

Roberts, Craige: 1996, 'Information Structure in Discourse: Towards an Integrated Formal Theory of Pragmatics'. In: J. Yoon and A. Kathol (eds.): *OSU Working Papers in Linguistics 49: Papers in Semantics*. Ohio State University, Dept. of Linguistics, pp. 91–136.

Romero, Maribel and Chung-hye Han: 2001, 'On Certain Epistemic Implicatures in Yes/No Questions'. In: *Proceedings of the 13th Amsterdam Colloquium*. Amsterdam, ILLC/Dept. Philosophy , Univ. of Amsterdam.

Romero, Maribel and Chung-hye Han: 2002, 'Verum Focus in Negative Yes/No Questions and Ladd's p /$\neg p$ Ambiguity'. In: *Proceedings of Semantics and Linguistic Theory*, Vol. 12. Ithaca, NY, CLC Publications.

Rooth, Mats: 1992, 'A theory of focus interpretation'. *Natural Language Semantics* **1**, 75–116.

Sadock, J. M.: 1971, 'Queclaratives'. In: *Proceedings of the 7th Regional Meeting of the Chicago Linguistic Society*. Chicago, CLS.

Stalnaker, Robert C.: 1978, 'Assertion'. In: P. Cole (ed.): *Pragmatics*, Vol. 9 of *Syntax and Semantics*. New York: Academic Press, pp. 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*. New York, London: Garland Publishing, Inc. 1985 Univ. of Pennsylvania Ph.D. Disserattion.