

Biased questions

Experimental results and theoretical
modelling

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Topics at the Grammar-Discourse Interface

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Preface

The twelve articles in this volume and the introduction developed from talks that were presented at the workshop *Biased Questions: Experimental Results & Theoretical Modelling* carried out at the Leibniz-Zentrum Allgemeine Sprachwissenschaft (ZAS) in Berlin on February 4–5, 2021. This was the third workshop of the project *SPAGAD: Speech Acts in Grammar and Discourse*, funded by European Union’s Horizon 2020 Research and Innovation programme under grant agreement no. 787929. Due to the Covid19 epidemic, it had to be carried out as a virtual workshop.

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Introduction

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1 Biased questions: An overview

According to the standard analysis of question meaning, a question denotes a set of propositions, i.e. those that answer the question. Polar questions, the subject matter of this volume, are taken by many theorists to denote a set of their positive and negative answers (Hamblin 1973, Groenendijk & Stokhof 1984, Ciardelli et al. 2019).¹ For example, (1) denotes the set of propositions in (2).

- (1) Is it raining?
- (2) {it is raining, \neg it is raining}

A common assumption among such theories of polar questions is that the alternatives proposed by the question are balanced, that is, the propositions in the set are equally ranked. This is represented visually in Figure 1.



Figure 1: Balanced question

But as we all know, sometimes questions are biased. For example, the speaker might take one answer to be more likely than another. This leads to an imbalance among the propositions, as in Figure 2.

¹There are non-trivial differences in how these theories of question semantics arrive at the set of propositions in (2), but for now we abstract away from these differences.





Figure 2: Biased question

There are several interesting questions about this kind of imbalance, including what constitutes the evidence for such an imbalance, whether there are different kinds or different dimensions of tilts, and how can we represent these aspects of meaning.

The existence of biased questions was famously pointed out by Bolinger (1978), who drew attention to the differences between simple polar questions and alternative questions. A polar question like (3a) is totally normal but an alternative question like (3b) is quite strange, perhaps because the questioner is more interested in the positive answer being true rather than the negative, and this is better expressed by (3a) than (3b).

- (3) a. Will you help me?
- b. Will you help me or not?

Another difference is that polar questions can be conversation starters whereas alternative questions cannot. The sequence in (4a) sounds normal, while that in (4b) sounds odd.

- (4) a. Nice to meet you! Do you like to play golf?
- b. # Nice to meet you! Do you like to play golf or not?

There is also a difference with respect to question complementizers. It seems that embedded polar questions introduced by *if* correlate with simple polar questions, while those introduced by *whether* correlate with alternative questions. Thus, the scenario in (5) is more naturally reported as (6) than (7).

- (5) John asked Mary: “Will you marry me?”
- (6) John asked Mary if she would marry him
- (7) ?John asked Mary whether she would marry him

Bolinger suggests that the complementizer *whether* is used when the speaker, having already considered the alternative possibilities, is trying to dispassionately gain information about them. We add that this corresponds to our intuition

that the use of *whether* in (7) indicates that John thinks a negative answer is a serious possibility, at least as likely as the positive answer.

So we see that simple polar questions can highlight one option, while alternative questions highlight both options. We can then ask whether alternative questions are neutral. But as Biezma (2009) shows, alternative questions are not neutral. They come with what Biezma calls a ‘cornering effect’: The hearer is forced to give an answer. The question in (8) sounds like it is the last of a series of questions to which the speaker has not gotten a proper answer.

- (8) Will you marry me or not?

Let us look at negated questions and the uses of antonyms. Assuming that a bridge is either closed or open, the standard view on questions would assign all of the following sentences the same meaning, namely $\{o, \neg o\}$, where o stands for the bridge is open and $\neg o$ for the bridge is not open, i.e. closed.

- (9) a. Is the bridge open?
 b. Is the bridge open or not?
 c. Is the bridge open or closed?
 d. Is the bridge closed?
 e. Is the bridge closed or not?

However, the choice of the expression clearly matters (Van Rooy & Šafářová 2003, Torres Bustamante 2012, Roelofsen & van Gool 2010, Trinh 2014). In a context where the speaker needs to get to the other side of the river and wants the bridge to be open, and there is no contextual indication as to whether or not it is open, the questions in (9) are ranked in the order of most to least appropriate.

Similarly, in a context where the speaker needs to throw an even number, the utterance in (10) would be most appropriate with the leftmost choice (*even*) and least appropriate with the rightmost choice (*odd or not*).

- (10) I don't dare to look! Is the number even / [?]even or not / ^{??}even or odd / #odd / ##odd or not?

However, in both preceding examples, further additions to context can change these intuitions. For example, suppose that in (9), the speaker wants the bridge to be open, but their interlocutor has just indirectly implied that the bridge is closed. In that case, (9d) is most natural. Or suppose the interlocutor ambiguously implies first that it is closed, and then that it is not closed. In that case, (9e) would be most natural, despite that the speaker wants the bridge to be open. As

for (10), suppose the speaker needs an even, but steadfastly believes that their luck is cursed, and therefore an odd number is almost certain. Then asking the question with *odd* is most natural. What this shows is that the contextual factors affecting which question form is most natural are influenced by multiple competing factors.

How can we differentiate between question meanings so that we can describe their different uses? Obviously the truth conditional content offered by the theories discussed above does not suffice. We have to look at how these truth conditions are expressed formally. One idea that has been proposed is that different kinds of questions introduce different kinds of discourse referents (DR) (see Krifka 2013 for the role of propositional discourse referents in responses).

- (11) a. “Is it raining?” \rightsquigarrow DR: ‘it is raining’
- b. “Is it not raining?” \rightsquigarrow DR: ‘it is not raining’
- c. “Is it raining or not?” \rightsquigarrow DR: ‘it is raining’, ‘it is not raining’

As a consequence, these questions would have different discourse potentials. There are other proposals, such as Roelofsen & van Gool (2010), which makes it possible to “highlight” one of the propositions, leading to a more complex semantic representation. Theories also exist which say the meaning of questions does not have to be balanced. These allow for a monopolar interpretation of questions. Hamblin’s semantics, for example, allows for (11a) to denote the set contain only one proposition, namely the proposition that it is raining. The question in (11b) would denote the set containing only the proposition that it is not raining. The set denoted by the alternative question in (11c) would contain both of these propositions. This is different from the assertion, which is just the proposition, not a set containing the proposition (Van Rooy & Šafářová 2003).

In commitment space semantics (Krifka 2015), there is also a way to differentiate between the cases in (11). We assume the common ground, or “commitment space”, represented by C , to be a set of information states, or “commitment states”, represented by c . Each commitment state is a set of possible worlds. The root of C , represented as \sqrt{C} , is the set of “largest” commitment states, so to speak.

$$(12) \quad \sqrt{C} = \{c \in C \mid \neg \exists c' \in C [c \subset c']\}$$

In case of an assertion, say of the proposition that it is raining, represented as r , the commitment space C is updated so that it contains only commitment states which entail r .

$$(13) \quad C+ ‘it is raining’ = \{c \in C \mid c \subseteq r\}$$

Questions differ from assertions in that they do not change \sqrt{C} , the root of the commitment space.

- (14) a. $C^+ \text{ 'is it raining?'} = \sqrt{C} \cup \{c \in C \mid c \subseteq r\}$
- b. $C^+ \text{ 'is it not raining?'} = \sqrt{C} \cup \{c \in C \mid c \subseteq \neg r\}$
- c. $C^+ \text{ 'is it raining or not?'} = \sqrt{C} \cup \{c \in C \mid c \subseteq r \vee c \subseteq \neg r\}$

In other words, questions do not add information. Instead, they restrict the continuation of the discourse. As shown in (14a) and (14b), the “positive” and the “negative” simple polar question restricts C to those c which entail r and $\neg r$, respectively. This is intended to represent the fact that the speaker wants to see if the discourse can continue with the information that it is raining, in the first case, or with the information that it is not raining, in the second case. The alternative question, as shown in (14c), has a yet different meaning from the two simple polar questions.

Note, however, that this approach would still not capture the distinction between (9b) and (9e), reproduced below in (15) and (16).

- (15) Is the bridge open or not?
- (16) Is the bridge closed or not?

The general question, then, is how to represent polar questions properly to capture their different uses.

We now turn to the topic of negation in polar questions (Bolinger 1957, Ladusaw 1979, Ladd 1981). Ladd (1981) discusses polar questions such as those in (1).

- (17) Is it not raining?
- (18) Isn't it raining?

These questions differ with respect to where syntactic negation is. In (17), it is low, below the subject, while in (18) it is high, above the subject. The low negation question seems to implicate that the speaker wants to be informed as to whether the proposition that it is not raining is true. The high negation question, on the other hand, seems to indicate that the speaker is already inclined to assume that it is raining and wants to confirm this belief.

Ladd (1981) assumes that high negation questions are actually ambiguous, with both “outer” and “inner” interpretations. He claims the ambiguity can be resolved by the presence of polarity items like *too* and *either*, which disambiguate the question toward the outer and inner readings respectively.

- (19) Isn't Jane coming too? → outer interpretation
- (20) Isn't Jane coming either? → inner interpretation

A prominent analysis of these facts is proposed by Romero & Han (2004). This analysis assumes a VERUM operator, whose meaning is a conversational version of the adverbial *for sure*, and whose occurrence is associated with a syntactically preposed high negation. We have the following form-meaning pairs, where p stands for the proposition that Jane is coming. Notice that negation can scope either below or above the VERUM operator.

- (21) Is Jane not coming?
= WHETHER($\neg p$) = $\{\neg p, \neg\neg p\} = \{p, \neg p\}$
- (22) Isn't Jane coming (either)?
= WHETHER(verum($\neg p$)) = $\{\text{for-sure}(\neg p), \neg\text{for-sure}(\neg p)\}$
- (23) Isn't Jane coming (too)?
= WHETHER($\neg\text{verum}(p)$) = $\{\neg\text{for-sure}(p), \text{for-sure}(p)\}$

Romero and Han propose that VERUM is also present when the question contains the adverb *really*. Thus, (24) ends up having the same meaning as (23).

- (24) Is Jane really coming?
= WHETHER(verum(p)) = $\{\text{for-sure}(p), \neg\text{for-sure}(p)\}$

A similar approach is adopted by Krifka (2015), which assumes a commitment operator \vdash that is present in both assertions and questions, and negation can scope either below or above that operator.

- (25) $C^+ \text{ 'is Jane not coming?'} = \sqrt{C} \cup C^+ [\text{Addressee } \vdash \neg p]$
~~ the speaker is checking whether the addressee is committed to $\neg p$
- (26) $C^+ \text{ 'isn't Jane coming?'} = \sqrt{C} \cup C^+ \neg[\text{Addressee } \vdash p]$
~~ the speaker is checking whether the addressee is not committed to p

So, there is a wide array of syntactic profiles available for polar question formation: high and low negation, the presence or absence of adverbials like *really*, and also, the presence or absence of bias inducing expressions such as negative polarity items (NPIs). Table 1 presents a fine-grained list (probably non-exhaustive) of relevant phenomena (see also the bias profiles discussed in Gärtner & Gyuris 2017).

Coming back to the topic of negation in questions, one promising approach is to look at contextual features. This goes back to Büring & Gunlogson (2000),

Table 1: Polar question varieties

Example	Abbreviation	Label
Is it raining?	PQ	positive question
Is it not raining?	NQ	negative question
Isn't it raining?	HPQ	high negated positive question
Isn't it not raining?	HNQ	high negated negated question
Is it really raining?	RPQ	<i>really</i> positive question
It is really not raining?	RNQ	<i>really</i> negated question
IS it raining?	FPQ	focused positive question
IS it not raining?	FNQ	focused negated question
Is it REALLY raining?	FRPQ	focused <i>really</i> positive question
Is it REALLY not raining?	FRNQ	focused <i>really</i> negated question
It is raining?	DPQ	declarative positive question
Is it raining??	IPQ	incredulity positive question
Is it raining or not?	APNQ	alternative question with negation
Is the bridge open or closed?	AAntQ	alternative question with antonyms
Do you have any potatoes?	npiPQ	positive question with polarity item

which assumes three levels of contextual evidence with respect to the prejacent of a polar question: positive, neutral, and negative. The generalization in Table 2 is established.

Table 2: Büring & Gunlogson's (2000) generalization

contextual evidence	PPQ	HPQ	
		high reading	low reading
positive	✓	✗	✗
neutral	✓	✓	✗
negative	✗	✓	✓

The contextual evidence is “positive” if it supports the prejacent, “neutral” if it neither supports nor speaks against the prejacent, and “negative” when it speaks against the prejacent. Thus, even PPQs are not neutral, in the sense that there are contexts where they cannot be used, namely those with negative evidence. Note that Büring & Gunlogson (2000) take HPQ with a low negation to mean the same as NQ. Thus, (27a) and (27b) would be equivalent in this approach.

- (27) a. Isn't Jane coming either?
 b. Is Jane not coming either?

The first experimental work on this topic is done by Roelofsen et al. (2013). This is a rating experiment, which contrasts prior speaker's belief (SB) with positive, neutral, and negative contextual evidence (CE). The experiment yields interesting results about the different uses of positive, high negation, and low negation questions as presented in Figure 3.

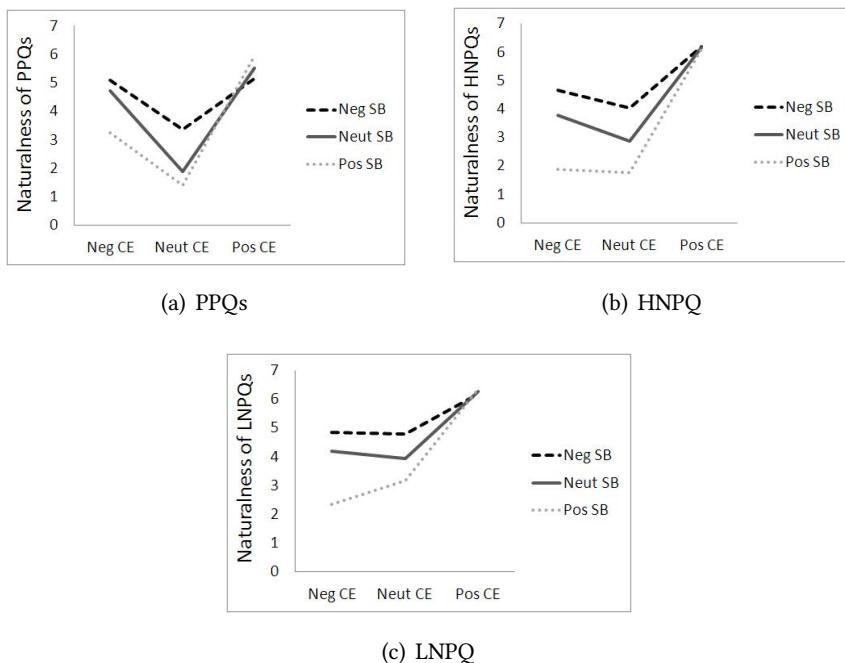


Figure 3: Roelofsen et al.'s (2013) experimental results

These uses were described in terms of various preference rules. An example of such a rule is “ask only if needed”. According to this rule, there is no need to ask any question if speaker's belief and contextual evidence coincide. Another rule is “avoid reversing processes”, which says that it would be strange to ask whether $\neg p$ is true when the speaker's belief or the contextual evidence supports p . Yet another rule is “use the least marked form”, which would prefer a positive question to a negative or an alternative question, for example. We note that these rules resemble constraints in bidirectional optimality theory (OT) in pragmatics, hence raise the question whether bidirectional OT should be employed in analyzing biased questions. We believe this perspective is promising.

It has become consensus to assume three levels – positive, neutral, negative – for both contextual evidence and prior speaker's belief, or “evidential bias” and

“epistemic bias”, which are terms proposed by Sudo (2013) which have gained some currency. We could let SB stand for prior speaker’s belief and CE for contextual evidence, and use +, 0 and – to represent the three levels positive, neutral, and negative. Bias profiles of questions could then be represented more succinctly. For example, [SB–, CE+] is a question with negative prior speaker’s belief and positive contextual evidence, and [SB0+, CE–] would be a question with neutral or positive prior speaker’s belief and negative contextual evidence. If we adopt the convention of placing the value for SB to the left of that for CE, the profiles can be represented even more economically. Thus, [SB–, CE+] can be shortened to [–/+] and [SB0+, CE–] to [0+/-].

Domaneschi et al. (2017) present further experimental results. Tests were conducted on high negation questions (HiNQ), low negation questions (LowNQ), positive question (PosQ), and positive question with *really* (ReallyPosQ). The object languages were English and German. Participants were given a selecting task, where they had to pronounce their option. The main results are presented in Figure 4.

A recurring question is whether syntactically high negation questions (HPQs) are semantically ambiguous. Ladd (1981) claims that they are; Sailor (2012), AnderBois (2019), Goodhue (2022) all argue that they are not. It should be pointed out, however, that Sailor’s data can be accounted for by assuming that for English, HPQs are ambiguous while NQs are not, and for German, the opposite is the case.

- (28) English
 - a. Isn’t there a train in the early morning? $\neg Qp / Q\neg p$
 - b. Is there no train in the early morning? $Q\neg p$
- (29) German
 - a. Gibt es hier nicht einen Zug am Morgen? $\neg Qp$
 - b. Gibt es hier keinen Zug am Morgen? $Q\neg p / \neg Qp$

How can we explain this difference between English and German? Suppose we say that in the [SB+, CE–] scenario, the wide-scope negation reading is the best. If we then assume that in German this wide-scope interpretation can also be expressed by a syntactically low negation, we can explain why there is more uses of this option in German.

The interesting issue here, therefore, is whether there are different readings of high negation questions and low negation questions.

Sudo (2013) looks at the Japanese counterparts of positive questions (PQs), high negation questions (HQs), and low negation questions (NQs).

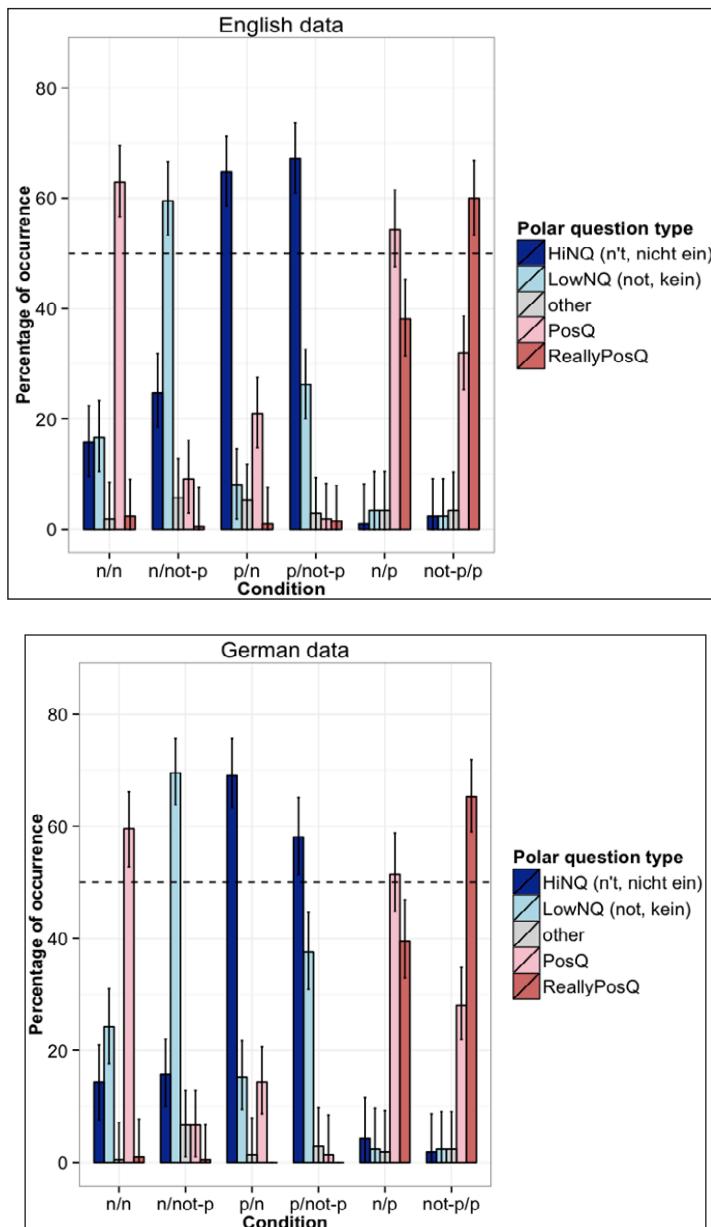


Figure 4: Domaneschi et al.'s (2017) experimental results

- (30) Mary-ga kita {Ø / no / desho}
 Mary-NOM came
 ‘Did Mary come’ PQ
- (31) doko-ka nihon-shoku nai?
 where-KA Japanese-food not.exist
 ‘Isn’t there some Japanese restaurant?’ HQ
- (32) doko-mo nihon-shoku nai?
 where-MO Japanese-food not.exist
 ‘Isn’t there any Japanese restaurant?’ NQ

Sudo treats epistemic and evidential bias, at different levels, as features which can be combined in different ways as presented in Table 3. Gyuris (2017) looks at three different types of polar questions in Hungarian as presented in Table 4.

Table 3: Sudo’s (2013) taxonomy

Question type	Epistemic	Evidential	Short
PQ	none	not negative	-0+/0+
HQ	positive	not positive	+/-0
NQ	positive	neutral	+/0

Table 4: Gyuris’s (2017) taxonomy

	-e-interrogative	Λ-interrogative	Λ-declarative
Neutral information question, (11)	✓	✓	✗
Grounding question, (12)	✗	%	✓
Indirect Request	✗	✓	✗
Indirect offer, (14)	✓	✓	✗
Conversation starter, (15)	✗	✓	✗
Pedagogical question	✓	✓	✗
Monological question	✓	✓	✗
Exam question, (18)	✓	✓	✗
Rhetorical question, (19)	✓	✓	✗

Gärtner & Gyuris (2017) look at possible bias profiles (see Table 5). There are $7 \times 7 = 49$ possible SB/CE combinations. When we consider the three types of questions (PQ, HQ, NQ), we end up with $7^3 \times 7^3 = 117649$ possibilities, which is

Table 5: Gärtner & Gyuris's (2017) bias profiles

Question type	Speaker belief	Current evidence
ePQ		0
\wedge PQ		0, for some speakers –
\wedge DPQ		+
eHQ	+	0
\wedge HQ	+	-0
\wedge NQ	+	–
\wedge DNQ		–

an astonishing number due to combinatorial explosion. But one can reduce the number of possibilities by certain general principles. For example, a principle of Markedness could favor non-negated questions over negated ones so that they are also used for neutral questions (cf. also Trinh 2014: 230).

Let us now turn to the topic of NPIs in questions (Ladusaw 1979, Kadmon & Landman 1993, Krifka 1995, Van Rooij 2003). It has been observed that NPIs do not occur in declarative questions. Since declarative questions presumably have a $[-0+/+]$ profile, in case of rising contour, or a $[-/+]$ profile, in case of incredulity contour, questions with NPIs must have a $[*/-0]$ profile. Questions with strong idiomatic NPIs (i.e. minimizers) appear to have a $[-/-0]$ profile, meaning their use requires that the speaker not believe and the context not have evidence for the prejacent.

- (33) a. Did John do anything to help?
 b. Did John lift a finger to help?

Asher & Reese (2005) account for NPIs in questions by assuming that such questions actually come with a negated assertion, which is what licenses the NPI. Another way to explain the felicity of NPIs in questions is by appealing to the fact that a question denotes a set containing a proposition and its negation, and it is the negated proposition which licenses the NPIs. The unacceptability of NPIs in declarative questions can then be explained by saying that these questions are monopolar: they denote sets containing only one proposition. Guerzoni & Sharvit (2014) account for the distribution of NPIs in questions by claiming that many questions contain covert disjunction with a covert negation that licenses the NPI. On this view, it could be argued that declarative questions fail to license NPIs because they lack covert disjunction and negation.

Krifka (1995) and Van Rooij (2003) propose that NPIs in questions create a more equal distribution of the likelihood of both options by way of widening the meaning of the NP complement. Thus, *potatoes* in *any potatoes* would denote a superset of *potatoes* in *some potatoes*. Strong NPIs would increase the chance of the positive answer being true, and this is a strategy for showing preference for the negative answer. It is, however, not clear how to represent the bias which comes about by way of (strong) NPIs with the features that we have discussed.

We believe that a distinction has to be made within the category of contextual evidence (CE). Specifically, we need to differentiate between CE which is factual and CE which is inferred from what the addressee says.

(34) Factual

- a. A: Coming in with a dripping raincoat
- b. B: Is it really raining outside?

(35) Addressee's belief

- a. A: The rain is bothering me!
- b. B: Is it really raining outside?

This leads us to the question of when an assertion is biased. Presumably, an assertion is biased if the speaker's belief supports the asserted proposition, there is no contextual evidence against it, but the addressee does not believe it yet. We can enrich our feature notation by placing the addressee's belief in brackets.

(36) It is raining	[+/0+] or [+0 + (-0)]
(37) It isn't raining	[−/−0] or [−/−0(0+)]
(38) Really, it is raining	[+/0 + (−)]

Other relevant topics include in-situ wh-question (Biezma 2009), assertions with question tags, and miratives (Delancey 1997, Torres Bustamante 2012).

Last but not least, we would like to emphasize the importance of prosody. In this connection, Bartels (1999) should receive mention. We would draw attention to the discussion on “falling” declarative questions, i.e. those that are not marked by rising contour. Other works on prosody and bias include Grice & Savino (2003), Kügler (2004), and Arnhold et al. (2021).

2 The contributions to this volume

In their chapter *Biased questions and modal ranking*, Alda Mari and Anastasia Giannakidou point out that questions share a semantic feature with epistemic modals: They are non-veridical in the sense that they do not entail that their prejacent proposition p is true. The authors suggest that questions with negative and positive bias lie on a continuum between regular questions and assertions, and that they share this property with weak and strong epistemic modals that modify assertions. Both questions and epistemically modified statements require that the modal base of the speaker contains both p and $\neg p$ worlds (the “nonveridicality axiom of modals and questions”). But questions and epistemically modified statements differ insofar as only the latter have truth conditions and can be said to be true or false. The authors discuss three empirical domains. First, *really*-questions are analyzed as marking a genuine interest of the speaker and having a negative bias. They provide an account of *really* in which this adverb points to a different ranking of propositions between the assumptions of the speaker and evidence of the context, with reference to experimental work on *wirklich* in German. They show that negatively biased questions ask for stronger confirmation; a response like *I think so* is felt to be insufficient. The second domain are questions with high negation and low negation with a positive bias, which are related to assertions with the strong modal *must* that also expresses a positive bias. The third domain are *reflective* or *conjectural* questions marked with weak epistemic modals, such as *might*. They observe that the modals must be weak, and argue that they widen the modal base, enlarging the range of possibilities, thus unearthing remoter ways in which a proposition may be true. As for assertions, the authors suggest that they are only added into the common ground when not modalized.

In her chapter, *Evidential bias across clause types*, Beste Kamali compares English rising declarative questions, known to express a positive bias towards their proposition, with a polar question type in Turkish. In this language, polar questions are always marked by a particle *MI* that is attached to a constituent of the sentence, then often marking the focus of the question, or after the (typically final) finite verb of the sentence, indicating a polar question without focus. However, when *MI* attaches to the direct object, focus may project to the whole sentence. There are subtle differences between such sentences and sentences where *MI* is attached to the final verb. In particular, the object-*MI* sentences have a reading that has a similar bias to English rising declarative questions, insofar as they also require a positive evidential bias. However, a careful examination in a battery of tests reveals interesting differences: First, object-*MI* questions are classi-

fied as “questions” in the object language, different from English (cf. *One question remains: Did Ali make dinner? / #Ali made dinner?*). They do not allow for modal adverbials, different from English (cf. *You certainly made dinner?*). And they can be embedded by rogative predicates, again different from English (**She asked Ali made dinner?*). Hence, object-*MI* questions achieve their positive bias in ways quite different from English declarative questions. According to the proposed analysis, they both are monopolar, in contrast to regular polar questions and verb-final *MI*-questions, which are analyzed as bipolar. Their differences derive from the fact that they are syntactically and semantically different clause types. The author also draws in evidence from Hungarian and Japanese that show similar question types as Turkish object-*MI* questions.

In their chapter, *The contribution of intonation in the conveyance of question bias*, Riccardo Orrico, Cristel Portes, Mariapaola D’Imperio provide a comprehensive overview of the role of intonation in the expression of question bias. They begin with a review of the literature on intonation patterns and the different dimensions of meaning they can express. This review is followed by a discussion of two recent experimental studies conducted by the authors themselves. Throughout the chapter, the authors address three main questions about the relationship between phonetic cues and speaker meaning: the kinds of meanings that can be expressed by intonation, the intonational cues that convey these meanings, and the degree of variation within the linguistic population. After a general overview, they provide a detailed comparison of the means used by Italian and French speakers to express question bias. They argue that the way in which meaning is encoded in intonation patterns is not universal. Their study shows that different languages have their own specific cues to express specific meanings.

In their chapter, *Negative Polar Questions in Russian: Question bias and question concern*, Sophie Repp and Ljudmila Geist study the appropriateness conditions of yes–no questions containing the particles *razve* and *neuželi*, both of which can be translated as *really*. In their analysis, they distinguish between the bias profile of a question and the *question concern*. The *bias profile* is defined by the question’s *epistemic* and *evidential* bias (following Sudo 2013), where the former refers to the speaker’s prior beliefs and the latter to contextual evidence that may or may not conflict with the speaker’s beliefs. By *question concern* they refer to the purpose of checking or rejecting the prejacent of a question, or its negation. Repp and Geist assume that the appropriateness of different types of polar questions depends on their bias profile and their concern. They demonstrate the usefulness of this assumption for polar questions in English, and then extend the analysis to polar questions in Russian with or without particles *razve* and *neuželi*. Repp and

Geist show that polar questions with *razve* and *neuželi* do not differ in their bias profile but in their ability to check the truth of the proposition which is favoured by the question's epistemic bias. Repp and Geist support their analysis by a corpus study and two experimental investigations. They further provide a semantic explanation for the difference between *razve* and *neuželi* in terms of their consistency with inner and outer negation.

In their chapter, *Bias in Tag Questions*, Corey Bill and Todor Koev study constructions consisting of a VP-elliptical yes/no question which is “tagged” onto an “anchor” declarative sentence of the opposite polarity, as exemplified by *it's raining, isn't it?* and *it's not raining, is it?*. It has been observed that tag questions give rise to the inference that the speaker is “biased” toward the anchor, i.e. that she believes the proposition it expresses to be true. Bill and Koev propose to describe such biases in terms of two parameters: (i) whether they are weak or strong, and (ii) whether they are optional or obligatory. They devise diagnostics to test these distinctions, and advance an analysis to derive the observations from syntactic and phonological properties of tag questions.

In their chapter, *Contextual Bias and the Landscape of Mandarin Polar Questions*, Yurie Hara and Mengxi Yuan discuss *ma*-questions and A-not-A questions in Mandarin Chinese. They present the following observations: (i) positive *ma*-questions can be used in either neutral or positively biased contexts; (ii) negative *ma*-questions can only be used in negatively biased contexts; (iii) A-not-A questions can only be used in neutral contexts. They then argue that it is contextual bias, not speaker's bias, which is instrumental for an analysis of this distribution. The concept of “contextual bias” is defined in terms of subjective probability and Farkas & Bruce's (2010) Table model.

In their chapter, *What can Cantonese sentence-final particles tell us about rhetorical questions?*, Angelika Kiss, Roger Yu-Hsiang Lo, and Justin R. Leung discuss three kinds of questions: (i) information seeking questions (ISQ), (ii) rhetorical question with empty set answers (RQ-), and (iii) rhetorical questions with non-empty set answers (RQ+). It uses the framework of inquisitive semantics to argue that these are in fact natural classes in terms of informativity and speaker's commitment. Moreover, ISQ and RQ- make up a subclass in this three membered group. An perception experiment is then presented whose result shows that the semantic distinctions are also reflected prosodically in Cantonese, specifically in distinctions with respect pitch contour and length of the final sentence particle.

In his chapter, *A note on bias and polarity in Vietnamese*, Tue Trinh discusses the distribution of two types of NPIs across two types of polar questions. NPIs in Vietnamese come in two morphological variants, one simple and one complex. Among polar questions in this language, Trinh distinguishes between yes/no

questions and agreement questions. The observation is that complex NPIs are acceptable in yes/no questions but deviant in agreement questions, and in yes/no questions, complex NPIs give rise to negative bias while simple NPIs do not. The analysis Trinh proposes for this fact assumes that complex NPIs require a covert EVEN in the structure, and that agreement questions contain a covert evidential marker.

Much of the study on biased questions has been based on the introspective intuition from different languages. In this chapter, *Psycholinguistic processing tasks and the study of question bias*, E Jamieson and Vinicius Macuch Silva provide another dimension: how can we investigate the issues related to biased questions from an experimental perspective? The chapter discusses different theoretical approaches to biased questions, an overview of psycholinguistic investigations on this topic, as well as the contribution of experimental data to the ongoing discussion and understanding of polar questions. In addition, Jamieson and Silva provide concrete suggestions and guidance regarding the aspects of experimental set-up, providing important resources for future researches.

Hungarian interrogatives are marked with a special suffix. In her chapter, *Marking the type of speaker bias: Hungarian nem-e interrogatives*, Gyuris examines a particle *nem-e*, which consists of a negation and an interrogative marker. This particle has not been investigated before, and naturally, Gyuris is the first to describe the different characteristics that the particle exhibits, and to a semantic account. Gyuris first discusses the meaning contribution and the distribution of the canonical question particle *-e*, showing the interaction between its meaning and biases. She then discusses the data on *nem-e*, and reveals that their meaning and distributional pattern reveal cross-dialectal variation: *nem-e* gives rise to the outside negation reading but not inside negation reading, and is incompatible with different types of biases. After identifying different uses of *nem-e*, Gyuris provides analyses of the particle, which predicts and accounts for their distribution. The chapter is a welcome addition to our understanding of biased questions.

In their chapter, *Children's acquisition of English "high" negation: A window into the logic and composition of bias in questions*, Rebecca Woods and Thomas Roeper investigate the production of English nuclear negative tag structures and negative questions, produced by children and adults. They argue that the structures of negative tags and negative questions are distinct, the former being simple speech acts that are complex at the clausal level. The negative questions, on the other hand, involve an interrogative clause, scoped over by metalinguistic negation and a question operator. Woods and Roeper provide a new type of evidence

for their analysis, providing making valuable (and novel) empirical contribution to the volume (suggetion)s.

In his chapter, *Everything that rises must converge: Toward a unified account of inquisitive and assertive rising declaratives*, Daniel Goodhue investigates the relationship between rising declarative clauses that are used to ask questions, and those that are used to make assertions. English matrix declaratives with a final rising intonation typical of polar questions are frequently used as a biased question: they convey that there is contextual evidence in favor of the proposition denoted by the declarative. However, some rising declaratives assert the content of the declarative, while raising a second issue. Goodhue offers a unified account of rising declaratives that seeks to explain both of these kinds of uses while positing unitary meanings for clause types and intonations. Achieving this goal depends the view that illocutionary force is not determined by clause type and intonation. Instead, clause type and intonation are proposed to merely constrain what a speaker could intend to do with them; pragmatic inference then plays a key role in enabling an audience to uncover the speaker's illocutionary intention. The proposed account enables a derivation of assertive force.

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Chapter 1

Modalization and bias in questions

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In this paper, we discuss the presence of modal elements in questions (adverbs, particles, negation) and propose a new theory of bias that relies on the similarities between polar questions and modal assertions. While the two differ in that the first do not have truth conditions, they are deeply similar in presupposing nonveridical spaces, partitioned into p and its negation. The partition can be indiscriminate, in which case we have nonveridical equilibrium, or bias (positive/negative). We propose an analysis of bias as indicating the presence of a meta-evaluation ranking function O which is also a component of modal structures (Giannakidou & Mari 2018a,b, 2021a,b). Focus adverbials such as REALLY, modal adverbials, and negation are overt lexicalizations of the ranking, and not indicators of VERUM, as we show. Our paper also discusses the phenomenon of *reflection* which arises with the presence of modal particles as a pragmatic dual to bias. We identify a number of properties of reflective questions that set them apart from information and biased questions evidencing enhanced uncertainty which we analyze as an effect of the modal element in a reflective question widening the modal base.

1 Questions, bias, and the nonveridical partition

In the literature on speech acts the assumption is made that different syntactic types (declarative, interrogative and imperative) map onto distinct speech acts such as assertions, questions and commands respectively (see for a recent discussion Portner 2018). When it comes to assertions and questions, most formal analyses assume a logical language that reflects a clear-cut syntactic distinction



between declaratives and interrogatives often containing a designated speech act operator such as ASSERT and ? respectively (Krifka 1995). Ciardelli et al. (2013) call those analyses ‘syntactically dichotomous’, and propose further that they are also semantically dichotomous in assigning different semantic values to assertions (propositions) and interrogatives, which are taken to denote questions, i.e., sets of propositions.

While categorically different, questions and assertions, however, come closer in the phenomenon of *bias*. While the denotation of a plain interrogative such as (1) is a request for information, biased questions (2) are not just seeking information but also convey the speaker’s expectation that a positive or negative answer is more likely. This is called *bias*:

- (1) Is Ernie a vegetarian?
- (2) a. Isn’t Ernie a vegetarian? (high negation: positive bias)
- b. Ernie is a vegetarian, isn’t he? (negative tag: positive bias)
- c. Is Ernie really a vegetarian? (adverb *really*: negative bias)

A speaker uttering a plain yes/no interrogative is in a state of “true” uncertainty: she does not know if Ernie is a vegetarian and poses the question as a request to find out. The polar question is therefore “information seeking” and does not discriminate towards one answer or the other. This state of neutral uncertainty between p and its negation has been characterized as nonveridical *equilibrium* (Giannakidou 2013, Giannakidou & Mari 2016, 2018a,b, 2021a,b) because the two options are entertained by the speaker as equal possibilities upon asking the question:

- (3) Nonveridical equilibrium (= “True uncertainty” in Giannakidou 2013)

A partitioned (p and $\neg p$) epistemic or doxastic space $M(i)$ is in nonveridical equilibrium if p and $\neg p$ are equal options, i.e., they are not ranked; i is the individual anchor, by default in questions the speaker.

Following our earlier work, we take equilibrium to be the default semantic feature of epistemic possibility, questions, and conditionals (for more recent discussion see Liu et al. 2021), regardless of their discourse function. The egalitarian state of the nonveridical equilibrium is neutral because when asking a plain polar question the speaker has no preconception of assuming which answer (yes or no) is true, no priors (i.e. previously held beliefs or assumptions) as to the positive or the negative answer being more likely. The proposition *Ernie is a vegetarian* is not challenged in the context prior to asking the question, and the speaker does

not have any preference for a positive or negative answer, no expectations that would make them think that Ernie is or is not a vegetarian. Nonveridical equilibrium is, in other worlds, a state of epistemic neutrality with no preconditions on the context or the speaker's epistemic state regarding the questioned content.

When asking a biased question, on the other hand, the speaker reveals that they actually do have some prior expectations that pre-empt them to discriminate between the two possible answers. They now judge a positive or a negative answer as more likely. For instance, upon asking (2a–2b) the speaker reveals that they are considering, prior to asking the question, that *Ernie is a vegetarian* is a more likely answer. Having prior expectation is not equivalent to believing that *Ernie is a vegetarian*; if the speaker had believed that the content is true they wouldn't have asked the question. Likewise in (2c) with *really*, the speaker is having reasons to think that *Ernie is not a vegetarian* is a more likely answer. Again, this is not a belief that Ernie is a vegetarian; if the speaker believed that already, there would be no need to ask a question. With biased questions uncertainty still exists about what the true answer is, but the speaker comes to question not from a neutral stance but from a discriminating one: she ranks the two possible answers, and has prior assumptions that favor the one or the other.

Bias thus modifies the neutrality of equilibrium in a positive or negative direction by the speaker's priors which are revealed in that the speaker chooses to add certain devices to the question, such as high negation (2a), a negative tag (2b), or the adverb *really* (2c). The choice to add these devices reveals to the audience that the speaker abandons neutrality and questions with preference towards a (positive or negative) answer (Sadock 1971, Ladd 1981a, Abels 2003, Van Rooy & Šafářová 2003, Romero & Han 2004, Reese 2007, Asher & Reese 2007, Krifka 2015, Malamud & Stephenson 2015, Roelofsen & Farkas 2015, Larrivée & Mari 2022, Giannakidou & Mari 2021a,b a.o.). In (2b–2c) the speaker has a positive bias and seems to believe it more likely that Ernie is a vegetarian; in (2c), by adding *really*, the speaker intends to show that they doubt that Ernie is a vegetarian, and we talk about *negative bias*.¹

¹Negative bias is also famously observed with negative polarity items (NPIs) (see Borkin 1971, Giannakidou 1997, 2007, Van Rooy & Šafářová 2003, Guerzoni 2004, Guerzoni & Sharvit 2007, a.o.):

- | | | |
|-----|---------------------------------------|----------------------|
| (i) | a. Have you spoken to Mary even once? | (NPI: negative bias) |
| | b. Did Mary lift a finger to help? | (NPI: negative bias) |

The speaker here has a negative expectation that the addressee has not spoken to Mary or that Mary did not help. In both cases, bias arises because the speaker decided to augment the questions with a focused NPI.

Biased questions, then, are not mere requests for information but rely on the speaker's prior doxastic and epistemic assumptions and expectations.² In this respect, they lie on a continuum between questions and assertions: they ask whether p but also discriminate towards p , or its negation. Notice that in the tag question (2b) we actually do have a hybrid declarative and interrogative sentence. Importantly, the bias can also famously be cancelled with an answer of the unexpected polarity. Bias is a choice that the speaker makes based on their assumptions and contextual knowledge but it is not a common ground presupposition, as we will emphasize, hence it can be objected to. In the case of positive bias, the speaker seems to rank p as more likely, hence they are more epistemically committed to it; in the negative bias, $\neg p$ is considered more likely and there is less epistemic commitment to p . Speaker commitment is a notion that plays a key role in modality (see Giannakidou & Mari 2021a), and a handy way to refer to the judgment of an epistemic agent towards the veridicality of p . In our view, commitment is private (we thus differ for instance from Krifka 2015 and Geurts 2019 who consider commitment a public attitude).

Giannakidou (2013) connected questions to modal sentences (which she called *inquisitive assertions*), and Giannakidou & Mari (2018b, 2021a,b) establish a parallel in modality between neutral possibility modals and biased ones (necessity modals): with possibility modals, the speaker is in a nonveridical information state where p and its negation are equally open possibilities, but with a necessity modal such as MUST there is bias towards the prejacent p . Consider:

- (4) a. Ernie is a vegetarian.
- b. Ernie must be a vegetarian.
- c. Ernie may/might be a vegetarian.
- d. Is Ernie a vegetarian?

Of the sentences above, only the unmodalized assertion conveys the information that Ernie is a vegetarian, and adds it to the common ground. Only this one is, then, an assertion of p . The modal sentences, just like the plain question, reveal uncertainty, which we represent as a nonveridical epistemic state, that is to say, a modal base partitioned between Ernie being a vegetarian and not being a vegetarian. The speaker, in choosing to utter modalized sentences, just like with

²There is also contextual bias relating to evidence available in the context, i.e., the common ground (*evidential bias*, Büring & Gunlogson 2000; Romero & Han 2004; Sudo 2013; Northrup 2014; Domaneschi et al. 2017), or answer bias (Krifka 2015; Malamud & Stephenson 2015). We will not discuss common ground bias here; for more details on factors determining belief formation see Giannakidou & Mari (2021a,b)

questions, takes a *nonveridical* stance (Giannakidou & Mari 2021a, Giannakidou & Mari 2021b). The nonveridical stance can be neutral, as with neutral information question and possibility modals, or biased when the speaker chooses to use MUST. This parallelism between possibility modals and unbiased questions on the one hand, and necessity modal MUST and biased questions on the other will play an important role in our analysis.

While we maintain that the categorical difference between modal assertions and questions lays in the first having and the second lacking truth conditions, we also acknowledge that both convey nonveridical states with two alternatives: p and its negation. Nonveridicality thus “allows us to see that the distinction between assertion and question is not as basic as we thought”, Giannakidou (2013) states, and this, she continues, “seems to support an approach to meaning as semantically non-dichotomous” (Giannakidou 2013 : 117). In the end, what seems to matter is whether a sentence presents the epistemic agent with one or more possibilities about the world, i.e. whether it reflects a homogeneous or non-homogenous (partitioned) epistemic space. “Superficially, this appears to correspond to the contrast between assertion vs. question. However, the more fundamental distinction is between a partitioned or not epistemic space” (Giannakidou 2013: 126).

In this paper, we expand on the idea that the distinction between assertion and question is not categorical semantically, and use the phenomenon of bias as a testing ground to establish a parallel between the structure of questions and the structure of modality. We argue that questions and possibility modals share an important piece of meaning: they express nonveridical equilibrium by not discriminating between the two alternatives p and $\neg p$; they are by default egalitarian. When a bias device is used, the device manipulates the equilibrium by introducing a ranking function. This is grammaticalized in modality with necessity modals such as MUST, SHOULD and their equivalents (Giannakidou & Mari 2016, 2018b, 2021a,b) – and the expressor of the ranking function can be an overt adverb such as *She must definitely be a doctor*, or a covert one. We will argue, similarly, that bias inducing devices in questions contribute or manipulate a ranking. The different effects, positive or negative, are due to the lexical contribution of the bias inducing device as we will show.

The discussion proceeds as follows. In Section 2 we outline the framework of modality we will be using with the bias inducing ranking function \mathcal{O} . In Section 3 and 4 we will propose that biased questions are equivalent to biased modal conjectures in containing a meta-evaluation function \mathcal{O} which ranks the two possibilities, p and its negation. Specifically in Section 3 we derive negative bias with the adverb REALLY, and, in Section 4, we discuss positive bias with negation

proposing that negation provides the ranking function. The discourse function of a biased interrogative is still that of a question, but its definedness conditions are those of a biased modal verb. Finally, in Section 5, we discuss questions with possibility modals and particles and identify *reflectiveness* as the inverse of bias, offering an analysis within the modal framework we have established.

2 Nonveridical structure and bias inducing meta-evaluation

Modal expressions in human languages – modal verbs, adverbs, particles – are common devices to reflect the speaker’s judgement towards the truth of a proposition. Almost all analyses of modality assume that non-alethic modal expressions as a class are nonveridical, i.e., they reflect epistemic states that do not entail that the proposition is true (Kratzer 1977, 1986, 1991, Giannakidou 1997, 1998, 1999, 2013, Condoravdi 2002, Portner 2009, Beaver & Fazee 2016, Giannakidou & Mari 2016, 2018b, 2021a,b, Lassiter 2016; von Fintel & Gillies 2010 being a notable exception).

In the modal framework of Giannakidou & Mari (2016, 2018b, 2021a,b) (henceforth GM) the function of epistemic modal expressions is to convey the nonveridical attitude of the speaker: upon hearing or reading a modal sentence, the audience understands that the speaker cannot be fully committed to the truth of the propositional content of the sentence. Modal expressions are therefore characterized as *anti-knowledge* markers in GM: a speaker cannot use a modal if she knows *p* to be true, e.g. if I see rain falling I cannot say *It might be raining*, or *It must be raining*. Likewise, when a speaker asks a question they are in a state of not knowing. Both questions and modals, then, convey epistemically nonveridical spaces, they have this common logical basis (see also Sherman 2018).

What does it mean for an expression to be veridical or nonveridical? Consider the following declarative sentences:

- (5) a. It is raining.
- b. It must be raining.
- c. It may/might be raining.

Let us call the tensed unmodalized sentences bare. In asserting a bare sentence the speaker is saying something that they know or believe to be true – they are veridically committed to it. GM call this the *Veridicality Principle* of co-operative communication, and it follows from abiding by Gricean Quality, which is fundamental to co-operative conversation:

- (6) Principle of veridicality for cooperative communication (Giannakidou & Mari 2021a,b)

A sentence S can be asserted by a speaker A if and only if A is veridically committed to the content p of S (i.e., if and only if A knows or believes p to be true).

Thus, upon hearing an unmodalized sentence the hearer understands that the speaker knows, or has grounds to believe that it is raining. The epistemic attitude of the speaker can therefore be thought of as a veridical state. For a given judge i (by default with epistemic modals, the speaker):

- (7) *Veridical epistemic state*

An epistemic state $M(i)$ is veridical with respect to a proposition p iff:
 $\forall w[w \in M(i) \rightarrow p(w)]$.

A veridical state entails p , thus conveying epistemic (or doxastic, or mixed) commitment of i to p .³ But when a speaker chooses to modalize, just like when she chooses to pose a question, she is uncertain about p . The epistemic state now is partitioned into p and $\neg p$:

- (8) *Nonveridical epistemic state*

An epistemic state (a set of worlds) $M(i)$ relative to an epistemic agent i is *nonveridical* with respect to a proposition p iff $M(i)$ is partitioned into p and not $\neg p$ worlds.

In a nonveridical state $M(i)$, p and not p are open possibilities. The partition can be neutral, as in the case of equilibrium, or discriminating as is the case with bias inducing necessity modals (cf. *infra*). Both modals and questions are evaluated with respect to nonveridical modal spaces $M(i)$, where i is by default the speaker.⁴ Giannakidou & Mari (2016) formulate nonveridicality as a definedness

³As we mentioned already, our notion of commitment is private and subjective, i.e., it represents the set of propositions held by individual linguistic agents (e.g., the speaker, the subject of the attitude in embedding) which Giannakidou (1997) and Giannakidou & Mari (2016, 2018b, 2021a,b) call *individual anchors*, recycling a term from Farkas (1985); in our definition above the anchor is called *judge*. Our commitment therefore differs from Krifka's which is "modelled as a set of propositions, containing the propositions that are publicly shared by the participants" (Krifka 2015: 328–329). Krifka's commitment corresponds to common ground assumptions, and the goal of speech acts is to "change a commitment state". Speaker commitment in our view can be entirely private, even solipsistic (Giannakidou & Mari 2016, 2018a,b, 2021a,b), as with verbs of belief, imagination, dreaming and pretending.

⁴Both questions and modals can be anchored to the addressee or a third party, and we return to the interrogative flip later in the paper. We assume that, by default, i is the speaker.

condition of modals in the form of the Nonveridicality Axiom – which appears to be also a definedness condition of questions:

(9) *Nonveridicality Axiom of modals and questions*

- a. $\text{MODAL}(M(i))(p)$ can be defined if and only if the modal base $M(i)$ is nonveridical, i.e. only if $M(i)$ contains p and $\neg p$ worlds.
- b. $\text{QUES}(M(i))(p)$ can be defined if and only if the modal base $M(i)$ is nonveridical, i.e. only if $M(i)$ contains p and $\neg p$ worlds.

The Nonveridicality Axiom is a definedness condition which lexically encodes a speaker presupposition in the Stalnakerian sense of modals and questions. We will revisit the presuppositional nature of bias and offer more comments in Section 3.

Now consider the difference between possibility and necessity modals.

- (10) a. Ariadne might be at the party.
b. Ariadne must be at the party.

In both cases, the speaker is uncertain about Ariadne being at the party, and leaves open the possibility that she might not be. The uncertainty is in nonveridical equilibrium with MIGHT: Ariadne being at the party is considered a mere possibility, and the speaker has no reason to believe Ariadne being in the party is closer to what is the case than Ariadne not being at the party. Possibility modals are thus very much like information seeking questions in this regard: in both cases the speaker is in a state of true uncertainty and entertains two alternatives equally.⁵ While questions lack truth conditions and are therefore distinct from modal assertions, it is important to understand that the common semantic core between neutral questions and possibility statements is the nonveridical state: they both generate alternatives – and presuppose equilibrium where the speaker entertains two possible alternatives that are not ranked.

On the other hand, when a necessity modal such as MUST/SHOULD is used, the equilibrium is manipulated towards the prejacent being considered more likely by the speaker. GM coin the term *biased* modals for necessity modals: the speaker is positively biased in favor of the prejacent proposition, though they still are not veridically committed to it. Modal bias reveals an epistemic stance supported by evidence in favor of the proposition, but it does not mean that the speaker knows or believes p to be true, i.e. they are not doxastically or epistemically committed to it. Modals, according to GM and what von Fintel &

⁵As we noted earlier, this also holds for the conditional protasis; see Liu et al. (2021) for recent discussion and experimental results.

Gillies (2010) call ‘the mantra’, remain indicators that the speaker reasons with uncertainty and that they leave both options, p and $\neg p$, open. With biased modals, in addition, the speaker positively discriminates towards p , she appears to think of p as a better possibility than $\neg p$. Bias thus reveals that the two possibilities are ranked. The ranking is done, GM propose, with a metaevaluation function \mathcal{O} which is always present in a modal structure – and in a nonveridical structure more generally.

Let us see what the epistemic MUST modal structure is precisely. First, we have the modal base of epistemic MUST which is nonveridical about the prejacent and contains both p and $\neg p$ worlds. To derive the truth conditions of MUST the literature assumes (see e.g. Kratzer 1991, Portner 2009, Giannakidou & Mari 2016, 2018b, 2021a,b) that MUST uses a set of propositions \mathcal{S} which describe shared stereotypical/normalcy conditions. The Kratzer/Portner semantics posits an ordering source Best which ranks worlds according to how close they are to the stereotypical ideal. Our account encodes that the modal base is partitioned into stereotypical and non-stereotypical worlds, but we dissociate stereotypicality from ranking. As an epistemic modal, MUST associates with an epistemic modal base $M(i)$ that contains the worlds compatible with what the speaker knows or believes. w_0 is the world of evaluation, by default the actual world:

$$(11) \quad M(i)(t_u)(w_0) = \lambda w' (w' \text{ is compatible with what is known by the speaker } i \text{ in } w_0 \text{ at } t_u)^6$$

Epistemic modality is thus by default subjective, and knowledge changes with time. Epistemic modality is therefore parametric to knowledge at t_u , as is often acknowledged in the literature (see Portner 2009, Hacquard 2006, 2010, Giannakidou & Mari 2016).

In the epistemic modal base $M(i)(t_u)(w_0)$, we define $\text{Ideal}_{\mathcal{S}}$ as a function over $M(i)(t_u)(w_0)$, still in the spirit of Portner (2009). The output $\text{Ideal}_{\mathcal{S}}$ is a subset of $M(i)(t_u)(w_0)$:

$$(12) \quad \text{Ideal}_{\mathcal{S}}(M(i)(t_u)(w_0)) = \{w' \in M(i)(t_u)(w_0) : \forall q \in \mathcal{S} \langle w' \in q \rangle\}$$

So defined, $\text{Ideal}_{\mathcal{S}}$ delivers the worlds in the modal base in which all the propositions in \mathcal{S} are true. \mathcal{S} is a set of propositions that corresponds to common ground norms.⁷ The truth condition for MUST says that p is true in the $\text{Ideal}_{\mathcal{S}}$

⁶Our notation $M(i)$ corresponds to the Kratzerian notation using set intersection $\cap f_{\text{epistemic}}(w_0, i, t_u)$, where this returns the set of worlds compatible with what it is known in w_0 by i .

⁷Since only those worlds are considered in which *all* the propositions in \mathcal{S} are true, the function $\text{Ideal}_{\mathcal{S}}$ determines a cut-off point.

set of $M(i)$. We assume that, by default, $M(i)$ is projected at the time of utterance in the actual world:

- (13) Given a set Ideal_S and the utterance time t_u ,
 $\llbracket \text{MUST} (\text{PRES} (p)) \rrbracket^{M,i,S}$ is defined only if $M(i)$ is nonveridical and is partitioned into Ideal_S and $\neg\text{Ideal}_S$ worlds. If defined,
 $\llbracket \text{MUST} (\text{PRES} (p)) \rrbracket^{M,i,S} = 1$ iff $\forall w' \in \text{Ideal}_S : p(w', t_u)$

We will now postulate that Ideal_S and $\neg\text{Ideal}_S$ worlds are ranked according to an ordering source \mathcal{O} , which, in the case of MUST, is introduced by a silent adverb, defined as in (14):⁸

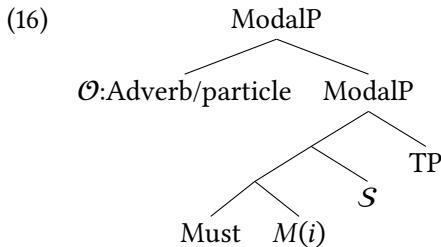
- (14) For any Ideal_S ,
 $\llbracket \emptyset \rrbracket^{\mathcal{O}, M, i, S} = \lambda q. \text{Ideal}_S$ is a better possibility with respect to $\neg\text{Ideal}_S$ relative to $M(i)$ and $\mathcal{O} \& q$

\emptyset is a covert adverb that provides a “meta-evaluation” that compares Ideal_S to its complement in $M(i)$. Ideal_S worlds are privileged by the ranking function \mathcal{O} which ranks the Ideal worlds as better possibilities (in the sense of Portner 2009 and Kratzer 1986).

The \mathcal{O} function manifests itself in the form of an adverb or a particle.

- (15) a. John might be sick perhaps.
 b. John must probably/definitely be sick.
 c. John must be sick.

Such structures are characterized as *modal spread* in Giannakidou & Mari (2018b), and the syntax is called the *modal skeleton*. The above are equivalent semantically in our system, with the example in (15c) containing the default null adverb. The modal skeleton always contains the metaevaluation, but with possibility modals \mathcal{O} is empty, hence the equilibrium:



⁸For more discussion on future shifting and the nonveridicality of MUST, see GM for details. The key observation here is that only in Ideal_S worlds is p true.

In the GM system, modal spread is the default modal structure, \mathcal{O} being always part of it. With MUST, the null adverb is akin to *probably* which induces the intrinsic positive bias of MUST favoring p worlds as better possibilities (15). Non-biased possibility modals differ from MUST in that they convey equilibrium, which is now defined as follows:

- (17) Nonveridical equilibrium (Giannakidou & Mari 2018b, 2021a,b)

A partitioned (p and $\neg p$) space $M(i)$ is in nonveridical equilibrium if the ordering \mathcal{O} is empty.

Possibility modals are structures with an empty \mathcal{O} . In discussion of the phenomenon of reflection later where we have possibility adverbials in questions, we will see that \mathcal{O} can also induce widening in the modal base in which case we end up with harder to answer or unanswerable questions.

In sum, the epistemic nonveridical structure involves two ingredients: (i) a partitioned modal base $M(i)$, and (ii) a metaevaluation \mathcal{O} that is either empty (possibility, neutral), or ranks the Ideal_S worlds as better possibilities than non- Ideal_S worlds (bias inducing modals). The preference for higher ranking of Ideal_S is lexically specified: necessity and possibility modals differ lexically in that higher ranking of Ideal_S is only a feature of the former. The availability of \mathcal{O} ranking is not limited to modal expressions but we expect to find it whenever we have a partitioned nonveridical ($p, \neg p$) structure as is the case with questions.

We now proceed to show how this analytical framework explains positive and negative bias in questions. We start with REALLY. Our basic idea is that the presence of bias in questions indicates, just like with modal verbs, the presence of a ranking function \mathcal{O} . The expressor of \mathcal{O} can be an adverb such as *really*, as we argue next – but negation can also function as \mathcal{O} . The commonality between questions and modals is that they both convey partitioned nonveridical epistemic spaces which can be ranked and have bias, or can be left unranked in the egalitarian state of equilibrium. Negation can function as \mathcal{O} when it is used as a focus sensitive operator.

3 Deriving negative bias with REALLY-questions

Questions with the adverb *really*, as mentioned earlier, are known in the literature to express negative bias. We give below the English example and its Greek and Italian equivalents:

- (18) Is Ernie really a communist?

- (19) Ine o Ernie *pragmati/st' alithia* kommunistis?
COP.3SG the Ernie truly/really a.comunist
'Is Ernie really a communist?'
- (20) Ernie è *davvero* un comunista?
Ernie COP.3SG really INDEF communist
'Is Ernie really a communist?'

By using REALLY (*really, pragmati, st'alithia, davvero*) the speaker seems to be genuinely interested in knowing if Ernie is a communist, like when one utters *I want to know whether Ernie is really a communist*. In addition, as we said at the beginning, in choosing to use REALLY the speaker intends to show that she has negative bias, i.e., she has some doubt that Ernie is a communist (see also a recent discussion of the REALLY effect in Bill & Koev 2025 and more references therein). With a REALLY question, as a reviewer suggests, the speaker raises the stakes for the addressee to give a truthful answer because her doubt about the asked content is enhanced. The negative bias of *wirklich* (the German counterpart of *really*) is experimentally confirmed in Liu et al. (2021) in questions and conditionals – and it appeared to be one of the most solid experimental findings. Romero & Han (2004) propose an influential account of the adverb *really* as VERUM which we consider after we first lay out our proposal.⁹

Bias, as we said earlier, is the destruction of the egalitarian state of equilibrium in a positive or negative direction because the speaker has some priors (in the sense of pre-questioning beliefs and expectations) that make them think that *Ernie is not a communist* is a better possibility than *Ernie is a communist*. It is for this reason that the stakes are higher for the answerer to show that he is. Importantly, the negative bias is not a belief that the prejacent is not true; it is rather, as with MUST, an indication that the speaker is considering a nonveridical partition and compares the likelihoods of *p* and $\neg p$. Unlike with MUST, the favored proposition now seems to be the negative one.

Bias is anchored to the speaker, who ranks the two possibilities prior to asking a question; it can thus best be understood as a speaker-anchored definedness condition on asking the question. For Stalnaker (1978), and this is important to note, presuppositions are preconditions that need to be satisfied before the common ground can be updated; hence they are requirements on the speaker's

⁹The *really* effect occurs also in constituent questions, as in *Who did really go to Berlin?*, alternative questions (e.g. *Did he really go to Berlin, or not?*), and in declarative questions e.g. *He really went to Berlin?*.

knowledge, not on the common ground.¹⁰ We ask here how bias comes about with REALLY expressions. Part of the puzzle is also that REALLY expressions, while positive, they bias towards a negative answer.

Let us observe further that the negative bias of REALLY holds across nonveridical constructions, including conditionals (21a) and imperatives (21b).

- (21) a. If John really studied very hard, he will pass the exam easily.
Speaker's assumption prior to the question: John most likely did not study very hard.
- b. Really, close the door!
Speaker's assumption prior to the question: the addressee resists closing the door.

None of the existing accounts explains this generalized REALLY effect. The prior assumptions could be the speaker's private assumptions but they could also be contextual, as the two types of information intersect. In some cases the prior could be merely a contextual challenge prior to assertion, as in the following example:

- (22) A: I know, John told you that he will study very hard for the exam, but I am still worried.
B: If John really studied very hard, he will pass the exam easily. And if he says he studies hard, I believe him.

In this example, B is entertaining A's uncertainty about whether John studied hard, while also asserting his own favoring position tilting towards the positive. This is consistent with the nature of bias which is speaker-anchored. (We thank a reviewer for bringing up this case).

In positive veridical assertions, REALLY again is anaphoric to prior assumptions, but now in a positive direction. Observe the following example from Romero & Han (2004):

- (23) a. ?I am sure I am tired.
b. I really am tired.

¹⁰von Fintel (2008) and subsequent literature in the context change potential tradition think of the presuppositional component of the meaning of a sentence as being a requirement on the information state it is used to update. "Since the information state a sentence is used to update in the ideal case is the common ground, the presuppositional requirements are imposed on the common ground" (von Fintel 2008: 5). In effect, then, definedness conditions can be understood as common ground presuppositions, or as in the Stalnakerian sense which effectively makes no distinction between felicity conditions of the speaker and common ground.

Here the speaker makes a positive statement against a background assumption that the speaker is not tired. As Romero & Han (2004) observe, “other epistemic certainty expressions” don’t have this property, as can be seen. In our view, the contrast here is further evidence that REALLY is not an epistemic attitude, unlike *I am sure*. Crucially, as a focus adverb, even in positive sentences REALLY depends on a prior assumption, and it contrasts in polarity with the assertion of the REALLY statement. *I am not really tired* presupposes a context where the background assumption is that the speaker likely is tired (see Liu et al. 2021 for discussion and references).

3.1 The REALLY effect as metaevaluative ranking

Our analysis goes as follows. REALLY words are focus adverbials, thus anaphoric to an alternative assumption prior to the assertion or question. In the positive assertion, the alternative contextual assumption seems to be that I am likely not tired. In the question, it seems to be that Ernie is likely a communist. Liu et al. (2021) call it *contextual* positive bias:

- (24) Is Ernie really a communist?
 - a. contextual positive bias: Ernie is likely a communist.
 - b. speaker negative bias: Ernie not being a communist is more likely than Ernie being a communist.

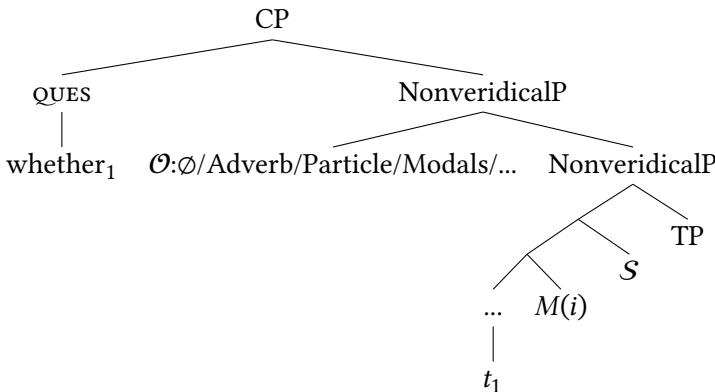
It appears, therefore that REALLY being a focus adverb requires an alternative contextual assumption of the opposite polarity to make sense, i.e., for it to be a reasonable alternative. In other words, the opposite polarity effect follows straightforwardly from the anaphoricity of focus and the requirement that the focused statement provide new information with respect to the alternative.

We start with the basic equilibrium partition for questions which is that of possibility modals. The initial state of possibility and information seeking is as follows for epistemic modal MIGHT (Giannakidou & Mari 2018b, 2021a,b).

- (25) $\llbracket \emptyset \text{MIGHT}(\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i}$ is defined only if
 - (i) $M(i)$ is nonveridical and partitioned into $\{p, \neg p\}$ worlds, and if
 - (ii) \mathcal{O} is empty
$$\llbracket \emptyset \text{MIGHT}(\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i} = 1 \text{ iff } \exists w' [w' \in M(i) \wedge p(w')]$$

This gives equilibrium, and as we see the meta-evaluative ranking is empty. The tree for questions is as follows.

(26)



The modal and question structure are distinguished in that the former has quantificational force and truth conditions, but the question does not have truth conditions.

(27) $\llbracket \text{QUES } \emptyset (\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i}$ is defined only if

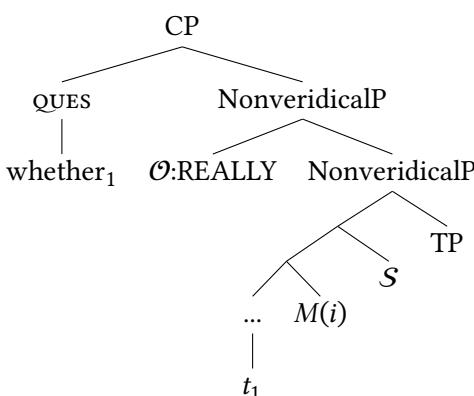
- (i) $M(i)$ is nonveridical and partitioned into $\{p, \neg p\}$ worlds, and if
- (ii) \mathcal{O} is empty

$$\llbracket \text{QUES } \emptyset (\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i} = \{p, \neg p\}$$

REALLY only has presuppositional content: it introduces the ranking function \mathcal{O} which now says that $\neg p$ is a better possibility than p :

(28) Is Ernie really a communist ?

(29)



(30) $\llbracket \text{QUES } \text{REALLY } (\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i}$ is defined only if

- (i) the modal base $M(i)$ is nonveridical and partitioned into $\{p, \neg p\}$ worlds.

- (ii) $\neg p$ worlds are better possibilities than p worlds
 $\llbracket \text{QUES REALLY } (\text{PRES}(p)) \rrbracket^{\mathcal{O}, M, i} = \{p, \neg p\}$

We assume the structure above for both main and embedded questions. The question still denotes the nonveridical partition p and $\neg p$ – but the worlds are now ranked by the speaker, and the negative worlds are judged to be better possibilities by the speaker upon asking the question. That the negative worlds are better possibilities means that the answer to the question will more likely fall in the negative space of the partition. In other words, prior to the question, the speaker considers $\neg p$ more likely. This captures the negative bias accurately both in terms of it being a precondition on using REALLY and in terms of the contribution of REALLY being speaker-driven. The ranking is driven by the speaker's priors, as we said including beliefs, but REALLY is not itself an attitude of belief. REALLY does not have truth conditional (assertive) contribution in questions because questions do not have truth conditions and do not assert. It is unclear to us whether REALLY has assertive content even in assertions: *I am really tired* seems to simply settle the statement (contested in the prior context, we we noted earlier) in the positive, but whether there is additional contribution in the assertion, e.g., a degree reading, is an open question that we will not address here.

3.2 Why **VERUM** doesn't get things right

Our analysis above differs from the well-known account of Romero & Han (2004) in substantial ways. Romero & Han (2004) acknowledges the epistemic root of bias, but makes a number of assumptions that are empirically unjustified thus failing to properly capture the nature of bias. Firstly, it posits that the bias is an 'epistemic implicature'. We have shown that bias is stronger than that, it is a definedness condition on the question, a precondition on its use, not a post-condition as an implicature is. The bias, crucially, cannot be cancelled by the same speaker:

- (31) Is Ernie really a communist? #I think so.

If bias were merely an implicature, the positive continuation above should be fine.

Secondly, while claiming that bias is an epistemic implicature, Romero & Han (2004) propose a semantics for REALLY-as-VERUM that is too strong. The claim is that REALLY is the VERUM operator: VERUM "is coming from the lexical item *really*" (Romero & Han 2004: 641). Romero & Han (2004) offer two versions of VERUM both rendering it an attitude of certainty or subcase thereof.

In one version, VERUM is a veridical operator akin to knowing or believing; Romero & Han (2004) call it “the run-of-the-mill epistemic operator denotation [...], 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)”:

$$(32) \quad \llbracket \text{VERUM}_i \rrbracket^{gx/i} = \llbracket \text{really}_i \rrbracket^{gx/i} = \llbracket \text{be sure} \rrbracket(\llbracket i \rrbracket^{gx/i}) = \\ \lambda p_{(s,t)} \lambda w. \forall w' \in \text{Epi}_x(w)[p(w') = 1] \quad ((40) \text{ in Romero \& Han 2004})$$

The function defined here is, according to Romero & Han (2004), “the correct denotation for straightforward epistemic expressions like *be sure*, *be certain*. But note that, though *really* or VERUM is often epistemically flavored, it is not interchangeable with pure epistemic expressions like “*be sure*” (Romero & Han 2004: 626). We agree, it is not interchangeable with epistemic or doxastic attitudes, and this is because REALLY is not an epistemic or doxastic attitude. Had VERUM conveyed the certainty or knowledge of p , it should have been unusable in questions which by definition presuppose uncertainty: if the speaker, or speaker and addressee jointly know or believe that p is true, then why bother asking the question? VERUM cannot be a veridical operator as above, it cannot entail p .¹¹

Romero & Han (2004) acknowledge the problem and admit that “the intuition 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* [emphasis ours].” (Romero & Han 2004: 627). They then offer a definition “FOR-SURE-CG $_x$ ” in example (43), where “ $\text{Epi}_x(w)$ is the set of worlds that conform to x 's knowledge in w , $\text{Conv}_x(w')$ is the set of worlds where all the conversational goals of x in w are fulfilled $\text{CG}_{w''}$ is the Common Ground or set of propositions that the speakers assume in w'' to be true (Stalnaker 1978, Roberts 1996)”.

$$(33) \quad \llbracket \text{VERUM}_i \rrbracket^{gx/i} = \llbracket \text{really}_i \rrbracket^{gx/i} = \\ \lambda p_{(s,t)} \lambda w. \forall w' \in \text{Epi}_x(w)[\forall w'' \in \text{Conv}_x(w')[p \in \text{CG}_{w''}]] = \\ \text{FOR-SURE-CG}_x \quad ((43) \text{ in Romero \& Han 2004})$$

Unfortunately, this understanding of VERUM is just a variant of their entry (40). VERUM is now driven by common ground assumptions – but the REALLY bias (and bias more broadly, as we showed) is tied to the speaker. The speaker

¹¹Even if questions “flip” epistemics to the addressee (Eckardt & Beltrama 2019) as in *Are you sure that Ernie is a communist?*, without an explicit signal to the addressee, the question remains anchored to the speaker.

may be making assumptions about Ernie being a communist that could be entirely at odds with the hearer's assumptions, thereby raising the stakes for the latter as we mentioned earlier. More importantly, VERUM in this new definition continues to be an attitude (now that the speaker is certain that p should be added to the Common Ground), and as such the problem of conflicting with the question remains. There is no evidence that REALLY has any assertive content in questions – and in an actual assertion (*I am really tired*) REALLY contributes only a degree meaning and no “epistemic implicature”.

The most important problem with the VERUM analysis of REALLY, in our view, is that the VERUM meaning is akin to a veridical attitude itself, but the bias is, as we argued, at the non-at-issue level (see also Liu 2012, Liu et al. 2021), and it is not an attitude. REALLY is not a propositional attitude: if, in asking REALLY $p?$, the speaker believed p or were certain that p should be added to the common ground, then why ask the question? It should be pointless. As an attitude, REALLY asserts content, but this is too strong. In our analysis, REALLY is an adverb that affects the ranking: it ranks the two possibilities given in the nonveridical space, the negative being more likely. REALLY thus turns out to be the dual of MUST. The only additional assumption that we make is that the modal ranking can be realized by expressions that are not strictly speaking modal, such as the adverbs meaning REALLY – and as we argue next, negation. But this assumption is not extraordinary as the possibility of ranking exists in all nonveridical contexts which can be ranked and have bias, or be left unranked in the egalitarian state of equilibrium.

4 Focus negation and bias

The bias arising with so called high negation (HNQ) also relies on the speaker's ranking. Since Ladd (1981b) the observation has been that high negation indicates that the questioner believes that p is true or likely:

- (34) a. N'est-il pas la maison? Je pensais qu'il l'était # Je ne
not.is NEG DEF.F house 1SG think.PST.1SG that.he was I not
pensais pas qu'il l'était.
think.PST.1SG NEG that.he was
'Isn't he home? I thought he was / #I did not think he was.'
- b. Isn't he home? I thought he was / #I did not think he was.
- c. Dhen ine spiti? (Greek)
Not is home?
'Isn't he at home?'

These questions expect a confirmatory answer, which should be positive (see also Büring & Gunlogson 2000, Romero & Han 2004, Goodhue 2018); *a contrario* Krifka (2015) states that with negated questions, the speaker checks whether the addressee is ready to express lack of commitment towards the proposition, which is compatible with expecting a positive answer. In English, syntactically high negation can be interpreted in a high or low position.

- (35) Isn't John at home?
- a. High negation: Isn't John at home? (NEG > QUES)
 - b. Low negation: Is John not at home? (QUES > NEG)

Across languages the ambiguity does not always arise, and high negation can only be interpreted in a high position. The two readings have different intonational patterns, and only high NEG bears focus as the following French example shows:

- (36) Il n'est pas venu? French
 He not.is NEG come
 'Hasn't he arrived?'
 a. Intended interpretation: It is not true that he has arrived?
 b. Impossible interpretation: Is it true that he has not arrived?

This data can be replicated for Greek, with focused negation *dhen*:

- (37) DHEN irthe?
 not came.3SG
 'Hasn't he arrived?'
 a. Intended interpretation: It is not true that he has arrived?
 b. Impossible interpretation: Is it true that he has not arrived?

Current accounts agree on a number of facts that hold uniformly across languages. High negation is focus sensitive (henceforth Focus-NEG) and (i) triggers the speaker's expectation that *p* is true (38); and in the question (ii) it renders the positive answer more likely:

- (38) Isn't he home? I thought he was / #I did not think he was.

A variety of approaches to negative biased questions have been developed:
 (i) VERUM operator accounts (Romero & Han 2004; see Repp 2013 for FALSUM).
 (ii) Double speech-act accounts (Reese 2007). (iii) Commitment (Krifka 2015) and

(iv) decision based accounts Van Rooy & Šafářová (2003); (v) Evidence-based accounts (Büring & Gunlogson 2000, Sudo 2013, Roelofsen & Farkas 2015, Goodhue 2018), stemming from the work of Ladd (1981b). It would be impossible to render justice here to the whole literature, and for the purpose of this paper we only focus here on the interrelations between MUST, Focus-NEG and bias; for extended recent discussions see Krifka (2017), Larrivée & Mari (2022).

Larrivée & Mari (2022) establish a series of correlations between high Focus-NEG in questions and MUST, pretty much in the spirit we outlined for REALLY. They argue that Focus-NEG and MUST share important similarities, namely (i) they are nonveridical, and (ii) they convey the speaker's prior that p is likely. However, they are in complementary distribution in evidential contexts. MUST is felicitous in contexts that are compatible with p , whereas negative questions are felicitous in contexts that are incompatible with p (called 'negative evidence' by Büring & Gunlogson 2000, see also Sudo 2013). The following examples are from Larrivée & Mari (2022).

- (39) John looked pretty happy coming back from school.

- a. – Il doit avoir réussi son examen de math.
he must have succeeded his exam of math
'He must have passed the big maths test.'
- b. – #N'a-t-il pas réussi son examen de math?
not.have-1SG-he NEG succeeded his exam of math
'Didn't he pass the big maths test?'

- (40) John looked pretty down coming back from school.

- a. – #Il doit avoir réussi son examen de math.
he must have succeeded his exam of math
'He must have passed the big maths test.'
- b. – N'a-t-il pas réussi son examen de math?
not.have-1SG-he NEG succeeded his exam of math
'Didn't he pass the big maths test?'

We argue here that the high Focus-NEG introduces a metaevaluation which, like MUST, produces positive bias. The bias is positive because the negation particle functions here as a modal adverb in focus. The negation particle in a question is forced to this meaning for two reasons. First, just like with REALLY, bias inducing negation bears focus and functions as a focus particle. (Low negation, by contrast, is de-accented and functions normally as the expected proposition negating function). Second, being a focus particle means that (i) there is a set of

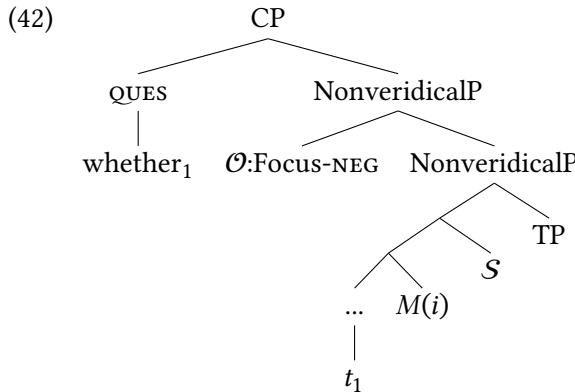
alternatives in the discourse, and (ii) in questions, the relevant alternative will have to be $\neg p$.

If $\neg p$ is the alternative Focus-neg, which needs to express new information, cannot not function as negation. Focus-NEG thus has no contribution other than the ranking presupposition.

As we noted for REALLY, the focus adverb (here, NEG) requires an alternative contextual assumption of the opposite polarity to make sense, i.e., for it to be a reasonable alternative. In other words, the opposite polarity effect follows from the anaphoricity of focus and the requirement that the focused statement provide new information with respect to the alternative.

- (41) $[\![\text{QUES Focus-NEG (PRES } (p)]\!]^{\mathcal{O}, M, i}$ is defined only if
- (i) the modal base $M(i)$ is nonveridical and partitioned into $\{p, \neg p\}$ worlds.
 - (ii) p worlds are more preferable than $\neg p$ worlds
- $$[\![\text{QUES Focus-NEG (PRES } (p)]\!]^{\mathcal{O}, M, i} = \{p, \neg p\}$$

Since a question does not assert $\neg p$ the contribution of Focus-NEG as \mathcal{O} arises as a meaning reanalysis. Just like with REALLY, we can assume that NEG is in the \mathcal{O} position in the question skeleton – recall that that was also the position of REALLY:



Putting the effect of REALLY and negation together, then, we must say that their content is only presuppositional. Thus, our account explains their contribution and the polarity reversal in a very simple way by acknowledging their status as focus operators, and allowing an extended syntactic structure in questions parallel to the (independently motivated) one for modals with a position for \mathcal{O} . No other account that we know of offers an explanation of these facts with such simplicity and no additional *ad hoc* assumptions.

Before closing, we want to go back to the strength of veridical commitment, and note that modals and questions mirror each other in terms of strength. In our theory, commitment with modals proceeds according to the following scale:

- (43) Scale of veridical commitment (Giannakidou & Mari 2016, 2018b, 2021a,b)

$\langle p, \text{MUST } p, \text{MIGHT } p, * \rangle$;

where i is the speaker, p conveys full commitment of i to p ; MUST p conveys *partial* commitment of i to p , and MIGHT p conveys *trivial* commitment of i to p . No modal expression conveys negative commitment.

* in (43) indicates that no epistemic modal can convey negative commitment (see Ernst 2009, Homer 2015, Giannakidou & Mari 2018b as for how this relates to the neg-raising property of universal epistemic modals).¹²

With REALLY and Focus-NEG, the commitment, which is a presupposition rather than an assertion, proceeds as a mirror image:

- (44) Scale of commitment in question presuppositions:

$\langle p, \text{FOCUS NEGATION } p, \text{MIGHT } p, \text{REALLY } p \rangle$;

where i is the speaker, p conveys full commitment of i to p ; HIGH NEGATION p conveys *partial* commitment of i to p , MIGHT p conveys *trivial* commitment and REALLY conveys *negative* commitment of i to p .

Like MUST and MIGHT, Focus-NEG and REALLY questions are nonveridical. Focus-NEG and MUST are equivalent in terms of function and commitment in questions, and likewise REALLY contributed ranking but is negatively biased for the reasons we explained earlier. Why modal assertions and questions are mirror images of commitment is a question that we cannot answer fully; but within the GM system the contrast can be simply due to the fact that, in questions, REALLY and negation are forced to function in an alternative way given their opposite polarity anaphoric property due to focus.

We now complete our exploration of the relation between questions and modality by considering questions where modal particles, including a different kind of negation, are used. The particles, we will show, are equivalent to unbiased possibility modals rather than MUST, and do not rank the two alternative propositions. Rather, they widen the options and create vagueness. The effect we observe is

¹²Cross-linguistically, attitudes like ‘doubt’ can instead convey negative commitment. As far as we are aware, at least in Indo-European languages, there is no modal verb/auxiliary equivalent.

an enhancement of equilibrium, not its shrinking (as is the case with bias) – with the opposite effect of creating more uncertainty. This operation, which we call ‘reflection’, targets the modal base.

5 The reflective question: enhancing uncertainty

In this section, we consider the use of possibility modal particles and verbs in questions, resulting in the question now becoming vague and potentially unanswerable. We call such questions *reflective*. In the literature the term ‘conjectural’ has also been used (see Littell et al. 2010, Matthewson 2010, Eckardt & Beltrama 2019, Frana & Rawlins 2019 a.o.). The reflective question is well documented for a number of languages, including Greek, Japanese and Korean (Kang & Yoon 2018, 2019). In discussing it along with bias, we view the two phenomena as pragmatic duals.

5.1 Modal particles in questions: The data

For a long time, it was thought that epistemic modals do not occur in questions (Coates 1983, Drubig 2001, Jackendoff 1972, Leech 1971, McDowell 1987). Jackendoff, specifically, claimed that while *may* can either be interpreted deontically or epistemically in a declarative sentence (*John may leave early tonight*), it can only be interpreted deontically in a question (*May John leave early tonight?*). Yet Ernst (2009) presented examples with modal adverbs in questions (*Is she possibly the murderer?*), and Hacquard & Wellwood (2012) offer corpus data with possibility modals in questions. The following examples are from that work:

- (45) a. With the owners and the players on opposite sides philosophically and economically, what might they talk about at the next bargaining session?
- b. Might he be blackballed by all institutions of higher learning?
- c. What might the Grizzlies have been like if their leading scorer and rebounder, 6-foot-10 center Brent Smith, had not missed his third straight game because of a sprained ankle?

The authors conclude that epistemic modals of possibility are very natural in questions.

In Greek, we find possibility modal verbs and particles in questions: the so-called *evaluative subjunctive* (Giannakidou 2017), and the particles *taxa*, *mipos*, *arage* ‘maybe/possibly’, the latter two only used in questions, as we see below

with examples from Giannakidou (2017) (see earlier discussions in Giannakidou 2009, Rouchota 1994):

- (46) Pjos irthe sto party?
Who came.3SG to-the party
'Who came to the party?'
- (47) Pjos na irthe sto party?
Who SUBJ came.3SG to-the party
'Who might have come to the party?'
- (48) Pjos bori / *prepi na irthe sto party?
Who might / must SUBJ came.3SG to-the party
'Who might/#must have come to the party?'
- (49) (Na) tou milise (arage/mipos/taxa)?
SUBJV him talked-3SG PARTICLE
'Might she have talked to him?'
- (50) Tou milise (#arage/#mipos/taxa).
him talked-3SG PARTICLE
'She talked to him (as-if).'
- (51) Tou milise?
him talked-3SG
'Did she talk to him?'

Here we observe the subjunctive, the possibility modal *bori* and the particles *arage/mipos/taxa* in questions (both polar and wh-questions). As we can see, the particles can spread in a fashion reminiscent of modal spread with modal verbs and adverbs (*He may possibly be here tonight*). The MUST modal is excluded as can be seen in (49), indicating that we are not dealing with a bias related phenomenon. In the declarative context, only *taxa* can be used, which means literally 'as if, allegedly' and casts doubt on the truth of the proposition it attaches to (see Giannakidou 2022 for more details on the Greek particles; Ifantidou 2001). The particles correspond to *might*, as indicated in the English translations.

Giannakidou (2017) argues that the particle question differs from the plain one in being open-ended, vague, and primarily self-addressed. It does not require an actual or full answer; for instance, *Pu na evala ta gialia mou?* 'Where might I have put my glasses?' is a question that one poses to herself in a wondering, reflective manner without expectation of knowing the answer. Bare questions cannot be used this way. (In fact, first person unmodalized questions are quite uncommon).

This open-endedness is found also in Japanese and Korean discussed recently in Kang & Yoon (2018, 2019), and with subjunctive questions in Salish (Matthewson's (2010) 'conjectural' questions). English data from Ernst (2009), Hacquard & Wellwood (2012) illustrate the same reflective character for English questions with possibility modals:

- (52) Is she possibly/*probably a spy?
- (53) Might/*must she be a spy?

These have been described as 'weaker' questions. Kang & Yoon (2018, 2019) in their discussion of a similar use of the particle *nka* in Korean note that by using *nka*, the speaker "reflects on her own background assumptions and is not simply requesting information from the addressee". *Nka*-questions, they argue, are *feigned monologues*, i.e., the speaker says something as if it were a monologue without expecting an answer necessarily. Because of the monologic nature of the utterance, it does not necessarily obligate the hearer to respond, and while there may be differences between the particles and across languages, these observations hold also for the Greek and English particle questions above.

The self-reflective character of particle questions is further evidenced by the fact that directly addressing the hearer is odd.

- (54) # Ti na efages arage xthes?
what SUBJ ate.2SG araje xthes
'What might you have eaten yesterday?'
- (55) Ti efages xthes?
what ate.2SG xthes
'What did you eat yesterday?'
- (56) # Na efages araje xthes?
SUBJ ate.2SG araje xthes
'Might you have eaten yesterday?'
- (57) Efages xthes?
ate.2SG xthes
'Did you eat yesterday?'

For the Greek particles, Giannakidou (2022) calls this 'anti-addressee' effect. Cross-linguistically, the effect is also observed in Korean (Kang & Yoon 2019). This effect has been discussed in the literature by appealing to constraints on the 'interrogative flip', that is to say the phenomenon whereby questions containing

an evidential target the addressee mental state (a.o. Bhadra 2017). Extending the view that evidentials enhance the interrogative flip to epistemic modals, one could argue (see e.g. Eckardt & Beltrama 2019) that what the modal or particle is questioning is the addressee's knowledge, and that a modal question presupposes lack of knowledge on the part of the addressee.

Mari (2021) shows that existential epistemic modal questions (58) – which include Italian future questions (59–60) – are by default self addressed (see also Eckardt & Beltrama 2019; *pace* Ippolito & Farkas 2022).

- (58) Dove possono essere i miei occhiali ?
where might be the my glasses
'Where might my glasses be?'
- (59) Dove saranno i miei occhiali ?
where be.FUT.3PL the my glasses
'Where might my glasses be?'
- (60) Sarà a casa?
be.FUT.3PL at home
'Might he be home?'

Such questions are akin to questions with *forse* which is the possibility adverb 'maybe' in Italian.¹³

- (61) a. È a casa?
Is at home
'Is he at home?'
- b. È forse a casa?
Is maybe at home
'Is he maybe at home?'

¹³The Italian future has been considered as an epistemic modal (see Pietrandrea 2005, Mari 2009, Giannakidou & Mari 2018a, Baranzini & Mari 2019; *a contrario*, Mari 2010, Frana & Rawlins 2019; Eckardt & Beltrama 2019 for Italian future as an evidential.) The German modal particle *wohl* is also reported to have similar use of adding a speculative component (the example below is from Zimmermann 2011 with his translation). Zimmermann (2011) writes: "The question above is not about whether or not Hans has invited Mary, but by using *wohl* the speaker indicates her awareness that the addressee may not be fully committed to her answer." (Zimmermann 2011: 2020):

- (i) Hat Hans *wohl* Maria eingeladen?
has Hans PRT Mary invited
'What do you reckon: Has Hans invited Mary?'

This way of understanding the impossibility to be addressee-oriented needs to postulate a device to undo the flip and render the question reflective when needed (see discussion in Frana & Rawlins 2019 and Mari 2021). Our view that these questions are, to begin with, reflective explains right from the bat the impossibility of being addressee-addressed without needing to stipulate any device to undo a putative flip.

Characteristically, the Greek negative particle *mi(n)* can also be used in questions with the same reflective flavor (Chatzopoulou 2018):

- (62) Min eitate ton Jani?
 NEG saw.2PL the John
 'Did you maybe see John?'

This use of a negative particle, which we can call Modal-NEG, remains productive in literary and other registers. *Mi(n)* is the negation of non-indicative contexts in Greek (Giannakidou 1997, Veloudis 1980), *dhen* being the negation in indicative sentences. The *min* negation is the semantic allomorph appearing in subjunctive contexts:

- (63) *Min/*Dhen eitate ton Jani.
 NEG saw.2PL the John
 'You did not see John.'
- (64) Na min/*dhen deite ton Jani.
 SUBJ NEG see.2PL the John
 'Do not see John!'

The particle *mipos*, emerges from a historical path that fused the negation *mi* with the indicative complementizer *pos*. Crucially, the reflective negation *min* is not used for bias:

- (65) Dhen/*Min eitate ton Jani?
 NEG saw.2PL the John
 'Didn't you see John?'
- (66) Idate ton Jani, etsi dhen/*min einai?
 saw.2PL the John, so not is
 'You saw John, didn't you?'

So, in Greek, there is a bias-producing focus negation *dhen*, and a reflective negation *min*. The fact that negation behaves like a modal particle speaks again

to our earlier point: a seemingly non modal element can acquire a modal function in questions because, these lacking truth conditions, it cannot function in the canonical way.¹⁴

Questions with possibility modals are weakened versions of the information-seeking question – weaker in that they involve more uncertainty. Notice that they can be continued by *Who knows?*, unlike regular information questions:

- (67) A: Pjos (arage) na irthe sto party? Pjos kseri!
Who arage-particle.SUBJ V came-3SG to-the party who knows
'Who might have come to the party? Who knows!'
- (68) Sarà a casa? Chi lo sa!
be.FUT.3SG at home who that knows
'Might he be home? Who knows !'

We can thus see that possibility modals (verbs, adverbs, and particles) create a vague question with more uncertainty, harder or even impossible to answer. The intent of the speaker, when choosing to use the possibility modal, is not simply to seek information from an addressee, but rather to signal that the question is hard to answer, that the hearer may not be an authority on giving a true answer, or that there is no addressee at all. Reflections, as we noted earlier, can actually be incompatible with the second person (what we called anti-addressee effect). And, as Kang & Yoon (2019) observe, they have the flavor of a monologue in being directed towards the speaker herself.

Let us now proceed to capture the effect of the epistemic modal in the framework we have developed.

5.2 Analysis: modal particles widen the modal base

The first analysis we know that addresses the use of of possibility modals in questions is Giannakidou & Mari (2016). They argued that, in Greek, possibility modals and the subjunctive are equivalent, and that, for the MIGHT question, the answer set contains modalized propositions:

¹⁴Salish employs negation in questions too; the following example is from Matthewson (2022):

- (i) A: Nee=hl gwila-n=aa?
NEG=CN blanket=2SG.II=Q
'Do you have a blanket?'

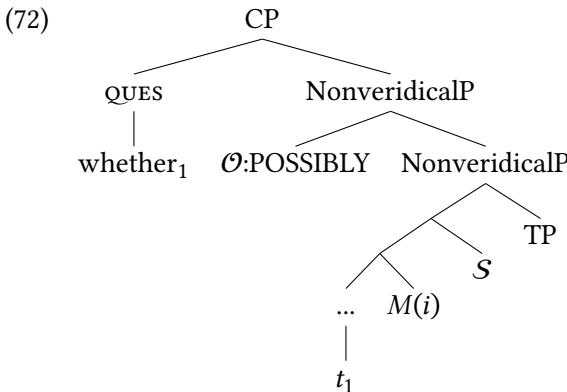
This is a neutral question according to Matthewson, hence this negation seems more akin to a question particle.

- (69) $\llbracket \text{Who came to the party?} \rrbracket = \{\text{Bill came to the party, Marina came to the party, Ariadne came to the party, Nicholas came to the party, ...}\}$
- (70) $\llbracket \text{Who might have come to the party?} \rrbracket = \{\text{it is possible that Bill came to the party, it is possible that Marina came to the party, it is possible that Ariadne came to the party, it is possible that Nicholas came to the party, ...}\}$

This analysis says that the possibility question is still an information seeking question, but instead of asking about p , it asks about POSSIBLY p . While a question with MIGHT indeed may ask about the possibility of p – like, for instance *Is it possible that Ariadne ate?* – the reflective effect is more than that.

In our current framework which uses metalevaluation, we will argue that the possibility expression enlarges the spectrum of the possibilities. Possibility expressions widen the set of the possibilities considered attracting attention to p , but seeking p in a larger set.

- (71) Ernie is possibly a communist?



- (73) $\llbracket \text{QUES POSSIBLY(PRES}(p)\rrbracket^{\mathcal{O}, M, i}$ is defined only if

- (i) $M(i)$ is nonveridical and partitioned into $\{p, \neg p\}$ worlds.
- (ii) $\cap \mathcal{O} \supset M(i)$

$$\llbracket \text{QUES POSSIBLY(PRES}(p)\rrbracket^{\mathcal{O}, M, i} = \{p, \neg p\}$$

The set of possibilities extends beyond the modal base thus making it harder to think of what would be a “correct” answer. This accounts for why reflection questions seem open-ended, vague, and potentially lacking answers. The epistemic state of the speaker entertains a broader set of potential answers, not a narrower one as in the case bias were a potential answer is favored by the speaker’s

prior assumptions. The category of reflective questions thus illustrates that an interrogative can be manipulated away from the canonical information-seeking mode but not necessarily producing bias. The effect of widening the modal base $\cap \mathcal{O} \supset M(i)$ is again presuppositional.

6 Conclusions

In this paper, we argued that, while polar questions and modal assertions differ in that the first do not have truth conditions, they are deeply similar in presupposing nonveridical spaces, partitioned into p and its negation. The partition can be indiscriminate, or as we said egalitarian – in which case we have nonveridical equilibrium. But the possibility of metaevaluative (\mathcal{O}) ranking exists in all nonveridical spaces, hence another commonality between questions and modals is that while they both start with a core partition between p and $\neg p$, a ranking is always available. When the ranking is contentful, the result is bias. Focus adverbials such as REALLY, modal adverbials, and negation are overt lexicalizations of the ranking. The overall analysis offers a novel way of understanding what bias is and how it is derived, capitalizing on a number of independently motivated assumptions about focus and the structure of the nonveridical space. The dichotomy between questions and assertions with modals comes at the discourse level where an interrogative sentence is used as a question (lacking truth conditions), and the declarative as an assertion.

In terms of what bias actually is, we emphasized that it cannot itself be an attitude (epistemic or otherwise); it is rather a presupposition of metaevaluative ranking. Our simple idea was that the presence of bias in questions indicates, just like with modal verbs, the presence of a ranking function \mathcal{O} . The expressor of \mathcal{O} can be an adverb such as *really* and its crosslinguistic equivalents – but also negation, which we called Focus-NEG and which has no truth conditional contribution in questions when it produces bias. Key to the polarity reversal of bias in questions was the status of the \mathcal{O} -contributing expressions (REALLY, negation) as focus operators requiring a contextual alternative of the opposite polarity.

Our analysis offers, as far as we know, the first unified explanation of the polarity reversal mechanism and makes the welcome prediction that focus will have a polarity reversing effect with other types of focus sensitive expressions. As a bonus, we have contributed to a deeper understanding of the phenomenon of reflection. Reflection is not just a variant of information seeking. Rather, we identified a number of properties of reflective questions evidencing enhanced

uncertainty which we captured as widening. We showed that reflecting is distinct from bias – in fact, they are pragmatic duals. Bias relies on ranking, but the role of the modal in a reflective question is to widen the modal base. Overall, the framework of modality we developed in our recent work – by dissociating modal force from ranking – offers a flexible way to understand the deeper relation between asking a question and modalizing, as well as how seemingly un-modal expressions can undertake functions typically associated with modality.

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Chapter 2

Evidential bias across clause types

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Declarative (polar) questions such as English rising declaratives are associated with a range of effects including positive evidential bias, which are commonly analyzed as arising from the non-interrogative clause type of these questions (Gunlogson 2003, Farkas & Roelofsen 2017, among others). A detailed comparison between English rising declaratives and Turkish object attachment interrogatives shows that (a) positive evidential bias is not an exclusive feature of declarative questions and (b) in fact a cluster of effects beyond evidential bias is common to rising declaratives and this particular kind of polar interrogative. I argue that both question forms are underlain by the monopolar question meaning in the sense of Krifka (2015), which can yield the evidential bias cluster of effects across clause types. The account helps to disentangle types of biased inferences some may still be rooted in clause type, offers a way of approaching variation in bias paradigms, and makes typological predictions regarding the relationship between monopolar question meaning and clause type.

1 Introduction

Some polar question forms trigger pragmatic inferences that go beyond the simple truth conditional meaning associated with polar interrogatives, globally called *bias*. The English rising declarative, a particularly well-researched declarative question, presents a prime case of biased question. In (1), if we first observe the use in context, while the polar interrogative felicitously conveys an unbiased hope to find jumper cables, the declarative question infelicitously appears to presume that such a hope is warranted. Further, certain lexical and grammatical elements such as an adverb of complete ignorance like *by chance* require an unbiased context and are infelicitous in a rising declarative.



- (1) *To passerby in a parking lot*

Excuse me, but my battery's dead ...

- a. Do you (by chance) have jumper cables?
- b. # You've (by chance) got jumper cables?

(Gunlogson 2003)

English rising declaratives are also known for their requirement of public evidence in favor of the content proposition of the question (Gunlogson 2003). This notion has come to be known as *contextual bias* or *evidential bias* (Sudo 2013). In (2a), the speaker infers that it is raining on the basis of the contextual evidence of wet coat, and the rising declarative is completely fitting. Whereas in contexts without such evidence (2b) or those with counterevidence (2c), a rising declarative is not felicitous. Hence, the rising declarative is said to bring about inferences of positive evidential bias.¹

- (2) a. [Ev. BIAS +] *My friend enters my windowless office in a dripping wet coat.*

It's raining? / Is it raining?

- b. [Ev. BIAS 0] *Speakers are on the phone, no related utterance has been made.*

It's raining? / Is it raining?

- c. [Ev. BIAS -] *My friend enters my windowless office in visibly dry summer clothes.*

It's raining? / Is it raining?

(2) also shows that in contrast to the rising declarative, the English polar interrogative is felicitous in all three contexts, hence it is termed *evidentially neutral* or *evidentially unbiased*. The English polar interrogative appears to be unrestricted and unmarked in numerous other respects, including the availability of adverbs of complete ignorance, as seen in (1a).

Beyond its bias properties, rising declaratives exhibit a host of other peculiarities, some of which are not straightforwardly relatable to evidential bias or bias in general. (3) summarizes some poignant cases including usage restrictions (infelicity when used as exam questions or as polite requests) and more structural features (the inability to support negative polarity items and to take part in polar alternative questions). The data in (3) come from Huddleston (1994) and Gunlogson (2003).

¹Throughout, I will be using Sudo's (2013) terminology that distinguishes these three evidential conditions as positive, zero, and negative bias conditions.

- | | |
|---|----------------|
| (3) a. # The empty set is a member of itself? | Exam question |
| b. # You can pass me the salt? | Polite request |
| c. # Anybody's home? | NPI |
| d. # She ordered coffee, or not? | Polar Alt |

Notable analyses of the meaning of English rising declaratives treat the evidential bias inferences as an extension of the generally biased nature of the form, typically only making reference to bias in an unspecified manner. Similarly common across the literature is the centrality of clause type as the root cause of these inferences. In the seminal work of Gunlogson (2003), declaratives are informative and inherently express commitment by their nature. This accounts for the infelicity in examples such as (1b), (3a) and (3b), where a commitment by the addressee cannot be said to be involved. The evidential bias observed in (2) is a consequence of informativeness in addition to commitment. Uninformativeness with respect to the addressee is a necessary condition for an utterance to be interpreted as a question act. Declaratives can be interpreted as a question only if the addressee is already understood to be publicly committed to the content proposition. For this reason, inferences based on evidence need to be public. Farkas & Roelofsen (2017) offer a larger framework of bias and neutrality based on principles of markedness. This account relies heavily on the marked status of question forms such as tags and declarative questions as opposed to the default status of polar interrogatives, argued to result in special discourse effects including bias. For Rudin (2022), who follows the Table framework of Farkas & Bruce (2010), the rising tune found both on the polar interrogative and the rising declarative serves to block the addition of a speaker commitment in the form of the content proposition ϕ to the discourse commitments and forces the addressee to make one, because Issues must be resolved. What separates the rising declarative and the polar interrogative is that the former, unlike the latter, fails to project a future common ground including $\neg\phi$ and in combination with broader pragmatic principles, this leads to the inference that the speaker takes the addressee to have a bias towards ϕ , which subsumes but also goes beyond evidential bias.

I introduce in this paper the case of an unmarked polar *interrogative* from Turkish which triggers inferences of evidential bias without any other associations of bias. The data thus shows that neither declarative clause type nor bias in the general sense is a necessary condition for evidential bias to arise. The necessary condition, I argue, is an underlyingly monopolar meaning in the sense of Krifka (2015). I further show that, despite its interrogative clause type, this form aligns with rising declaratives in a number of ways including all of the features

exemplified in (3), which I dub the Ev+ cluster of effects. Moreover, this cluster is partially observable in evidentially biased forms found in other languages, providing further empirical footing for the approach.

For English rising declaratives, the implication of the analysis is that evidential bias and what I will argue to be related effects are driven by the monopolar denotation of these questions, much in the same spirit as Rudin (2022). However, I do not propose to supplant the cumulative understanding of rising declaratives with one based on evidential bias. That would be contrary to the empirical evidence, as we will see below. What I aim to do is to illustrate the viability of a crosslinguistically and cross-structurally valid alternative to the analysis of the empirical presentation of rising declaratives that concerns evidential bias and related effects.

The paper continues in Section 2 with the empirical discussion, where Turkish polar questions, and specifically the evidentially biased object attachment questions, are introduced, followed by the introduction of the Ev+ cluster. In Section 3, an account is sketched which relies on the monopolar question meaning proposed by Krifka (2015), which I argue leads to inferences of positive evidential bias and the Ev+ cluster due to its interactions with focus. Section 4 documents differences between the Turkish and the English Ev+ forms and suggests that these may indeed be clause type-based. Section 5 compiles existing findings in unambiguous Ev+ forms in two further languages and illustrates the commonness of the features. Section 6 reconsiders the connection between declarative clause type and Ev+ and suggests that the connection is through the defaultness of the monopolar meaning. Section 7 concludes the paper.

2 The evidentially biased Turkish polar interrogative and the Ev+ cluster

Let us delve into the two empirical novelties that necessitate a reconsideration of the connection between evidential bias and clause type and the generalization regarding the family of effects that cluster with evidential bias across clause types. Most of the observations in this section will be based on Turkish polar questions, which I first briefly introduce.

2.1 Turkish polar questions at a glance

Polar questions in Turkish are built by the addition of the vowel-harmonic clitic *-mI* to the corresponding declarative. The clitic is focus-sensitive, therefore it

attaches to a focused element (Ladd 1996, Kornfilt 1997). In (4b), a cleft translation is adopted to facilitate the intended focus interpretation, while Turkish polar questions do not show any signs of being clefts or have any other marked morphosyntax other than carrying the clitic *-mi* (boldfaced throughout). The reader is referred to Kamali & Krifka (2020) for a recent and empirically detailed treatment of focus in Turkish polar questions.

- (4) a. Ali dün yemek yap-tı.
Ali yesterday dinner make-PAST
'Ali made dinner yesterday.'
- b. Ali **mi** dün yemek yap-tı?
Ali MI yesterday dinner make-PAST
'Was it Ali that made dinner yesterday?'

When no particular element is in focus, there are two possible attachment sites (Kamali 2011a,b). The clitic may be found on the discourse-new object, or on the verb. I will call these *object attachment* and *verb attachment* questions. Both instances may be found in all-new and out-of-the-blue situations such as (5). Angular brackets signify mutually exclusive potential attachment sites.

- (5) *A, B and Ali are roommates. They meet at the breakfast table for the first time after B's month-long trip.*
A: Good morning! I didn't know you were back.
B: Good morning! You were both asleep when I arrived. Tell me ...
Ali dün yemek <**mi**> yap-tı <**mi**>?
Ali yesterday dinner MI make-PAST MI
'Did Ali make dinner yesterday?'

Both forms are surface-ambiguous with multiple interpretations available due to limits on attachment site among other things. The clitic is attached to the verb if any overt marking in the verbal morphological complex is focused, such as the verb stem or tense. It is also attached to the verbal complex in cases of verum/polarity focus which require no further marking. Note that (5) is a context where none of these focus interpretations is supported without accommodation, which we will notice in various other contexts in due course. I use the term *verb attachment* only to refer to the broad focus/focusless interpretation of polar questions carrying the clitic on the verbal complex.

A similar observation pertains to cases where the clitic is found on the object. Unsurprisingly, this attachment site is used for cases of object focus (6a). Not only

that, VP focus is also expressed this way (6b), suggesting that the correspondence from object to VP to broad focus is regulated by focus projection in the sense of Selkirk (1995). (6) shows this through the example of alternative questions, which in Turkish carry *-mI* on both disjuncts. Note, again, that these construals (the part of the AltQ up to the disjunction) are not felicitous in (5) without accommodation. So, again, by the term *object attachment*, I will only be referring to the broad focus construal felicitous in (5).

- (6) a. Ali [yemek]_F **mi** yap-tı, yoksa [tatlı]_F **mi**?
Ali dinner MI make-PAST or dessert MI
'Did Ali make [dinner]_F or [dessert]_F?'
b. Ali [_{VP} yemek **mi** yap-tı]_F yoksa [_{VP} ders **mi** çalış-tı]_F?
Ali dinner MI make-PAST or lesson MI study-PAST
'Did Ali [_{VP} make dinner]_F or [_{VP} study his lesson]_F?'

A consequence of focus projection is that polar questions lacking a discourse-new object will automatically cause the clitic to be on the verb. Hence, data with unergative verbs or those with a discourse-given object (along with the well-known interactions with differential object marking, cf. Özge 2011) are uninformative for the purposes of this paper and are disregarded.

The meaning of the verb attachment and the object attachment options differ in interesting ways. In particular, as we will shortly see, object attachment shares important features with the English rising declarative. We will also be referring to verb attachment for comparison and for a fuller understanding of the paradigm.

2.2 The evidentially biased polar interrogative

In (5), both clitic placement options may be possible, but they have different meanings. Object attachment, in particular, implicates the presence of a non-linguistic cue in favor of the content proposition (first intuited to my knowledge by Göksel & Kerslake 2005). Consider possible continuations to the conversation in (5), which are not interchangeable.

- (7) A: Yes. Why do you ask?
B': [Continuing from object attachment] When he cooks, he always leaves the kitchen in this kind of mess, that's why.
B'': [Continuing from verb attachment] I'm starving, that's why.

Indeed, object attachment questions carry positive evidential bias exactly like English rising declaratives. They are licensed in the presence of evidence (8a), and not in the absence of evidence (8b) or in the presence of counterevidence (8c). For this and other reasons we will see throughout, object attachment questions and similar forms are translated with an English rising declarative in (8) and elsewhere.² To aide the reader, when a translation of a polar question is itself infelicitous in the given (pragmatic or structural) context, I prefix the judgement in square brackets. I will be referring to positive evidential bias as *Ev+* in short.

- (8) a. [Ev. BIAS +] *Speaker observes tell-tale signs of Ali's recent cooking.*
 Ali dün yemek mi yap-tı?
 Ali yesterday dinner MI make-PAST
 'Ali made dinner yesterday?'
- b. [Ev. BIAS 0] *Speakers are on the phone. No related utterance has been made.*
 # Ali dün yemek mi yaptı?
 '[#]Ali made dinner yesterday?'
- c. [Ev. BIAS -] *Speaker notices the kitchen looking and smelling exactly as they left it the previous day.*
 # Ali dün yemek mi yaptı?
 '[#]Ali made dinner yesterday?'

From the perspective of what we know about English rising declaratives, we could expect the *Ev+* object attachment questions to be declarative questions. This is not correct, however. Both verb attachment questions and object attachment questions are interrogatives. Let us see why.

First, contexts of unresolved question typically require a true interrogative, barring declarative questions (Gunlogson 2003) (9b). In Turkish, the clitic *-mi* is required in such contexts regardless of position, hence both object and verb attachment align with the English polar interrogative and not with declarative question (9a).

- (9) a. Bir soru cevapsız. Ali yemek <mi> yap-tı <mi>?
 one question answerless Ali dinner MI make-PAST MI
 'One question remains. Did Ali make dinner?'
 b. # One question remains. Ali made dinner?

²I save the English polar interrogative to translate verb attachment questions and polar questions where attachment site does not matter for the point being made. As I will explore, neither correspondence is perfect, but this two-way division is both maximally accurate and, I believe, reader-friendly.

Secondly, interrogatives are incompatible with certain biased adverbs such as adverbs of speaker certainty or evidentiality (Huddleston 1994), whereas declarative questions are fine with them (Gunlogson 2003). In Turkish, neither object nor verb attachment questions may feature these adverbials (10a), again patterning with interrogatives.

- (10) a. # Müdür buna kuşkusuz/besbelli izin <mi> verdi <mi>?
manager this certainly/evidently permission MI gave MI
'[#]Has the manager certainly/evidently given permission for this?'
b. The manager has certainly/evidently given permission for this?

Thirdly, interrogatives, but not declaratives, can be embedded under a rogative predicate. (11a) shows a grammatical embedding under *wonder* of both verb and object attachment options. (11b) shows that the clitic is obligatory in this complement clause, indicating, again, that both forms are interrogatives.

- (11) a. Ali yemek <mi> yap-tı <mi>, merak ed-iyor-um.
Ali dinner MI make-PAST MI wonder do-PRES-1SG
'I wonder if Ali made dinner.'
b. * Ali yemek yaptı, merak ediyorum.
'(I wonder if Ali made dinner.)'

The equally common nominalized embedding form can also be used to show this, but with a few clarifications. (12a) shows the baseline example where a declarative is embedded under a non-rogative verb, rejecting a rogative verb. When the verb attachment form is nominalized, the clitic has to be replaced by a periphrastic construction expanding the standard nominalization with a V-not-V form (12b). The nominalization of the object attachment question, in contrast, retains the clitic on the embedded object while using the standard nominalization (12c) (Kamali 2011b). In neither case does nominalization itself suffice to embed the interrogative clauses, indicating that the periphrasis in (12b) and the clitic in (12c) are interrogative markers. Indeed, neither form accepts a non-rogative matrix predicate and requires a rogative one. The meaning of (12b) and (12c) are for all relevant purposes identical to the meaning of (11a) and (11b).

- (12) a. Merve [Ali'nin yemek yap-tığ-in]-1 saniyor / *soruyor.
Merve Ali-GEN dinner make-NOMIN-3SG-ACC thinks asks
'Merve thinks/*asks that Ali made dinner.'

- b. Merve [Ali'nin yemek yap-ip yap-ma-dığ-in]-i
 Merve Ali-GEN dinner make-CONV make-NEG-NOMIN-3SG-ACC
 soruyor / *sanıyor.
 asks thinks
 'Merve asks/*thinks if Ali made dinner.'
- c. Merve [Ali'nin yemek mi yap-tığ-in]-i soruyor / *sanıyor.
 Merve Ali-GEN dinner MI make-NOMIN-3SG-ACC asks thinks
 'Merve asks/*thinks if Ali made dinner.'

So, we see here a polar question form, the Turkish object attachment question, that is restricted to positive evidential bias contexts while being an interrogative through and through. As it is not a declarative, the Ev+ feature of the Turkish object attachment question cannot be due to clause type. The competing form in the paradigm, the verb attachment question, is also an interrogative, so there are no surprises there.

Now, even if both object attachment and verb attachment questions are interrogatives, there could be a markedness asymmetry between the two forms. This could put the object attachment form in a marked position and may lead to its associations with bias. When we look at the full paradigm with verb attachment questions, we see that this cannot be the case. Departing from the distribution of polar interrogatives in the English paradigm, the competing form in Turkish, verb attachment, is not unmarked.

Recall that the English polar interrogative is in many ways a default. Directly related to our purposes, it is evidentially neutral (2). The Turkish verb attachment question, in contrast, is not a default. We will see several other reflections of this in due course. For now, observe that it is not evidentially neutral (13). Namely, it is banned from positive evidential contexts (13a) (it is Ev-/Ev0, or has "anti-evidential bias"). As such, it is in complementary distribution with the object attachment form. (As English does not have a form that parallels this distribution, the translations given are approximate.)

- (13) a. [Ev. BIAS +] *Speaker observes tell-tale signs of Ali's recent cooking.*
- # Ali dün yemek yap-tı **mi?**
 Ali yesterday dinner make-PAST MI
 ('Did Ali make dinner yesterday?')
- b. [Ev. BIAS 0] *Speakers are on the phone. No related utterance has been made.*
- Ali dün yemek yaptı **mi?**
 'Did Ali make dinner yesterday?'

- c. [Ev. BIAS -] *Speaker notices the kitchen looking and smelling exactly as they left it the previous day.*

Ali dün yemek yaptı mı?

‘Did Ali make dinner yesterday?’

This data shows that Turkish object attachment and verb attachment questions are in complementary distribution with respect to evidential contexts. As they share the pie equally, it is impossible to describe one as the default. For this reason, a markedness-based account, even if it can be formulated bypassing a clause type markedness, cannot easily explain why the object attachment form is biased in a similar way to the English rising declarative, nor why the verb attachment form is anti-biased in this respect.

Let us finally briefly consider Turkish declarative questions. A curious aspect of the Turkish paradigm of question forms is the very restricted use of declarative questions. If these were categorically missing, one could speculate that the meaning of the object attachment question exceptionally subsumes a normally declarative-related function, or that the paradigm is too unusual to challenge our existing generalizations without further empirical understanding. But declarative questions do exist in Turkish. (14) provides a real life example.³

- (14) *Airline employee is screening passengers at the check-in queue.*

Bagaj-iniz yok? Pasaport-unuz yan-iniz-da?
baggage-POSS.2PL not.exists passport-POSS.2PL side-POSS.2PL-LOC
Lit. ‘You have nothing to check in? You have your passport?’

As expected of a declarative question, these forms may include an adverb of certainty but may not be embedded under *wonder*.

- (15) [*Same context as (14)*]

- a. Bagaj-iniz yok? Pasaport-unuz herhalde
baggage-POSS.2PL not.exists passport-POSS.2PL presumably
yan-iniz-da?
side-POSS.2PL-LOC
‘You have nothing to check in? You presumably have your
passport?’

³I am not aware of work on the meaning of Turkish declarative questions. My impression is that they are used when the content of the answer can be taken to be almost certain. Sarcastic echoes may also use this form, where the sarcasm appears to be relying exactly on the certainty of the answer. In both cases, most clearly with the airline employee who would not move to the next passenger otherwise, an answer is nevertheless expected.

- b. * Bagaj-iniz yok, merak ed-iyor-um.
 baggage-POSS.2PL not.exists wonder do-PRES-1SG
 ('I wonder if you have nothing to check in.')

What appears to be behind the relative scarcity of declarative questions in Turkish is that they cover a smaller range of uses compared to English declarative questions. Much of the usage space is covered by object attachment questions.

In sum, in Turkish, a proper polar interrogative exhibits the evidential bias profile of English rising declaratives. This form is not more marked than the other major form in the paradigm. Neither is the paradigm too idiosyncratic to be discarded as invalid. Hence, the Turkish facts call for an account of evidential bias that is divorced from clause type or markedness.

2.3 The Ev+ cluster

Now, because the object attachment question is an interrogative and not a declarative question, it could be possible that this construction does not share any other features of the English rising declarative than the evidential bias profile. However, this could not be farther from the truth. In fact, the two questions share a striking number of features. This will lead us to a novel empirical generalization: there is a class of features shared by evidentially positive question forms across clause types, which I will be referring to as the *Ev+ cluster*.

This exploration of the Ev+ cluster of effects has two dimensions. First, I will be documenting further parallelisms between English rising declaratives and Turkish object attachment questions, which I will call *unambiguous Ev+ forms* because of their evidential bias profile. For this, I ask the reader to initially pay attention to the parallels between the object attachment distribution given in the example and the provided rising declarative translation (with felicity included in square brackets as before). An alternative translation in the form of a polar interrogative is included to allow for a comparison to the felicitous neutral form in English. I will simultaneously be documenting the complementary distribution between object attachment questions and verb attachment questions in Turkish, which will be visible in the contrasting felicity associated with the two potential attachment sites of the clitic in the examples. I will ask the reader to pay attention to the verb attachment distribution toward the end of the section when we observe the complementary distribution between the two Turkish forms, which will inform us further about the Ev+ cluster.

Now starting with the two unambiguous Ev+ forms, as we have seen in Section 1, rising declaratives are barred from certain uses such as exam questions.

This list extends to various sorts of questionnaire questions, and court questions that are not triggered by contextual evidence or conversational content. Turkish object attachment questions, which are interrogatives, exhibit the same distribution.

(16) *Exam question*

Türkiye İlkinci Dünya Savaşı'na <#**mi**> gir-di <**mi**>?
Turkey Second World War-DAT MI enter-PAST MI
‘[#] Turkey fought in WW2?’
‘Did Turkey fight in WW2?’

(17) *Questionnaire*

Son iki hafta içinde yumuşatıcı <#**mi**> kullan-di-nız <**mi**>?
last two week inside fabric.softener MI use-PAST-2PL MI
‘[#] You have used fabric softener in the last two weeks?’
‘Have you used fabric softener in the last two weeks?’

(18) *Routine traffic checkpoint*

Alkol <#**mü**> al-di-nız <**mi**>?
alcohol MI take-PAST-2PL MI
‘[#] You have had alcohol?’
‘Have you had alcohol?’

Similarly, neither English rising declaratives nor Turkish object attachment questions may be used in indirect questions expressing polite requests, offers and invitations.

(19) Your roommate says they are coming home and you need bread.

Ekmek <#**mi**> al-ır <**mi**>-sin?
bread MI get-AOR MI-2SG
‘[#] You could buy bread?’
‘Could you buy bread?’⁴

(20) *Hosting a guest.*

Pasta <#**mi**> iste-r <**mi**>-sin?
cake MI want-AOR MI-2SG
‘[#] You would like cake?’
‘Would you like cake?’

⁴The clitic occurs to the left of the agreement marker following certain tense-aspect-modality markers.

- (21) *At a ballroom:*

Benim-le dans <#**mi**> ed-er <**mi**>-sin?
 me-COM dance MI do-AOR MI-2SG
 '[#]You will dance with me?'
 'Will you dance with me?'⁵

Two structural features exhibited by the rising declarative are the impossibility to support negative polarity items and polar alternative questions expressed with *or not*. These, too, hold across clause types, as the Turkish object attachment question is also restricted in this way. In (22), a neg-word's inability to be licensed by object attachment is shown. Note that this is ungrammatical even when the clitic *-mI* attaches to the neg-word, hence presumably has it in its local scope. I use neg-word glossing and assume that neg-words constitute a type of negative polarity item following Giannakidou (2000).⁶

- (22) Ev-de kimse <***mi**> var <**mi**> ?
 house-LOC n-body MI exists MI
 '[#]Anybody's home?'
 'Is anybody home?'⁷

In (23), the similarly ungrammatical polar alternative question with object attachment is given. The alternative question construction requires the clitic in both alternatives as before, and negation must appear inside the verbal morphological complex as it is a bound morpheme.

- (23) O kahve <#**mi**> söyle-di <**mi**>, yoksa söyle-me-di **mi**?
 she coffee MI order-PAST MI or order-NEG-PAST MI
 '[#]She ordered coffee, or not?'
 'Did she order coffee, or not?'

So, contexts like exams, questionnaires, court questions, indirect questions, and certain markers of negativity and polarity are systematically rejected by the two unambiguous *Ev+* forms we have been looking at – the English declarative question and the Turkish object attachment question. The familiar wisdom takes it that a polite request or negative polarity licensing do not go with a rising declarative in some way or another because it is not a proper interrogative. With the

⁵The nominal in light verb constructions counts as syntactic object.

⁶An unlicensed neg-word is considered to be a failure of negative concord, and hence lead to ungrammaticality rather than infelicity. See Kamali & Zeijlstra (2024) on Turkish neg-words.

⁷Subjects of unaccusatives count as objects.

Turkish object attachment question we have a proper interrogative in our hands that nevertheless has the same set of properties. I refer to this set of properties of unambiguous *Ev+* forms that hold across clause types the *Ev+ cluster*.

Our characterization of the *Ev+* cluster so far relies on contexts from which both the Turkish object attachment question and the English rising declarative are excluded. Are there also contexts which require these forms and exclude others? The answer is yes, but the English polar question paradigm will not help us here. Because of its default and neutral status, no context excludes the English polar interrogative. The Turkish paradigm supplies the contrast we need.

As we have observed with its evidential bias profile in (13), the Turkish verb attachment question is not a neutral and default form like the English polar interrogative. If the reader now considers the verb attachment distribution in the examples given so far in this section, it will be seen that verb attachment is felicitous in all of the contexts object attachment is ruled out, mirroring the distribution of the English polar interrogative. But unlike the English paradigm, the two forms in Turkish are in complementary distribution: there are also contexts that exclude verb attachment questions and require object attachment questions. Also perfect for English rising declaratives, felicity in these contexts instantiate a positive *Ev+* cluster feature. Two such contexts are responses to requests for guesses and echoic responses to all-new utterances, given in (24) and (25).

- (24) A: Guess what happened/why the kitchen is a mess.

B: Ali yemek <mi> yap-tı <#mi>?
Ali dinner MI make-PAST MI
'Ali made dinner?'
'Did Ali make dinner?'

- (25) A: Sonra Ali yemek yap-tı.

then Ali dinner make-PAST
'And then Ali made dinner.'

B: Ali yemek <mi> yaptı <#mi>?
Ali dinner MI made MI
'Ali made dinner?'
'Did Ali make dinner?'
(Is that what you said?/ No way!/ Hm, and then?)

All of this put together, a cluster of features emerges as the *Ev+* cluster, which I summarize in Table 1. Verb attachment questions which do not have an English analogue, cover the complementary set of contexts.

Table 1: The Ev+ cluster based on English rising declarative and Turkish object attachment question

	English	Turkish
Unambiguous Ev+	yes	yes
As exam/questionnaire/court question	no	no
As indirect question	no	no
With <i>or not</i>	no	no
With NPI/neg-word	no	no
As guess & echoic	yes	yes

The Ev+ cluster includes features shared by the English rising declarative and the Turkish object attachment question as our investigation has shown so far. I take these unexpected parallelisms to be a valuable starting point because they hold across clause types and unrelated languages. More features may be discovered that belong here, but probably not those we readily know not to be shared between the two forms. By this reasoning, the null hypothesis would be that features of the two forms that fall outside of the intersection are independent effects. We have seen some such features in (9) through (11). We will revisit these and a few more pieces of similar data to develop a perspective of residual bias effects in Section 4. On the other hand, further examination may prove that some features cluster together accidentally. A crosslinguistic perspective, which I will lay out in Section 5, may help determine the core of effects that really are due to the same underlying structural phenomenon and tease apart others.

Ideally, the task is to account for the Ev+ cluster, not just positive evidential bias, as the elements of the cluster remain constant across two starkly different constructions. The account must not be based on clause type, because these features are observed in a declarative question on the one hand and an interrogative on the other. Features not shared between the two Ev+ forms, i.e. features that fall outside of the cluster, must stem from other reasons. Finally, the complement set of features, not present in an English form but represented by verb attachment questions in Turkish, must also find an explanation.

3 The proposal

The Ev+ cluster and its complement can both receive an explanation under the notions of *monopolar* and *bipolar questions* of Krifka (2015). Specifically, the mo-

nopolar question meaning provides the core meaning which leads to positive evidential bias and the Ev+ cluster, while the Turkish verb attachment question stands out as a true bipolar question manifesting the absence of these effects. The account does not make reference to clause type. Polar interrogatives as well as declarative questions may have this underlying meaning (but see Section 6 on why declaratives may have to).

Krifka (2015) argues that there are two possible polar question meanings. The bipolar meaning denotes the speaker's invitation to restrict future commitments in the discourse to either the content proposition ϕ or its complement $\neg\phi$, similar in essence to the standard two-membered set of polar question meaning (Hamblin 1973, Karttunen 1977). These questions may be answered with a conclusive *no* or a negative fragment and take part in polarity alternative questions. I simplify below.

(26) Bipolar question: $\phi?$ = Do you commit to ϕ or $\neg\phi$?

A: I'm hungry. Did you make dinner (or not)?

B: Yes. / No. / (No,) I didn't.

The second meaning is the monopolar meaning, which denotes an invitation to restrict future commitments to the content question itself without its complement.⁸ These questions may not occur with the polar alternative but rather may occur with an open alternative such as *or what*. Their possible answers are also restricted, making a conclusive *no* answer degraded and a negative fragment even worse. This is due to the absence of the complement proposition $\neg\phi$ from the meaning.

(27) Monopolar question: $\phi?$ = Do you commit to ϕ ?

A: It smells delicious. Did you make dinner (or what)?

B: Yes. / ?No. / #(No,) I didn't.

Krifka already envisions that English rising declaratives are biased towards the *yes* answer because they are monopolar. Differently from Krifka, I would like to connect the monopolar meaning to evidential bias in particular, and along with that to the rest of the Ev+, with no association to clause type.

⁸An earlier proposal of this sort is due to Biezma & Rawlins (2012) where a monopolar propositional content is interpreted with a Q operator. Their account is stronger, though, in postulating this meaning to be the default polar question meaning. Hence, the English polar interrogative as well as presumably the rising declarative would receive a monopolar analysis.

3.1 Rising declaratives and object attachment questions are monopolar

First, let us observe that rising declaratives and object attachment questions both behave in a way expected of monopolar questions. A conclusive *no* answer to a rising declarative or an object attachment question is degraded. A negative predicate fragment is unacceptable. (For contrast, see (30) and (40) for examples of what I take to be non-conclusive *no* answers.)

- (28) A: Ali yemek **mi** yaptı?
 ‘Ali made dinner?’
 B: Evet. /?Hayır. #(*Hayır*,) yap-ma-di.
 yes no no make-NEG-PAST
 ‘Yes. / ?No. / #(No,) he didn’t.’

As we see in (23) and (29), neither rising declaratives nor object attachment questions can take part in a polar alternative question. The infelicity of the *no* answer and the polar alternative are in line with the missing alternative $\neg\phi$ from the monopolar meaning.

- (29) # Ali yemek **mi** yap-tı, yoksa (Ali yemek) yap-ma-di **mi**?
 Ali dinner MI make-PAST or Ali dinner make-NEG-PAST MI
 ‘[#]Ali made dinner, or (did he) not?’

Recall that the Turkish object attachment question is a proper polar interrogative, so it should in principle be able to take part in a polar alternative question or be answered with a *no* in a conclusive manner, which might not be said that easily of the rising declarative. Still, this polar interrogative diverges from the expected pattern in line with the usage restrictions we have observed earlier.

Where both Turkish object attachment questions and English rising declaratives do occur is contexts where distinct propositional alternatives are evaluated instead of the polar alternative $\neg\phi$, such as *ψ the cat knocked over the shelves*, or *Hasan will order pizza* etc. We can observe the surfacing of such an alternative, for instance, in the form of a voluntary addition to a *no* answer as in (30). It is noteworthy that the speakers appear to be spontaneously converging on a Question Under Discussion (QUD) (Roberts 1996) like *What happened?*

- (30) A: Ali yemek **mi** yaptı?
 ‘Ali made dinner?’

- B: Hayır, kedi raflar-ı devir-di.
no cat shelves-ACC knock.over-PAST
'No, the cat knocked over the shelves.'

Another example where distinct propositional alternatives surface under monopolar question forms is propositional alternative questions with distinct propositional alternatives (31). Here, again, ϕ and ψ are contrasted. This is in stark contrast to the unavailability of polar alternative questions contrasting ϕ and $\neg\phi$ given in (29).

- (31) Ali yemek mi yap-tı, yoksa Hasan pizza mı söyle-yecek?
Ali dinner MI make-PAST or Hasan pizza MI order-FUT
'Did Ali make dinner or will Hasan order pizza?'
'Ali made dinner or Hasan will order pizza? (Which one is it?)'

(31) suggests that a monopolar question with content proposition ϕ can project broad focus alternatives similar to an assertion of the proposition ϕ . Indeed, the same ϕ in an assertion (32) and a rising declarative (33) may be cued by *what happened*, a trigger of broad focus alternatives. (33) would be expressed by object attachment in Turkish, skipped here for reasons of space.

- (32) A: What happened?
B: The shelves collapsed.
Other broad focus alternatives not picked up by the speaker: {Somebody broke the window, officemate fell off the ladder while changing a lightbulb, the loudspeakers malfunctioned ...}.
- (33) A: What happened? The shelves collapsed?
Other broad focus alternatives not picked up by the speaker: {Somebody broke the window, officemate fell off the ladder while changing a lightbulb, the loudspeakers malfunctioned ...}

So, both English rising declaratives and Turkish object attachment questions, the difference in their clause types notwithstanding, can be argued to exhibit the monopolar question meaning.⁹ This meaning lacks the polar alternative but allows the generation of broad focus alternatives via focus. In contrast, as we will see below, bipolar questions only lead to the two polar alternatives. One consequence of the monopolar/bipolar division is that the polar alternative $\neg\phi$ and broad focus alternatives $\{\psi, \pi \dots\}$ do not mix.

⁹Rudin (2022) also argues English rising declaratives to be monopolar.

3.2 Verb attachment questions are bipolar

Equipped with this idea, let us consider bipolar questions. English does not have an unambiguous bipolar question form. The English polar interrogative may be found in an alternative question with distinct propositional alternatives as in (31) as well as a polar alternative question as in (29), see (34).

- (34) a. Did Ali make dinner or will Hasan order pizza?
 b. Did Ali make dinner, or not?

But Turkish verb attachment questions, complementary to object attachment questions in a range of features reviewed earlier, behave perfectly like unambiguous bipolar questions. In terms of the felicity of a *no* answer and the polar alternative, we see that verb attachment supplies the correct form.

- (35) a. A: Ali yemek yaptı **mi?**
 Ali dinner make-PAST MI
 ‘Did Ali make dinner?’
 b. B: Evet. / Hayır. / (Hayır,) yap-ma-di.
 yes no no make-NEG-PAST
 ‘Yes. / No. / (No,) he didn’t.’
- (36) Ali yemek yap-tı **mi**, yoksa (Ali yemek) yap-ma-di **mi?**
 Ali dinner make-PAST MI or (Ali dinner) make-NEG-PAST MI
 ‘Did Ali make dinner, or (did he) not?’

Conversely, verb attachment is infelicitous in cases relying on a distinct propositional alternative like (31), illustrating the unavailability of focus alternatives when bipolar polar alternatives are in question (37). As with the object attachment question, this form is a proper polar interrogative and should not have a problem being in a proposition-level alternative question, but in fact it does.

- (37) # Ali yemek yap-tı **mi**, yoksa Hasan pizza söyle-yecek **mi?**
 Ali dinner make-PAST MI or Hasan pizza order-FUT MI
 (‘Did Ali make dinner, or will Hasan order pizza?’)

Similarly, (38) shows the closest verb attachment equivalent of the discourse in (30). Unlike object attachment, with verb attachment there is a clear judgement that B’s *no* answer resolves the QUD. An attempted continuation parallel to the corresponding object attachment example is infelicitous (38b). One may utter this proposition next in the discourse, but it must be separated from the previous QUD with a full prosodic and topical reset (38c).

- (38) a. A: Ali yemek yaptı mı?
‘Did Ali make dinner?’
b. B: # Hayır, kedi rafları devirdi.
‘(No, the cat knocked over the shelves.)’
c. B’: Hayır. Fark ettin mi? Kedi rafları devirdi.
‘No. Have you noticed? The cat knocked over the shelves.’

Based on these tests, verb attachment questions prove to be a good candidate for a true bipolar question. Conversely, object attachment questions and rising declaratives both demonstrate features expected of monopolar questions. Between the two meanings, not only the presence of the polar alternative $\neg\phi$, but also the concomitant availability of distinct focus alternatives varies.

- (39) Bipolar question ($\{\phi, \neg\phi\}$) : Verb attachment question (Turkish)
Monopolar question (ϕ) : Object attachment question (Turkish)
Rising declarative (English)

With the proposed distinction, on the one hand the abundantly clear complementary distribution between the two forms in Turkish can be derived in a straightforward way. This is in contrast to English, where the polar interrogative is effectively ambiguous between the two meanings.¹⁰ On the other hand, the division collapses the two Ev+ forms together and provides a common underlying reason for the cluster of effects in their monopolar meaning.

3.3 How to derive the Ev+ Cluster?

I will now turn to relating the monopolar question meaning to the Ev+ cluster. This will be a proof of concept rather than a fully fleshed out analysis. Here is the idea in a nutshell: The monopolar meaning, not the bipolar meaning, provides the necessary conditions for the Ev+ cluster. It does not provide sufficient conditions for all of the effects, however, among them positive evidential bias. This particular inference can be said to arise from an accommodation of the QUD in the absence linguistic cues to establish one.

Fist, the necessary conditions. We have seen in Section 2 that rising declaratives and object attachment questions both work perfectly when the content proposition is a *try-out*: including an inference based on public evidence, guess, or perception of the speaker regarding what the addressee has said. The tried out

¹⁰Recall (34). Whether this is due to some hidden structural ambiguity or another process is not clear at the moment, but see Section 6 for some related discussion.

possibility is one among many. In contrast, contexts that exclude these two forms and in fact require the bipolar verb attachment form in Turkish are like exams. There is a right answer and a wrong answer which is the logical complement, instead of numerous possibilities.

This difference, I suggest, stems from the difference in the sets of alternatives supported by the two meanings. There are two facets to this, which I will not try to reduce to one in this paper (but presume to be reducible): the first is the possibility of unlimited propositional focus alternatives $\{\phi, \psi, \pi \dots\}$ afforded by the focus semantic value of monopolar questions. This fits the function of trying out, because when venturing a guess or making an inference about the true state of affairs behind my friend's wet coat or the mess in the kitchen, I am picking one possibility among many. Likewise, when I ask a confirmation question or echo the addressee's last statement in surprise or sarcasm, I am picking what I possibly misheard, or pretend to have misheard, as the one utterance by the addressee which could have been any number of similar utterances. Hence, the set against which the content proposition is evaluated is the set of focus alternatives. Let us take the wet coat scenario with the rising declarative as the unambiguously monopolar form. The dialogue in (40) does not automatically come to an end if an initial guess is wrong. It will be continued with another, perhaps less likely guess (40c).¹¹ It is in fact odd to stop guessing if the perceived question under discussion has not been resolved while the dialogue is still continuing (40d).

- (40) *A's friend enters their windowless office in a dripping wet coat.*
- a. A: It's raining?
 - b. B: Nope.
 - c. A2: Oh dear, someone activated the sprinklers on your floor again?
 - d. A2': ??OK!

The second facet is the restricted alternatives of the bipolar question, and the restriction, specifically, to the two polar alternatives $\{\phi, \neg\phi\}$. This makes for a very poor choice of form for a try-out, especially in the presence of a monopolar form in the paradigm. One piece of evidence that polar alternatives are not evoked in Ev+ contexts is found in the absence of polar alternative questions in such contexts. (41) shows that polar alternative questions are infelicitous in Ev+ contexts.¹²

¹¹A2 indicates A's second turn in conversation responding to B.

¹²A reviewer points out the felicity of *It's not sunny?* in this context. This suggests that negative propositions can be part of the set of focus alternatives of a monopolar question without their logical complement (this time the positive *It's sunny?*) being involved. Unfortunately space does not allow me to expand on this interesting lead.

- (41) *My friend enters my windowless office in a dripping wet coat.*

#Is it raining, or not? / #Is it, or is it not, raining? / # It's raining, or not?

If we consider from this point of view a typical use that rejects our monopolar forms but goes very well with our bipolar form, the restrictions start making sense also in that direction. Take an exam question or a polite request. If met with the answer *no*, the exam is graded 0 and the request is denied. The questioner cannot attempt to request a response to the same question/request with a question from a different angle parallel to making a second guess after a failed one. The question is resolved. Whether *yes* or *no*, one answer excludes the other and becomes immediately conclusive because ϕ and $\neg\phi$ are the only alternatives on the table. A clear manifestation of the underlying bipolar meaning in contexts such as court questions and indirect questions is the common use of polar alternatives when necessary pragmatic conditions are met, such as in (42).

- (42) a. *Court hearing*

Did you or did you not tell him that if we were going to attack you'd let him know?¹³

- b. *Threat*

Will you or will you not turn that damn radio off?

What about the *sufficient conditions* to create positive evidential bias? I suggest that contexts of positive evidential bias constitute a particular kind of trying out, namely one where no QUD has been established and hence the speakers must consult the physical environment to construct one. They must do so because expressions with open focus alternatives must be licensed in a QUD that limits the space of salient alternatives (Roberts 1996, Biezma & Rawlins 2012). In this line of thinking, the bias arises as a pragmatic inference based on the knowledge that both interlocutors must converge on a QUD.

Let me start with how linguistic cues delimit the alternatives in some English declarative questions and Turkish object attachment questions. The most straightforward case is an alternative question with distinct propositional alternatives as in (31), repeated as (43). Even though each alternative is in the form of a monopolar question, the resulting alternative question does not lead to any inferences of bias, nor any evidence needs to be involved. This is because each of the exactly two relevant alternatives are overtly included in the form. The QUD is just that, or something like *which of the following is the case*.

¹³<https://www.washingtonexaminer.com/policy/defense-national-security/milley-under-fire-i-would-never-tip-off-any-enemy> (Last accessed 12 June 2025.)

- (43) Ali yemek **mi** yap-tı, yoksa Hasan pizza **mi** söyle-yerek?
 Ali dinner MI make-PAST or Hasan pizza MI order-FUT
 'Ali made dinner or Hasan will order pizza? (Which one is it?)'

A guessing challenge is slightly more complicated, but alternatives may nevertheless be construed relatively easily. Consider the rising declarative/object attachment question in (44) in response to the guessing challenge *Guess why I'm so happy today*. Here, the alternatives would be delimited by the knowledge of all possible events that might make the challenger happy, such as winning the lottery or passing an exam. There is no need for particular evidence towards a marriage proposal, because the challenge is simply to pick a likely state of affairs out of many potential ones, which is exactly what the monopolar form delivers. As in (43), there is no urge to look into the physical environment.

- (44) Your friend said "Guess why I'm so happy today?". You respond.
 Sevgili-n evlenme **mi** teklif et-ti?
 lover-POSS.2SG marriage MI propose-PAST
 'Your girlfriend proposed?'

Now consider the same question in a context of positive evidence noticed privately by A, as in (45). A wants to know whether B's girlfriend proposed, using the same monopolar form as in (44), hence indicating that he is considering multiple states of affairs for the true answer. B may be looking at her computer all the while and there may have been no prior exchange about a marriage proposal. Not being aware of A's attention on the ring, the monopolar question is puzzling to B. A must have in mind a QUD with multiple alternatives, to which B has no immediate access. But, assuming A is being cooperative, B must be able to construct a congruent QUD that matches A's. B looks to the physical context for clues and realizes that her ring is a novelty that could lead to the hypothesis that B received a marriage proposal. B may then utter the maximally congruent (45b) or (45c). Alternatively, B may not try to match A's QUD or fail to do so, in which case she could answer as in (45d).

- (45) A notices his friend B is wearing what looks like an engagement ring.
- A: Sevgili-n evlenme **mi** teklif et-ti?
 lover-2SG marriage MI propose-PAST
 'Your girlfriend proposed?'
 - B: Yes! Cool ring, huh?
 - B': No. You mean my grandma's ring who just passed away?
 - B'': Yes, who told you?/No, why?

Notice that effects of this QUD congruence emerge irrespective of whether the true answer to the question at hand is *yes* as in (45b) or *no* as in (45c). Maximal question/answer congruence with the monopolar form is achieved only when the QUD is also addressed. Hence, *yes* and *no* alone are perceived to be odd unless the evidence in question is public.

QUD is a promising notion to connect the monopolar meaning to the biased inference based on evidence.¹⁴ Monopolar questions are unambiguously Ev+, that is, they evoke a need to refer to the physical environment to fully make sense, as a result of the pressure to construct a QUD based on the non-linguistic context in the absence of other clues revealing the nature of the relevant alternatives. This way, the requirement of public evidence which Büring & Gunlogson (2000) and Gunlogson (2003) address at length would have a pragmatic source, namely based on a matching QUD construal by both parties.

Putting together everything said in this section, I sketched an account that connects English declarative questions with Turkish object attachment interrogatives around the cluster of Ev+ features and across clause types, successfully excluding Turkish verb attachment interrogatives. Both English rising declaratives and Turkish object attachment questions are monopolar. They can support the generation of broad focus propositional alternatives while excluding the polar alternative. The monopolar meaning underlies the Ev+ cluster of effects, because the monopolar form allows the speaker to formulate a question where one of many possibly true states of affairs is picked. Inferences of positive evidential bias arise when interlocutors have to decide on a QUD that restricts that set of states of affairs. Turkish verb attachment questions are bipolar questions and denote the pair of polar alternatives only. Hence this form is employed in cases where only the content proposition and its negation represent potential states of affairs, presenting the complement set of effects to those of the Ev+ cluster.

One case has been left out, which I will touch upon briefly before closing this section. Regarding negative polarity/concord licensing, our empirical excursion

¹⁴A reviewer suggests that a polar question with narrow focus such as (4b) or (i) may be subsumed in the monopolar analysis following Krifka (2014). It becomes an interesting question, then, to what extent they are evidentially biased and whether this would fall out of the proposal given here. I leave this topic to future research, but note that empirically there may be an inference of evidential bias associated with (i).

- (i) Hey, did [LEA]_F win the tournament?
 - a. Felicitous in [Ev. BIAS +] *I see Lea fans celebrating.*
 - b. ?? in [Ev. BIAS 0] *Speakers are on the phone, no related utterance has been made.*
 - c. Infelicitous in [Ev. BIAS -] *I see Luke fans celebrating.*

has suggested that it is a bipolar or non-monopolar feature. This could be because bipolar forms have a morphosyntactic representation of the negation in their meaning (related to the polar alternative). Our sketch analysis so far cannot say much more on this topic.

4 Residual clause type bias?

In this paper, data demanded the generation of an account that can predict evidential bias effects along with the Ev+ cluster both in declarative and interrogative polar questions. Thus the proposed account does not rely on clause type and its consequences in deriving evidential bias. However, widely observed characteristics of English rising declaratives indicating a general bias concerning the addressee's epistemic state are not accounted for. In this account, such effects must come from different sources than the proposed monopolar meaning, so the possibility arises that rising declaratives are biased in multiple ways and the residual non-evidential inferences of bias are in fact due to the clause type of the rising declarative. In this section, I will describe the ways in which our two monopolar forms differ from one another and suggest that these cases may in fact provide the key examples to address this residual bias. Much of the rising declarative data discussed comes from Gunlogson (2003).

We have seen in examples (9–11) some of the ways in which the Turkish object attachment question and the English rising declarative are different. These are well-known differences between English polar interrogatives and rising declaratives, which we then used to argue that Turkish object attachment questions must be interrogatives. One case was the possibility of embedding under rogative predicates, which may be a direct morphosyntactic effect of the clause type, say, if the clause type is represented in the features of the C head, as commonly assumed. We have also seen that a discourse reference to an unresolved question could only be made with an interrogative. This requires a finer understanding, but one could still hypothesize that the formal qualities of the declarative do not fit the purpose. An intriguing possibility is that the intonation that marks the declarative as a question is only available when it is delivered within the question act. The last piece of data was the unavailability of adverbs like epistemic and evidential adverbs in polar interrogatives. I leave it open why this might be the case, but the interaction between clause type and such adverbials is empirically confirmed (the reader is referred to Krifka 2021 for a suggestion).

There are further, less structural, differences between the monopolar object attachment interrogatives and rising declaratives. Let us start with the case of

speaker ignorance. We have seen that the English rising declarative cannot occur with an adverbial of complete ignorance like *by chance* (Gunlogson 2003) (1). This indicates the presence of a general prior disposition for a certain answer for rising declaratives. Object attachment questions (or verb attachment questions) are not biased in this way (46).

- (46) Acaba Ali yemek **mi** yap-tı?
wondering Ali dinner MI make-PAST
‘[#]Ali made dinner by chance?’

Secondly, while object attachment questions are completely fine (even possibly required) in out-of-the-blue questions, rising declaratives are not. In (47), we add some evidentiality to the context of this example to make it convincing, but make it so that the evidence is indirect and there is no conversational common ground. English-speaking informants are not as happy with rising declaratives in such a context as Turkish-speaking informants are with object attachment questions (47) (also see Gunlogson 2003).

- (47) *There was a crashing noise in the next office and I run to help. Behind closed doors, I ask “Are you okay? ...”*
Raflar **mi** devril-di?
shelves MI collapse-PAST
‘[?]The shelves collapsed?’

A similar illustration concerns alternative questions with propositional alternatives. We have seen (48) before without much discussion of the translations adopted. In fact, in line with the previous examples, the Turkish alternative question is just a run-of-the-mill alternative question, while the English declaratives in this alternative question form bring about an additional flavor. The speaker is not asking for information, but asking their interlocutor to finally commit to one of the statements.

- (48) a. Ali yemek **mi** yap-tı, yoksa Hasan pizza **mi** söyle-yecek?
Ali dinner MI make-AST or Hasan pizza MI order-FUT
‘Did Ali make dinner or will Hasan order pizza? (I’ll buy the drinks accordingly.)’
- b. Ali made dinner or Hasan will order pizza?
...??I’ll buy the drinks accordingly.
...Which one is it? Make up your mind.

Finally, object attachment questions make very good (and frequent) newspaper headlines, whereas a declarative question as a newspaper headline is very odd.

(49) *Newspaper headline*

- Yeni koronavirüs varyantları mı geliyor?
 new coronavirus variants MI come-PRES
 '[#]New coronavirus variants are on the way?'

In all these cases, we see that the object attachment question makes no meaningful contribution beyond a plain monopolar interrogative while the rising declarative leads to extra inferences. If my account of the Ev+ is on the right track, these unshared effects of bias would be dissociated from the effects of monopolarity. Because the object attachment question in these cases act in line with the English polar interrogative, clause type emerges as a likely culprit for the rising declarative's divergent behavior. Hence, one could still argue for a clause-type-mismatch analysis *à la* Gunlogson (2003) or Farkas & Roelofsen (2017) for these effects. The novelty under such an account would be that English rising declaratives would be exhibiting two types of bias stemming from different sources.

5 A crosslinguistic excursus

The proposed account attempts to connect a seemingly disparate set of features across clause types with some pre-compositional coherence, but the core of the approach is data-driven. After all, the departure from clause-type-based analyses of evidential bias was enforced by the Turkish polar interrogatives and the outlined account was built on the emerging Ev+ cluster. As the reader will surely have noted, the contrast between a declarative and an interrogative across unrelated languages is informative, but may be partly mired in uncontrolled language-specific factors. What I would like to do now is to evaluate the little available crosslinguistic data on Ev+ forms to confirm the Ev+ cluster and make an initial attempt to interpret crosslinguistic variation in polar question meanings.¹⁵

Two languages with unambiguous Ev+ forms analogous to English rising declaratives and Turkish object attachment questions I am aware of are Japanese and Hungarian. Notice that no two languages in the resulting set of languages to be compared are genetically related. The following discussion is based heavily on work on these languages respectively by Sudo (2013) and Gyuris (2017).

¹⁵In many languages including many Romance and Slavic languages, declarative questions are neutral. Consequently, they do not count as Ev+ forms.

Japanese has at least three polar question forms, described in detail with respect to their bias profile by Sudo (2013). Among these, questions with the morpheme *-no* carry positive evidential bias (50). The major competing form is morphosyntactically unmarked, which is noteworthy as it shows the absence of a crosslinguistic correspondence between markedness and Ev+ as one might suspect on the basis of English. This second form is also not neutral.

- (50) a. [Ev. BIAS +] *My friend enters my windowless office in a dripping wet coat.*
Ima ame futteru no?
now rain falls NO
'It's raining?'
b. [Ev. BIAS 0] *We are looking for a left-handed person. I'm wondering about John, who is not around.*
John-wa hidarikiki-na no?
John-TOP lefty-COP NO
'[#]John is left-handed?'
c. [Ev. BIAS -] *[Same context as (a)]*
Ima hareteru no? (Sudo 2013)
now sun.shines NO
'[#]It's sunny?'

There is no published data on usage restrictions of Japanese *-no* questions to my knowledge, but negative polarity licensing, which is also in the form of negative concord like in Turkish (Watanabe 2004), is banned as predicted (51).¹⁶

- (51) * Daremo kita no? (Kuno 2008)
n-body came NO
'(Did anyone come?)'

Polar question forms in Hungarian are described in a good amount of detail by Gyuris (2017). The unambiguous Ev+ form, termed the /\-declarative (read: rise-fall declarative) following its intonation, is a declarative question like in

¹⁶Differently from the negative concord asymmetry in the two Turkish polar interrogatives, absence of concord holds across polar question forms in Japanese (Yasutada Sudo, Kazuko Yatsushiro, p.c.). For this reason, it is not beyond doubt that the failure of concord licensing in (51) is a manifestation of the Ev+ cluster. But this possibility is not to be rejected *a priori*, either.

English. In this language, both the Ev+ form and the primary competing form are morphosyntactically unmarked, but the latter has a different intonational phrasing and tests as an interrogative.

The Hungarian /\-declarative exhibits a remarkable subset of Ev+ cluster features such as the infelicity as exam questions and polite requests, and the unavailability of negative polarity licensing (52) (data from Gyuris 2017). Other associated contexts do not contradict any element of the cluster.¹⁷

- (52) a. # Magyarországnak/\ van/\ tenerpartja/\? Exam question
 Hungary-DAT be.3SG seashore.its
 '[#]Hungary has a seashore?'
 b. # Kinyitod/\ az ajtót/\? Polite request
 PFX.open.2SG the door.ACC
 '[#]You are going to open the door?'
 c. * Esik/\ valahol is/\ az eső/\? NPI
 falls somewhere too the rain
 '[#]It's raining anywhere?'

In the limited literature with sufficiently detailed descriptions of polar question paradigms, a few studies could not be included because they do not document an unambiguous Ev+ form. Mandarin has an array of polar question forms with associated nuances in bias, but none of the forms in question is strictly Ev+ (Ye 2021, Hara & Yuan 2025). The description of *kya*: questions in Hindi-Urdu by Bhatt & Dayal (2020) does not include much pragmatic nuance, but it may be noted that the given semantic analysis is monopolar.

The findings are summarized in Table 2.¹⁸ In this small sample of unrelated languages covering declaratives, interrogatives, and different paradigms of division of labor across competing forms, we see that various Ev+ cluster features remain constant or at least undisturbed. I take this to be a confirmation for the typological reality of unambiguous monopolar question forms across languages and the Ev+ cluster as a good initial characterization of its manifestation.

If this initial review is on the right track, the monopolar meaning is represented and expressed across languages with dedicated forms showing (we expect

¹⁷Gyuris (2017) includes infelicity as conversation starters among these, but the category may be too loosely defined to be helpful.

¹⁸As this paper was prepared for publication, Kamali & Nakamura (2024) documented that Japanese *-no* questions align with Turkish object attachment questions in terms of the listed Ev+ features.

Table 2: Emerging Ev+ cluster based on the languages examined

	English	Turkish	Hungarian	Japanese
Unambiguous Ev+	yes	yes	yes	yes
As indirect question	no	no	no	?
Exam/questionnaire/court	no	no	no	?
With <i>or not</i>	no	no	?	?
NPI/NC	no	no	no	no
As guess & echoic	yes	yes	?	?

most) features in the Ev+ cluster. We are not in a position to hypothesize the presence of forms corresponding to this meaning universally, nor the complete empirical profile if they are present. If the meaning is in the repertoire of a given language, its manifestation will depend on language-particular factors such as the morphosyntactic and intonational properties of the structure it is expressed with, or the pragmatics of the division of labor between the questioning forms in the paradigm. Mandarin *ma* questions, which are Ev+/Ev0, are a good candidate to be evaluated from this perspective. At the same time, the convergent features can be used as a starting point to better understand the meaning of these forms as well as their form-meaning correspondence, which I briefly address in the next section.

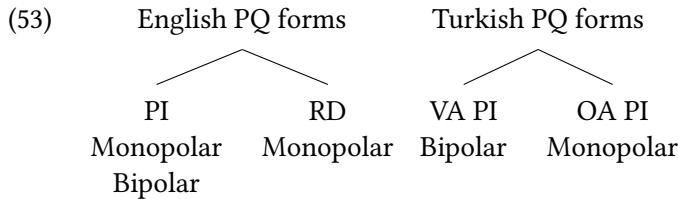
In contrast to the promising picture on monopolar meaning manifestations, competing forms in this sample of languages fail to paint a coherent crosslinguistic picture corresponding to the proposed implementation of bipolar questions presented here. Why could this be? Foremost, the absence of universality predictions noted for the monopolar meaning applies here as well, so there is no *a priori* reason to assume that unambiguous forms with the bipolar meaning will be observed across languages. It is however possible that some languages show a cluster of effects, yet to be discovered, converging on the bipolar meaning. At the moment, it remains unclear how much of the behavior of the Turkish verb attachment question, which I have argued to instantiate the bipolar meaning, is a pure manifestation of this meaning and how much of it is Turkish-specific. For this reason, it makes more sense to base further typological reasoning on the Ev+/monopolar qualities than apparent bipolar qualities.

6 Clause type and polar question meaning revisited

Now that we have argued against the role of clause type in the Ev+ cluster of effects, the question arises if its apparent correlation with the declarative clause type is entirely coincidental. I suggest the answer is no. The data implies that declarative questions may be crosslinguistically monopolar (cf. English and Hungarian forms). If confirmed, this connection between the declarative clause type and the monopolar meaning may indicate that the monopolar meaning is the default.

This makes considerable conceptual sense. Of the two distinct meanings we have argued to be part of grammar, the monopolar meaning is the simpler one. It is a question form that just invites a commitment over the content proposition without generating its polar alternative. Hence, the monopolar question meaning in this sense of response solicitor may be the freely available with intonational marking alone, without requiring dedicated morphosyntactic structure.

A consequence of an approach where the monopolar meaning is the default is that it would be expected to be attested more broadly. This prediction is borne out in our small sample. Of the four forms we have analyzed in detail, the Turkish verb attachment interrogative is the only one that is excluded from the monopolar meaning. All others manifest it either unambiguously (the rising declarative and the object attachment question) or possibly ambiguously (the English polar interrogative). Recall, also, that we could find monopolar analogs but no straightforward bipolar analogs in Hungarian and Japanese.



If the monomopolar meaning is present by default, where does the bipolar meaning come from? For the unambiguous bipolar question in Turkish, the answer cannot be interrogative syntax, as both the monopolar and the bipolar forms are interrogative. A better initial hypothesis would be that object attachment questions do not have a syntactic component driving the bipolar meaning, but verb attachment questions do. Kamali & Krifka (2020) assume a Polarity head in the syntax of verb attachment questions in this spirit and Kamali (in review) defends this view based on an asymmetry in negative concord. But if it is the default as

we have been entertaining, the monopolar meaning must be barred from arising in verb attachment questions. Kamali (in review) attributes this to a failure of focus projection à la Selkirk (1995) because main prominence is not on its default position.

The versatility of English polar interrogatives, noted in their evidential neutrality and the lack of distinct forms in polar and propositional alternative questions, implies that they command the union of effects, meaning both meanings are available at the same time. How exactly this ambiguity is encoded is an open question, but under the line of thought pursued here, it may be hypothesized that (part of) the English interrogative syntax drives the bipolar meaning whereas the monopolar meaning ensues by default.

7 Conclusion

I have argued that not just evidential bias but rather the entire Ev+ cluster of features result from the monopolar question meaning and not from clause type. The sketched approach empirically solidifies the mono- versus bi-polar question dichotomy and their coexistence in grammar, and opens new avenues in approaching the problem of form-meaning correspondence in polar questions. One implication of the approach was the emergence of a residual bias inference that appears to indeed be clause-type-dependent, once evidential bias proper is disentangled from it. Another was the crosslinguistic commonness of an unambiguous monopolar question form sharing a number of the Ev+ cluster features. And finally, I have suggested that the monopolar meaning may correspond to declarative questions more commonly if it is the default. All in all, if correct, this approach points to a more refined relationship between polar question form and meaning enriched by two universally available polar question meanings and regulated by diverse language-specific factors.

Abbreviations

1/2/3PL	1/2/3 plural person	GEN	genitive
1/2/3SG	1/2/3 singular person	LOC	locative
ACC	accusative	NEG	negation
AOR	aorist	NOMIN	nominalizer
COM	committative	PAST	past
CONV	converbial	PFX	prefix
COP	copula	POSS	possessive
DAT	dative	PRES	present
FUT	future	TOP	topic

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Chapter 3

The contribution of intonation in the conveyance of question bias

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The aim of this chapter is to address the issue of how meanings related to bias in polar questions are conveyed by intonation. We present an overview of previous studies conducted on two Romance languages, Italian and French. The review of these studies is used to show how intonation can be used in different languages to signal the presence and the polarity of question bias, as well as the source of information from which the bias stems. We also point out that future research on this topic should deal with, among other things, how gradient phonetic information maps onto meanings and the role of individual variability.

1 Introduction

A growing body of research has been dedicated to the discursive role of intonation, taken to be involved in the conveyance of meanings related to the attitude of discourse participants relative to the expressed proposition. Starting from Pierrehumbert & Hirschberg (1990), several intonational meaning models have been proposed, with the idea that intonation can express commitment or beliefs on the part of the speaker and, at the same time, project such beliefs/commitments to



the interlocutor. Hence, the present chapter aims at presenting an overview on the role of intonation in encoding and decoding polar question meaning, reporting on recent studies that have addressed this issue in two Romance languages, Italian and French.

According to standard semantic theories (e.g., Hamblin 1973), declaratives denote a proposition and function as a means for the speaker to assert something, by making a commitment (among others Krifka 2017). Interrogatives, on the other hand, denote a set of propositions and are used by the speaker to lead the addressee to engage in an assertion. Certain types of questions, however, are used to also assert something (in addition to eliciting information) and, as a consequence, they convey a bias about the information asked (Dayal 2017). Such questions are typically referred to as *biased questions*. In the case of a biased question, the questioner is not simply requesting information from a position of complete ignorance, but is also expressing an expectation about what the information might be. Formal models of the semantics and pragmatics of questions have actually addressed such phenomena. For instance, Asher & Reese (2007) provide a formal proposal in which biased questions are accounted for as complex speech acts, containing both a question and an assertion. Similarly, Malamud & Stephenson (2015) analyse polar questions by proposing that they project speaker or addressee commitment to the truth of one of the propositions. These formalizations provide an understanding of question bias as an object of complex nature, which can be analysed along different dimensions: i) polarity of the bias (and conflictual information between speaker and addressee), ii) degree/strength of (tentative) commitment proposed by the speaker, iii) source of information on the basis of which the speaker proposes commitment. Languages can express these dimensions of bias using different strategies, among which the most investigated are negative questions (Ladd 1981, Krifka 2017, Arnhold et al. 2021), tag questions (Ladd 1981, Asher & Reese 2007, Malamud & Stephenson 2015) and presence of polarity items or other lexical markers (Romero & Han 2004, Asher & Reese 2007, Frana & Rawlins 2019a,b).

The role of intonation in conveying information about question bias has also been recently recognized, though a comprehensive account of its contribution (especially in isolation) is still lacking. First, the link between intonation and question bias has mainly been investigated in interaction with other linguistic levels (e.g. morpho-syntactic properties of utterances). However, in languages like Italian, in which a strong role is assigned to intonation in the definition of the discourse function of utterances (e.g., the absence of specific syntactic cues for questionhood), recent studies have unveiled that intonation alone can be responsible for the conveyance of question biases. Past research on intonational

meaning has unveiled that intonation can be used not only to signal the presence of bias, but also to specify its polarity (i.e. towards which proposition the speaker is biased) and degree (how strong the bias is). The way in which types of biases can be intonationally conveyed is related to elements that are responsible for encoding these meanings. Most of the studies addressing the role of prosody in modulating the meaning of utterances have argued/assumed that phonological elements of intonation (i.e. pitch accents and boundary tones) are the main cues involved in the expression of these meanings. In this framework, general prosodic properties of phonetic nature have typically been linked to the expression of paralinguistic meanings (see, for example, the treatment of pitch range by Liberman & Pierrehumbert 1984). Nevertheless, in spite of the fact that published work on this issue is still rather scarce, experimental evidence has shown that the relationship between prosody and discourse-related meanings is far more complex, with several cues beyond phonological elements having a role in the definition of the semantics and pragmatics of utterances, e.g. pitch range, voice quality, and temporal information (see also Section 2).

Finally, recent experimental investigations have also unveiled the role of extralinguistic information of speakers and listeners in modulating the way bias is perceived. These results have implications on linguistic theory, both on the pragmatic/semantic and the prosodic side. On the one hand, these results support an idea of question bias as a gradient feature of utterances rather than a categorical one, as often treated in formal models; on the other, they also shed light on the way intonation is exploited to convey meaning.

Building on these premises, this chapter aims to characterise the general role of intonation in the expression of question bias in two Romance languages, i.e., Italian and French, trying to address three main issues: i) what kind of meanings are concerned with bias in questions and can be conveyed by prosodic means?, ii) which are the elements of intonation that are responsible for conveying meanings related to question bias?, and iii) is the relationship between intonational cues and pragmatic/semantic meanings stable within a linguistic community? The remainder of this chapter is organized as follows: Section 2 will deal with the general role of intonation in the conveyance of meaning; next, Section 3 and Section 4 will review some recent findings on the role of intonation in two selected Romance languages (Italian and French). Finally, Section 5 will discuss the implication of these findings for linguistic theory and methodologies.

2 Intonational meaning

Very different conceptions of intonation meaning have been proposed in the literature (see Portes & Beyssade 2015, Prieto 2015, Westera et al. 2020 for recent overviews). Some phoneticians conceive it as a direct link between phonetic parameters of prosody and communicative functions (Local 2003, Xu 2005), while phonologists assume that the relation of prosody to meaning is mediated by phonological units such as global tunes (Gussenhoven 1984), individual tones (Pierrehumbert & Hirschberg 1990), or intermediate constructs like pitch accents and boundary tones (Steedman 2007). The latter approaches have the advantage of being more compatible with semantic theories of meaning and of being engaging in a fruitful dialogue with them as evidenced by various contributions to this book.

In this trend of research, it is now well established that, beyond information structural meanings, intonation also conveys meanings related to *epistemicity* (the commitment of the speaker/addressee towards the content of the utterance: Bartels 1999, Gunlogson 2003), *evidentiality* (the source of information: speaker, addressee or else; Gunlogson 2008, Escandell-Vidal 2017), *dialogue negotiation* (agreement/disagreement: Steedman 2007) and *mirativity* (unexpected information: DeLancey 2001, Rett & Murray 2013, Celle et al. 2018)

For instance, Bartels (1999) proposes that, in English pitch contours, the L-phrasal tone is a morpheme which conveys “assertiveness” in questions as well as in statements, by indicating not only the speaker’s commitment, but also by instructing the addressee to publicly commit herself to the proposition at stake. Gunlogson (2003) argues that, while commitment to the propositional content is expressed by the declarative syntax of the utterance, intonation is responsible for the *attribution* of that commitment to the speaker (falling contour) or the addressee (rising contour). A very similar conception is presented in Portes & Beyssade (2015), who propose that, in French, L% signals that the speaker assumes responsibility for the content of the utterance whereas H% signals that the speaker delegates this responsibility to the addressee. Moreover, in her 2008 paper, Gunlogson reformulates the meaning of rising intonation as indicating that the commitment of the speaker is *contingent* on the addressee’s ratification, which gives a rising declarative its questionhood. This new formulation relies on the more fundamental principle that commitments have a *source*, in that one of the participants obviously has more independent evidence supporting the content than the other. Escandell-Vidal (2017) also places *evidentiality* at the centre of her conception of intonational meaning. Modelling the meaning of three different prosodic contours in Castilian Spanish polar interrogatives, she proposes

a common Q feature conveying unspecified polarity. While the meaning of the L+H* H% low rise is modelled by Q alone, the meaning of the H* H% high-rise combines Q with the “Self” modality of the evidential feature Evid, and the meaning of the L+;H* L% rise-fall combines Q with the “Other” modality of Evid.

The role of intonation in the negotiation dimension of dialogue can also be approached through the relevance of the addressee’s reaction as a separate feature, such as the notion proposed by Beyssade & Marandin (2007, 2006). Specifically, the authors propose that, in the meaning of tags or intonation meaning, the feature *call on the addressee* refers to a request from the speaker concerning the addressee’s next move. For instance, a *declarative* followed by the tag *n'est-ce pas* (‘isn't it’) in French requires an *answer* as the next move instead of an acknowledgement. Moreover, intonation may signal participants’ agreement or disagreement. For instance, in Steedman’s (2007) semantics of English intonation, some nuclear pitch accents mark *consensual* information (L+H*, H* and H*+L), while others can mark potentially *conflictual* information (L*+H, L* and H+L*). Building on this idea, Portes & Beyssade (2015) further proposed that pitch accent choice may convey different *degrees of disagreement*, H+L* indicating a stronger disagreement than H*+L in French.

Finally, the difference between participants’ commitments may relate to the *mirative* dimension of intonational meaning. According to Celle et al. (2018), the concept of *mirativity* was introduced by DeLancey, as “the linguistic marking of an utterance as conveying information which is new or unexpected to the speaker” (DeLancey 2001: 369–370). In other words, *mirativity* refers to the situation in which an interlocutor is surprised by a piece of information that s/he received, though, differently from incredulity, the speaker is not conveying that s/he does not believe that the proposition holds. In fact, the mirative attitude should be considered a dimension that is clearly separated from incredulity, in which the interlocutor shows a negative bias towards (i.e. does not believe) a proposition. Though it is conveyed by morphology in languages such as Lhasa, Tibetan or Cheyenne, mirativity is claimed to be marked by intonation in English, as shown by the contrast between the following utterances (cited by Celle et al. 2018: 219 from Rett & Murray 2013: 455):

- (1) a. John arrived on time.
- b. (Wow,) John arrived on time!

It is still unclear and a matter of lively debates how to semantically/pragmatically model these different aspects of intonational meaning (and of other various linguistic forms) as parts of a unified concept of commitment or as separated/

transversal dimensions. To help clarify these issues, experimental investigations have begun to put these meanings and their association to prosodic vehicles to the test. A first way to test commitment is to investigate perceived speaker bias by asking listeners to rate perceived certainty/uncertainty of the speaker depending on the utterance intonation (Armstrong & Prieto 2015, Gravano et al. 2008), or the speaker's expectation of a positive/negative answer (Lai 2010, Nilsenovà 2006). More indirect methods ask listeners to pair the prosodically varied utterances with a biased context (Prieto & Borràs-Comes 2018) or a biased reaction (Portes et al. 2014, Baltazani et al. 2020). Production studies using bias eliciting contexts are also very informative (Michelas et al. 2016), and are particularly interesting when coupled with a perception experiment (Goodhue & Wagner 2018).

Beyond the certainty/uncertainty of the speaker, the agreement/disagreement dimension of intonational meaning has also been experimentally investigated in various languages. Hara et al. (2014) argued that the bias towards *p* (instead of $\neg p$) in negative polar questions is enhanced by sentence final stress denoting an alternative set in Mandarin Chinese. Conversely, deaccenting would denote the givenness of *p* in Japanese, both insisting on the contradiction between the two propositions. A different perspective was adopted by Goodhue & Wagner (2018), who experimentally investigated the prosodic realization of polar particles *yes* and *no* in response to negative polar questions in English. They found that Liberman & Sag's (1974) contradiction contour was "systematically produced in positive responses that disagree with the negative bias of negative PQs, while not appearing in negative, agreeing responses" (Goodhue & Wagner 2018: 39). Alternatively, Prieto & Borràs-Comes's (2018) experimental results on question intonation in Catalan gave support to the need of a REJECT semantic operator alongside to the more basic ASSERT operator as proposed by Krifka (2015, 2017) in order to model a binary agreement distinction.

Most of these works show that pitch accents, boundary tones and their composition into nuclear contours seem to play a major role in conveying epistemic biases and the related semantic meanings just reviewed. Nevertheless, a few studies also began to provide evidence in favour of alternative prosodic cues to commitments. We already mentioned that in Mandarin Chinese, in which tonal specification convey lexical information, speaker commitment can be enhanced by *metrical stress*, and that Japanese makes use of *deaccenting* (Hara et al. 2014). These are mainly still discrete phonological cues, though also gradient phonetic details have been claimed to come into play. For instance, seminal work by Hirschberg & Ward (1992) demonstrated the role of *pitch range* in disentangling uncertainty from incredulity for the L^{*}+H L-H% contour in American English.

Moreover, recent work on rhetorical questions by Braun et al. (2018) gave evidence that breathy voice quality and longer constituents duration were relevant cues in distinguishing rhetorical from information seeking questions in German.

Another less studied issue is the relationships between intonation and other cues to commitments, for which experimental investigations are more recent and fewer in number. For instance, Armstrong & Prieto (2015) showed that a strong belief context occasioned a reversal effect in the perceived belief associated to the contour L*HL% in polar questions in Puerto Rican Spanish. While this contour conventionally conveys disbelief, participants perceived it as ironical in the strong belief context. Lai (2010) also investigated the effect of context type together with intonation and cue words like *really*, *well*, *okay*, *sure*, or *yeah* on perceived certainty and found that with a rise sounded more uncertain than with a fall, but that this was not the case for *well*. Furthermore, the relationship between modal epistemic intonational contours and lexical or morphological epistemic markers encoding similar meanings is still poorly understood. Nevertheless, a recent study by Prieto & Roseano (2021) compared two Romance languages, Catalan and Friulian, the former having a more fine-grained inventory of epistemic pitch contours and the latter a richer inventory of lexical epistemic markers. The result of their production study shows that, while both languages display both types of marker, Catalan speakers prefer intonational epistemic markers while Friulian speakers rely more on modal particles. This functional trade-off is statistically confirmed. Conversely, Borràs-Comes et al. (2019) gave experimental evidence for a close parallelism and collaborative reinforcement between intonation and co-speech gestures in conveying epistemic biases. Their experiments showed that Catalan speakers were able to match an epistemic co-speech gesture with the intonational contour conveying the same epistemic bias in that language, and vice-versa. These studies demonstrate the interest of a joint study of the different formal sources of epistemic biases in utterances in order to document and explain both their complementarity and potential reinforcing effects. A last important aspect that has just began to be investigated is the variability of intonational meaning mapping across speakers and listeners. Individual empathy scores have been shown to facilitate the interpretation of the contrastive LH*L% contour in French (Esteve-Gibert et al. 2020). On the other hand, speakers mastering two varieties of the same language (for instance, Corsican and standard French) have been recently shown to be sensitive to contextual regional information, both explicit and implicit, when identifying a speech act conveyed by intonation (Warren 2017, German & Portes 2020, Portes & German 2019). These issues will be discussed at a greater length in Section 4 below.

3 Intonation and bias in Italian and French

In the previous section we have discussed how intonation is used as a way for speakers to define their own position, both in relation to the propositional content of the utterance and to the interlocutor. Additionally, the bibliographic review shows that several tonal cues are involved in the conveyance of these meanings: while the phonological identity of tonal elements (e.g., rises and falls) is an important cue to specific meanings, finer phonetic cues (e.g., pitch range) as well as the presence vs. absence of specific pitch accents also appear to be viable linguistic means to encode and decode meanings. Theoretical models and experimental research investigating this role of intonation have recently increased, revealing a complex picture, both on the intonation and on the meaning level. The following section will review some data on the role of intonation in conveying question bias in Italian (Salerno Italian) and French, coming from several previous studies.

3.1 Italian

Italian presents a very complex linguistic situation characterized by extensive lack of homogeneity across languages spoken in the different geographical areas. Italian speakers do not speak a common standard language, but rather a *variety of Italian* characterized by strong regional traits (due to contact between standard language and vernaculars spoken in the different areas). Although the specific diatopic influence is relevant at different levels, prosody is deemed to be one of the most clearly identifiable cues of regional identity for Italians (Lepschy & Lepschy 1977, Cerruti 2011). For instance, a recent investigation by Gili Fivela et al. (2015) has revealed a particularly fragmented picture, characterized on the one hand by variability within the same varieties and, on the other, by similarities being detected across different (and sometimes even distant) ones. The lack of homogeneity implies that, when conducting investigations on Italian prosody, we should necessarily refer to specific regional (or city-based) varieties. Here we focus on Salerno Italian (SI), which is a southern regional variety spoken within the area of Salerno (Campania region). Both recent and ongoing investigations have studied the intonation of this variety (among others Gili Fivela et al. 2015, Orrico et al. 2019, Orrico & D'Imperio 2020, 2022). This section will report on these studies with the aim of providing a general picture of the use of intonation made by SI speakers and listeners.

An overview of the intonational system of SI is reported in Orrico et al. (2019). The study reports a production study carried out by analysing productions by 4 SI

speakers. The material was elicited using both Discourse Completion Tasks and Reading Tasks: in the former, participants were asked to read the written description of a scenario, whose role was to define the specific pragmatic condition and to react in a spontaneous way; in the latter, participants had to react to the same scenario by reading a scripted utterance. The utterances produced included statements (3 broad focus and 3 narrow-corrective focus statements), wh-questions (5 information seeking, 1 unheard echo, and 1 counter-expectational questions), and yes-no questions (5 information seeking, 2 confirmation seeking, 1 unheard echo, 1 counter-expectational questions). All participants made 2 repetitions for each item. The authors report high levels of variability and, in particular, polar questions were found to be realized with different intonational contours, some of which crucially share phonological features with other utterance types (e.g. statements). This is compatible with theories proposing that intonational meaning does not operate at the level of sentence modality, though it is rather implicated in conveying information at the dialogical-epistemic level. Recent investigations (Orrico & D'Imperio 2020, 2022) have therefore been conducted under this assumption.

Figure 1, adapted from Orrico et al. (2019), shows attested polar question tunes in Salerno Italian. Note that Italian is a language in which a question is not typically expressed by means of specific morphosyntactic cues, e.g., subject-verb inversion, which is typical in English, therefore sentence modality is generally conveyed through intonation alone.

Note that polar questions can be expressed with two different nuclear pitch accents, specifically an early-peaked rise analysed as a L+H* (realized as rising-falling movement within the accented syllable) and a late-peaked rise, labelled L*+H (realized as a rise through the syllable nucleus ending at the vowel offset). Both of these accents are combined with either a rising or a falling boundary tone. Crucially, a falling HL- phrase accent between the pitch accent and the boundary tone appears to be a mandatory cue for polar questions. These four nuclear tunes had very different frequencies of occurrence within the data analysed: the L+H* HL-H% tune was the most frequent one, accounting for more than 50% of the productions; the least attested was the L*+H HL-L% tune, with only a 10% of occurrences, while the L*+H HL-L% and L+H* HL-L% tunes were found to account for the remainder of the cases, with roughly equal distributions.

In spite of the differences in distribution, all these tunes represent a choice for SI speakers to express a polar question. The first thing that can be noticed is that in SI, as also reported for other varieties of Italian, a final rise is not a necessary condition for expressing a polar question (Gili Fivela et al. 2015; see also Savino 2012 for a general account of polar questions). Indeed, contrary to most

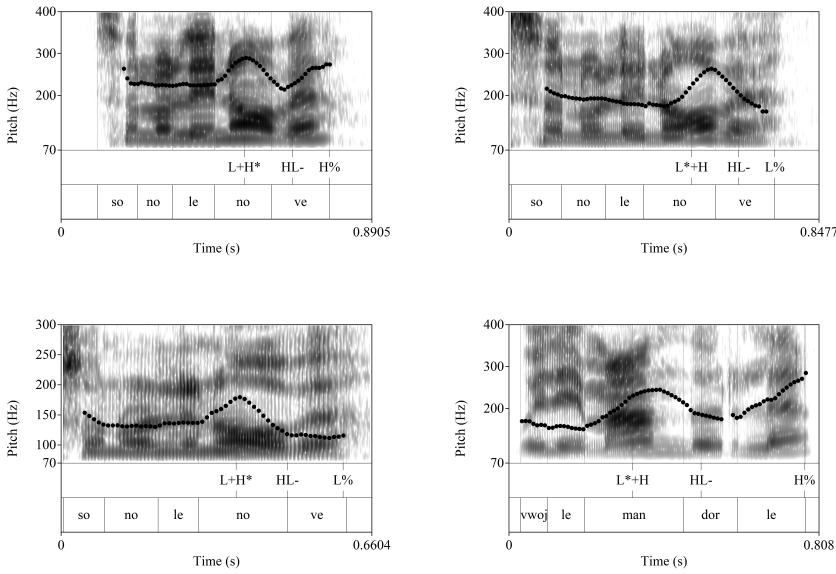


Figure 1: Example of yes/no question tunes attested in Salerno Italian by (Orrico et al. 2019). The figure shows three contours of the utterance *Sono le nove?* 'Is it 9 o' clock?' uttered with a L+H* HL-H% (top left) L+H* HL-L% (bottom left) and L*+H HL-L% (top right) and one contour for the question *Vuoi le mandorle?* 'Do you want the almonds?' uttered with a L*+H HL-H% (bottom right).

descriptions of intonation in other languages, rising boundary tones represent only a possibility on the paradigmatic axis, rather than being the primary cue to questionhood. The same status appears to be compatible with the use of pitch accents in nuclear position, with speakers having the possibility of selecting either an L*+H or an L+H*.

Note that literature on Italian intonation has assigned nuclear pitch accents, rather than boundary tones, a crucial importance in the definition of an utterance as a polar question. Grice et al. (2005), building on previous studies (e.g. Grice 1995, Savino 1997, D'Imperio 2002), put forward the idea that, especially for southern varieties, the phonological identity of a nuclear pitch accent is the main cue for questionhood. Later research has challenged this idea: other cues beside nuclear pitch accents have been found to be responsible for sentence modality identification – e.g. prenuclear region (Petrone & D'Imperio 2011) or temporal patterns (Cangemi & D'Imperio 2015). Nevertheless, the disambiguation provided by pitch accent choice, as far as the question vs. statement opposition is

concerned, is strong in several varieties. The role of boundaries, on the contrary, has often been linked to speech style and/or attributed to the unnaturalness of the experimental condition during data collection (Savino 2012, Cangemi & Grice 2016) rather than representing a specific pragmatic choice of the speaker. Nevertheless, in the specific case of SI, phrase boundaries, as well as pitch accents, appear to be sufficient cues for expressing a polar question and are linked to the expression of specific pragmatic meanings (e.g., Orrico et al. 2019 did not observe any distributional differences manipulating the naturalness of the task employed, i.e. Discourse Completion vs. Reading Task).

Analyses of production data show that nuclear accent position within a sentence might also be involved in the expression of sub-meanings within a polar question. Note that within the intonational phonology of Italian, a nuclear pitch accent does not have to be the rightmost accent within an utterance. Rather, a nuclear pitch accent can be placed early in the sentence, being followed by a post-nuclear accent, typically downstepped (Grice et al. 2005, D'Imperio et al. 2020). Additionally, in case of complex accented constituents, the rise-fall movement can be stretched over the whole constituent, creating a high plateau (hat pattern). In these cases, the accentual rise is moved leftward and placed on the first stressed syllable of the constituent, while the HL- phrase accent is placed on the last stressed syllable of the same constituent. This pattern, when found in polar questions, was analysed in Neapolitan Italian by D'Imperio (2002) as a L^{*}+H H(^{*})L-L%, with the parenthesized star (*) indicating that the phrase accent is secondarily associated with a stressed syllable (see also Prieto et al. 2005). A similar pattern is attested in SI, as shown in Figure 2.

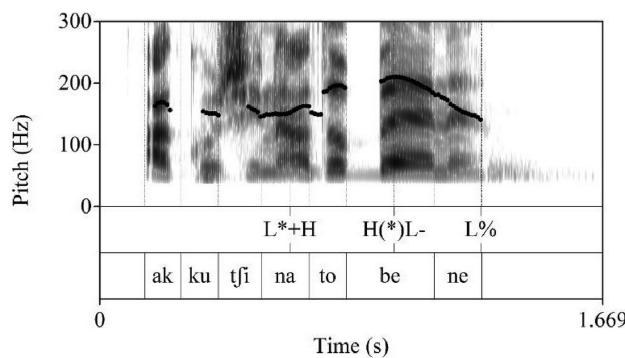


Figure 2: F0 contour for the question utterance *Ha cucinato bene?* (Did s/he cook well?) uttered with a L^{*}+H H(^{*})L-L% tune.

Recent studies investigating the issue on both the production and perception sides have found that both tune choice (pitch accent and boundary type) and nuclear accent placement are involved in the conveyance of the epistemic position of the speaker towards the utterance. Despite data from production, showing high levels of inter-speaker variability, some patterns were found to correlate with specific pragmatic conditions. For example, the analysis of distribution reported in Orrico et al. (2019) shows that a L+H* HL-L% contour is mainly employed in the counter-expectation condition (i.e., the speaker is rejecting some information provided by the addressee). As for perception, an experiment recently reported in Orrico & D'Imperio (2022) was designed with the aim of testing whether and how phonologically different tunes could be interpreted by SI listeners as mapping onto different degrees of speaker certainty towards the expected answer. The tunes investigated were the rise-fall-rise tune with the early-peaked pitch accent (L+H* HL-H%) and the two rise falls, differentiated on the basis of the pitch accent (i.e. L^{*}+H HL-L% and L+H* HL-L%). Additionally, the L^{*}+H H(*)L-L% tune was included in the experimental design to test whether the pitch accent placement could play a role in the conveyance of these meanings. 45 SI listeners took part in the experiment. They were asked to listen to questions out of context and to rate them by assigning a score (from 0 to 100) according to the degree of perceived certainty of the speaker for a specific answer to the question. Results show that specific cues within question tunes are exploited by SI listeners to extract bias information. Specifically, the L+H* HL-H% tune was found to be rated significantly higher in speaker certainty than L+H* HL-H%, while the L^{*}+H HL-L% was globally rated the lowest in certainty score. Additionally, the tune with a nuclear pitch accent placed earlier in the utterance (L^{*}+H H(*)L-L%) received the highest certainty score.

Finally, a further element of variation across question tunes is the pitch excursion within the pitch accent. In fact, data from Salerno Italian show that questions can have at least two different distributions as far as the excursion of the pitch accent in nuclear position is concerned, as shown in Figure 3.

In both examples reported in Figure 3, the nuclear pitch accent produced by the speaker is an early rise (L+H*), though with different pitch span values correlating with specific pragmatic information of the context they were uttered in. More specifically, Orrico et al. (2019) reported that instances of L+H* nuclear accents with a narrower pitch span were typically employed to encode counter-expectational questions, i.e., when the speaker is conveying his/her incredulity towards the information contained in the question.

A parallel investigation was conducted to perceptually test the role of pitch span within the nuclear region, as reported in Orrico & D'Imperio (2020). The

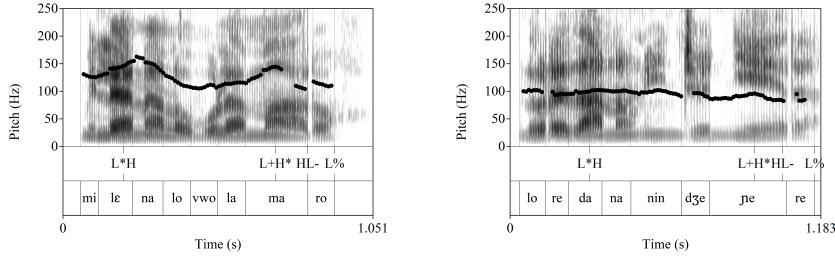


Figure 3: Examples of L+H* with different span values. The figure shows the question utterances *Milena lo vuole amaro?* (Does Milena take it [coffee] black?), on the left, and *Loredana un ingegnere?* (Loredana an engineer?), on the right, uttered by the same male speaker but with a narrower pitch span (adapted from Orrico et al. 2019).

experimental setting included a collection of the same judgment as in Orrico & D’Imperio (2022), that is the assignment of certainty scores by SI listeners, though the manipulated variable was pitch span. 45 participants took part in the experiment; they were asked to rate a set of 18 experimental stimuli, which were artificially created by manipulating the height of the L+H* nuclear accent into three different steps and the height of the boundary tone in six different height steps. Results show (Figure 4) that the wider the span in both pitch accent and boundary tone, the higher the certainty score assigned to the tune. However, while for pitch accent the three different span levels were rated as all conveying a different degree of speaker certainty, the same was not found for boundary tones, given that only the lowest two steps were classified as conveying a significantly different score. In other words, while boundary tones were found to have a categorical effect on the perceived bias of a polar question (corresponding to the two phonological L% and H% boundaries), different span levels within pitch accent were found to gradually map onto the pragmatic level.

3.2 French

Given that linguists’ awareness that prosody is a crucial dimension of grammar is relatively recent, an obvious issue in the study of intonational meaning is how it is conceived. In a paper about the compositionality of intonational meaning, Portes & Beyssade (2015) argue that the contribution of prosody to utterance meaning depends not only on how the interface between prosody and morphosyntax is conceived, but also, and more crucially, on how the notion of prosodic form and the dimensions of meaning are conceptualized. In the present

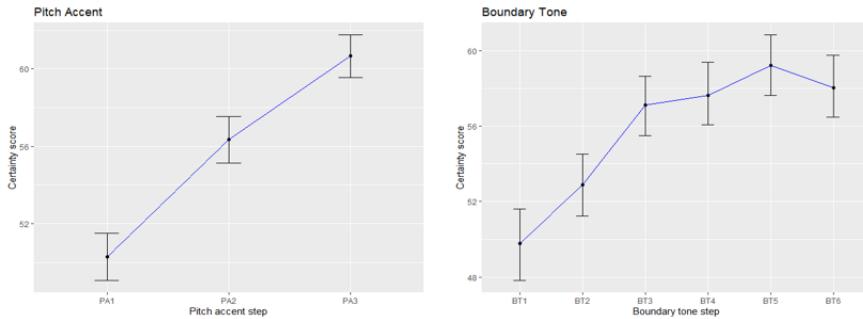


Figure 4: Certainty score assigned to different span values of the L+H* pitch accent (left) and boundary tones (right) (Orrico & D'Imperio 2020).

section we present several papers on the meaning of French intonation, which contribute to a better understanding of these questions.

First, Portes & Beyssade (2015) propose that prosody is formally structured by a developed phonological model. Specifically, a more detailed and fine-grained semantic description of prosodic meaning is allowed and required only when compositionality is proposed. This is the reason why more sophisticated accounts of intonation meaning have been proposed in phonological approaches to *intonation* (Gussenhoven 1984, 2014, Pierrehumbert & Hirschberg 1990, Steedman 2007; among others).

Adopting such an intonational approach, Portes et al. (2014) developed a detailed semantics in order to account for the meaning of four French intonational contours (see Figure 5 below).

On the basis of a theory initiated by Beyssade & Marandin (2007), Portes et al. (2014) proposed that the meaning of the four contours shown above can be accounted for by using three distinctive features, i.e., *speaker commitment*, *attitude attribution* to the addressee (does the addressee agree or disagree with the speaker?) and *call on addressee's next move* (a verbal answer, an acknowledgement, another behaviour?). If intonational contours can make public speaker's projections about beliefs attributed to the addressee and the addressee's next move, the latter should dialectically reflect these projections of the speaker in reacting to them. Specifically, in the above study participants were asked to match a declarative sentence bearing one of the four contours with one of four possible meanings summarized in Table 1.

Results showed that participants very robustly matched the intonation they heard with the hypothesized reaction for three of the contours (but not for the

Table 1: Proposed intonation contour meanings designed using the three features proposed by Beyssade & Marandin (2007), and associated reactions (from Portes et al. 2014).

Contour	Prototypical Meaning Features	Reaction
$L^*L\%$	S commits her-/himself to the truth of p S signals that (s)he anticipates no disagreement from A (about p) S proposes to A to update CG with p	<i>J'en prends note</i> 'I get it' A acknowledged that S has no disagreement about p and that p can be added to the CG
$H^*H\%$	S signals that (s)he doesn't commit to p S signals that (s)he attributes a belief about p to A (that p or $\neg p$) S proposes to A to commit to p or to commit to $\neg p$	<i>J'en sais rien</i> 'I've no idea' Contradicts S's attribution to A
$H^*L\%$	S commits her-/himself to p S signals that (s)he anticipates a disagreement from A: S signals that (s)he attributes to A the belief that $\neg p$ S proposes to A to update CG with p	<i>Tu dois avoir raison</i> 'I guess you're right' Acknowledgement of S's commitment Remaining potential disagreement of A
$H+H^*H\%$	S signals that (s)he does not commit to p S anticipates a disagreement from A: S signals that (s)he attributes to A the belief that p) S proposes to A either to commit to p or to commit to $\neg p$	<i>Si, si, je t'assure</i> 'No, really, it's true' Comments both on S's disagreement and on the confirmed commitment of A

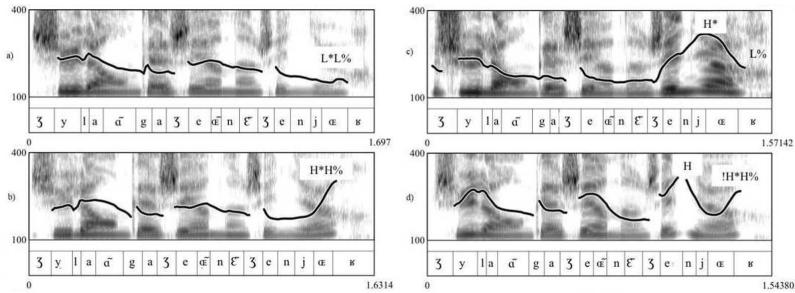


Figure 5: Four renderings of the utterance *Jules a engagé un ingénieur* ‘Jules committed an engineer’ with the four intonational phrase final contours (adapted from Portes et al. 2014: 18): a) L*L%, b) H*H%, c) H*L% and d) H+!H*H%.

H*L%), indicating a promising way to investigate fine grained intonational meaning. As for H*L%, Portes & Reyle (2014) reports a corpus investigation dedicated to its meaning, possibly more sensitive to context and better perceived in presence of a real potentially opposing addressee.

One of these four French intonation contours, the rise-fall-rise H+!H*H%, was also investigated in a production study (Michelas et al. 2016). In this study, participants had to read a declarative question matched with a negatively biased context eliciting incredulity or matched with a neutral context eliciting an unbiased yes-no question. The questions matching the negatively biased context were produced with the H+!H* pitch accent in 62% of the cases and with H* in the remaining 38%. Conversely, the questions matching the neutral context were produced with H* in 97% of the cases, with 3% of H+!H*. This result demonstrates that the negative bias was mainly conveyed by the choice of the pitch accent. If we relate this result to the proposal by Portes et al. (2014), it appears that the semantic feature *attribution of intention* (agreement/disagreement) should be conveyed by pitch accent choice in French, as proposed by Portes & Beyssade (2015). Therefore, the other two features (i.e. speaker commitment and call on addressee), could be jointly conveyed by boundary tones.

An important observation is that, in the negatively biased context, H+!H* was followed by a rise attributed to an H% boundary tone in 69,4% of the productions. However, the remaining 30,6% exhibited a fall that has been interpreted as a L%. This variability may in fact be explained by a truncation of the H% boundary tone due to lack of segmental space. This hypothesis remains to be further investigated. If confirmed, this would be a strong piece of evidence that phonological constraints, internal to the intonational system of a language, play an important role in observed variability.

A more striking variability is the production of 38% H*H% patterns in the negatively biased context. One possible explanation is that the mere rise expresses mirativity (surprise) in that context, while the H+!H*H% contours rather express incredulity. Indeed, a surprise meaning may also convey a negative speaker bias even if it is to a lesser degree. One may further speculate that there could be an additional prosodic distinction affecting H*H% depending on whether it appears in the neutral context or in the negatively biased context: a pitch range variation would certainly be a good candidate. This nuance of meaning hence remains to be better studied in French and other languages.

To conclude this section, several studies on French intonational meaning in the last two decades have contributed to explore an approach where detailed accounts both of intonational form in a phonological approach and of intonational meaning in a semantic perspective allow to give evidence in favour of a possible compositionality of intonational meaning. Such an approach deserves to be refined and enriched by a better understanding of the observed variation, an issue that will be developed in the following section.

4 Variability in intonational meaning

A further point to be addressed is the role of individual variability in both the encoding and decoding of intonational meaning. Within the last decade, the issue of variability has become central in phonetic studies, both at the segmental and at the prosodic level. The sources of such variability can be related to two main factors, i.e., environmental and cognitive factors (Kidd et al. 2018). More specifically, speech has been found to vary as a function of gender and sexual orientation, socio-economic status, exposure to specific language input as well as cognitive (affecting also neurotypical populations) and emotional states (see Pierrehumbert 2016 and Yu & Zellou 2019 for a review of these issues).

Variability in the use of intonation has been found both in production and perception. With specific reference to Italian, the study by Gili Fivela and colleagues (Gili Fivela et al. 2015) investigated intonation production in several cities and described the general situation as a “mixing of patterns”, reporting that despite the inter- and intra-variety variability, similar patterns are easily found across Italy, also in geographically distant cities. The authors attribute these findings to factors of socio-political nature, which have an effect that is larger than the individual speaker, e.g. internal migration and the influence of the language of media broadcastings. Recent studies have linked intonational variation in production to individual-specific choices. Great importance has been given to the

role of exposure to non-native dialects: while the distribution of polar question tunes can be linked to specific meanings, individual speakers are found to behave very differently from each other as a function of the input they were exposed to throughout their lives, e.g. by having a non-SI parent (Orrico et al. 2019, 2020).

The impact of linguistic input on linguistic behaviour at the individual level has also been observed in perception. Both Orrico & D'Imperio (2020) and Orrico & D'Imperio (2022) have considered the role of past linguistic experience in the attribution of bias-related meanings conveyed by SI question tunes. Taken together, these studies show that the effect of having been exposed for a long time to non-native input (either a foreign language or a non-native dialect of the same language) has a major impact on the way listeners extrapolate tune information. Crucially, the two studies show that the effect is visible at different levels, both at a coarse-grained level – i.e., by asking which phonological elements are considered to primarily convey the bias-related meaning – and at a finer phonetic level – i.e., how gradual variation in pitch span affects the interpretation of question meaning. Interestingly, the general picture yielded by these investigations is that exposure affects the extent to which listeners rely on specific tonal cues to interpret meanings. Indeed, Orrico & D'Imperio (2022) reported that the exposed population discarded the role of boundary tones and relied only on pitch accents. Similarly, Orrico & D'Imperio (2020) reported that manipulations in the span of pitch accents were interpreted in a coarser way by exposed listeners.

Similar investigations have also been carried out for French. A recent study by Portes & German (2019) has in fact addressed the issue of how listeners manage intonation-meaning mappings in case of exposure to different regional varieties. They reported a study in which a rise-fall tune in French was interpreted not only on the basis of the context in which it is produced, but also of the presence of extralinguistic cues to the specific geographical location. Note that this rise-fall tune is ambiguous since it is used in Continental French to encode a statement and in Corsican French to encode a polar question. In their model, tune-meaning mappings are stored in the listeners' mental representation in association with a contextual label (in this case, Continental or Corsican French), in a way that contextual cues can determine which mapping is relevant in the situation and therefore activated. Crucially, the extent to which the contextual cue is functional to the correct interpretation of the meaning is strictly linked to the amount of relative exposure to the two varieties, with the greatest advantage predicted for listeners with a balanced exposure to the two systems (German & Portes 2020).

A further source of variation of the tune-meaning mapping concerns listeners' cognitive states. Recent research has pointed out that the degree of cognitive and emotional empathy determines the way in which intonational meaning is

processed. In an eye-tracking study, Esteve-Gibert et al. (2020) show that the interpretation of ambiguous utterances by French listeners varies as a function of the empathy skills of the listeners: while listeners with low empathy skills show a weaker reliance on prosodic information leading to the disambiguation of lexical items, listeners with higher empathy skills attended more closely to prosodic information and showed a higher sensitivity to the possible meanings conveyed by the tonal contour. Similarly, Orrico & D'Imperio (2020) introduced the degree of empathy skills in their experimental setting, reporting that empathic listeners were more attentive to fine tonal modifications and to the way they are used to encode meanings than the low-empathy group. Interestingly, empathy was also found to affect the role of exposure to other linguistic systems. Specifically, Orrico & D'Imperio (2020) found that the perceptual change as a result to exposure to non-native language was strongest in high-empathy listeners. These results provide an impression of the extreme sensitivity of intonational meaning to a number of different factors, which should be taken into account when conducting research on this issue.

5 Which dimensions of bias in questions are conveyed by intonation?

This chapter has reported a discussion on the general role of intonation in the conveyance of information linked to question bias. The idea is that the speaker aims at signalling that s/he is not completely ignorant with respect to the propositional content of the utterance. The findings reported here also allow to characterize the dimensions over which intonation operates in the expression of these meanings.

First, intonation serves the role of signalling that the speaker has his/her own beliefs with respect of the question being asked and, additionally, it allows for finer specifications of the type and strength of the belief as well as how they are positioned relative the interlocutor's beliefs. Intonation is hence also involved in the conveyance of the presence of speaker bias, through the expression of speaker commitment. This function of intonation are attributed to the type of pitch accent in nuclear position in Italian, with the L+H* early rise conveying that the speaker is committing to the surface proposition within the question, as opposed to the L*+H late rise, which signals that the speaker is not making a commitment toward the truth of the proposition. On the contrary, French exploits boundary tones to encode this meaning, with L% boundaries being linked to the expression of speaker commitment. Moreover, both languages make use of intonational cues

to encode negative bias, by signalling that some piece of information is in contrast with what the speaker previously believed to be true. On one hand, this meaning is assigned to pitch accent type in French, specifically through the use of a H+!H*. On the other hand, Salerno Italian conveys this meaning by modulating the pitch span within the L+H* rise, with a narrower span in case of negative bias. Moreover, the pitch span feature is also exploited by Salerno Italian to encode information about the relative strength of speaker commitment: a wider excursion would allow signalling that the expectation for a positive answer to the question is significantly higher. Finally, we show that intonation was also involved in the attribution of commitment from the speaker to the addressee, which is again encoded through the type of pitch accent in French. As for Italian, an impressionistic analysis of the data collected suggests that the meaning of commitment attribution might be conveyed by boundary tones. More specifically, the presence of a H% boundary in questions might signal that the speaker is attributing the addressee the role of source of the commitment and, therefore, the commitment expressed by the speaker is only tentative and dependent on the addressee's ratification.

Taken together, the findings reported here for both Italian and French allow us to make general considerations about intonational meaning. On the one hand, intonational meaning is not universal. Specifically, although intonation might have a similar role in different languages, the way in which specific meanings are encoded within an intonation contour is language-specific. Moreover, both French and Italian would extract similar functions from intonation as related to the expression of meanings relative to question bias, i.e., signalling the presence of bias, specifying the position of the speaker relative to the proposition and to the addressee and, possibly, defining the source of the commitment. Nevertheless, the way in which the meanings are grammaticalized within the two languages appears to be different. Note that differences might also be found within different varieties of the same language. Recall, for example, the differences in the meaning assigned to the rise-fall in Continental and Corsican French. Furthermore, lack of universality is also found as far as fine phonetic modifications are concerned. For instance, the incredulity conveyed by narrower pitch span in Salerno Italian is not found in all other varieties of the same language. In Bari Italian, for example, the same meaning is conveyed through a wider span within the pitch accent (Savino & Grice 2011).

The link between pitch range, information and pragmatic meanings, as also reported in Section 2, has been reported in several languages. Among these, Savino & Grice (2011) and Crocco & Badan (2016) reported the role of pitch excursion in modulating the meaning of a question in two varieties of Italian. Hirschberg &

Ward (1992) also found that information relative to pitch range was instrumental in determining the difference between an incredulous and an uncertain reading of the rise-fall-rise contour in English. Further, Vanrell (2011) and Borràs-Comes et al. (2014) showed that, in Catalan, a different scaling of the peak within the pitch accent is a crucial cue for discriminating across linguistic categories, both in production and perception. Both the above studies as well as the findings reported here for Salerno Italian allow to clarify yet another controversial issue of intonational meaning, specifically which are the tonal elements responsible for meaning conveyance. While information relative to pitch range and level beyond the two phonological discrete tones (L and H) is often discarded both in the analysis of intonation and its meaning, these studies point out that gradual information relative to pitch height might actually be involved in the expression of pragmatic meanings and therefore deserve to be acknowledged and accounted for in intonational meaning models. Nevertheless, the way in which this type of information should be integrated in existing models is not yet proposed here, especially considering that most of the models proposed seem to advocate for the absence of a direct link between phonetic information and pragmatics/semantics, given phonology mediation. One possibility, which appears to be compatible with findings in Orrico & D'Imperio (2020) for Salerno Italian, is that pitch span manipulation is not meaningful *per se*, though it modulates the core meaning of the pitch accent (or the tonal discrete element it modifies). For instance, in the case of L+H*, while its core meaning would be committing the speaker to some proposition, a pitch span modification would modulate the speaker confidence to that commitment and, in this specific case, the degree of bias. An intonational meaning model allowing for these types of gradual modification of meaning would, in turn, require that also the pragmatic side should acquire a finer granularity.

Finally, the data reported above suggest that the way intonation is linked to pragmatic meanings is extremely sensitive to various sources of variation, making the investigation of these issues both a theoretical and a methodological challenge. On the theoretical side, one major implication of this issue is relative to how we even understand meanings conveyed through intonation. As reported above, two studies that address this issue are Portes & German (2019) and German & Portes (2020) reported in Section 4, in which the authors propose an exemplar-based model in which intonational contours are stored with contextual-specific meanings and retrieved when needed during communication. In general, very little has been done as far as processing of intonation in variable contexts is concerned. Some experimental studies have been conducted (among others Kurumada et al. 2014, Roettger & Rimland 2020), which, together with experimen-

tal evidence discussed in this chapter, reinforce the idea that we, as language users, are extremely adaptive and, when put before unprecedented or variable situations, rapidly adapt and change the way the speech input is processed. This should be kept in mind both when we set up experimental procedures to investigate intonational meaning and when we interpret the results.

6 Conclusion

This chapter had the aim of defining the way intonation is used by interlocutors to encode and decode meanings related to bias in polar questions, by reporting on recent studies addressing this specific issue. More specifically, the chapter has focused on three main aspects: the definition of the bias-related meanings that can be conveyed by prosodic cues, the elements of intonation that are exploited to convey those meanings and, finally, the variability that exists in the mapping between intonational cues and meaning expressed within a linguistic community. The investigation reported here concern two Romance languages, French and Salerno Italian, whose intonation has extensively been studied in recent research. The point made here is that intonation plays a crucial role in conveying discourse meaning, by defining, at various levels, the attitude of speakers and listeners towards the propositional content which, in turn, allows for the definition of the meaning of utterances. Nevertheless, several aspects concerning the contribution of intonation are still to be settled, such as the way gradient phonetic information maps onto meanings of semantic nature, the relationship between intonation and other linguistic levels or even gestures, and the role of variability. Future research should aim to provide answers to these questions.

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Chapter 4

Negative polar questions in Russian: Question bias and question concern

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We explore the contextual appropriateness conditions of *yes-no*-questions in Russian, focusing on negative questions with the particles *razve* and *neuželi*, in comparison to questions without a particle, providing corpus evidence and experimental evidence from two acceptability judgement studies. We argue that both *razve*-questions and *neuželi*-questions are felicitous when there is a conflict between the speaker's original assumption that a positive proposition is true (*epistemic bias* for p), and contextual evidence indicating the falsity of p (*evidential bias* for $\neg p$). The differences between *razve*-questions and *neuželi*-questions are about what we call the *question concern*. The question concern comprises the different goals that a speaker pursues by asking a question, such as to double-check the epistemic bias or the evidential bias, as well as the strength of the conflict between the epistemic or evidential bias that is signaled by the speaker together with the speaker's concomitant psychological state. We argue that *razve*-questions can double-check epistemic or evidential bias, whereas *neuželi*-questions can only double-check and express disbelief in the evidential bias. The latter difference correlates with the availability of outer and inner negation readings (Ladd 1981): *razve*-questions can have both readings, *neuželi*-questions only have inner negation readings. We explain this difference in terms of the illocutionary operators VERUM and FALSUM, where outer negation corresponds to FALSUM and inner negation to VERUM scoping over propositional negation (Repp 2009). We argue that *neuželi* denotes VERUM, which cannot occur with FALSUM in the same question, whereas *razve* is a propositional semantic operator, which can occur in the scope of VERUM or FALSUM.



1 Introduction

Questions expecting a *yes* or *no* answer come in different forms. In English or German, for instance, a $\{p, \neg p\}$ question may have interrogative or declarative syntax. The syntactic form has an influence on the contextual appropriateness of the question. It affects for example whether or not there must be evidence pointing towards the truth of p or $\neg p$ in the immediate context. It may also impose requirements on the speaker's previous beliefs or current expectations regarding the truth of p or $\neg p$. Similar requirements have been found to be triggered by the presence of a negative marker in a question, modulated by the marker's form and syntactic position. Furthermore, in various languages particles have been shown to influence the contextual requirements for *yes-no*-questions. Finally, prosody has been shown to be important. In recent years, there have been increased efforts to find empirically adequate descriptions of the contextual appropriateness conditions of *yes-no*-questions in several languages, and various theoretical proposals have been made on how to account for these conditions (e.g. Ladd 1981, Büring & Gunlogson 2000, Gunlogson 2003, 2008, Van Rooij 2003, Romero & Han 2004, Šafářová 2005, Repp 2009, 2013, AnderBois 2011, 2019, Northrup 2014, Trinh & Crnić 2011, Trinh 2014, Malamud & Stephenson 2015, Romero 2015, Seeliger 2015, 2019, Domaneschi et al. 2017, Farkas & Roelofsen 2017, Krifka 2015, 2017, Gärtner & Gyuris 2017, Westera 2017, 2018, Goodhue 2018, 2019, 2021, Jeong 2018, Rudin 2018, Seeliger & Repp 2018, Silk 2020, Romero 2020, Arnhold et al. 2021).¹

The central term in the discussion of the contextual appropriateness conditions of *yes-no*-questions is *question bias*. This term intuitively is used to express that a question may be non-neutral: it may be biased, for instance because the speaker has particular expectations regarding the true answer. As suggested above, a question can be biased in various ways, and various bias types have been suggested. A fruitful systematic division was proposed by Sudo (2013), who distinguishes between *epistemic bias* and *evidential bias*. *Epistemic bias* refers to the speaker having particular beliefs, desires or expectations with respect to the truth of $p/\neg p$. Thus the term subsumes various *speaker bias* types beyond those based on beliefs, contrary to what the term *epistemic* might suggest. In this paper, we will use the term *epistemic bias* for the speaker's beliefs only.² *Evidential bias*, the other major bias type, is the bias contributed by the contextual evidence.

It has become clear in the discussion of question bias that there is no such thing as a truly neutral question. All questions have what has been termed a *bias*

¹The final draft of this paper was submitted in 2022. Therefore, there is no reference to literature beyond that date. This holds for all literature in this paper.

²Other speaker bias subtypes would then be, e.g., bouleptic and deontic bias.

profile (Gärtner & Gyuris 2017). The bias profile describes the exact requirements concerning epistemic bias and evidential bias for the felicitous use of a question with a certain form. The bias profile of a seemingly neutral question – a simple positive question with interrogative syntax in English like *Is the cafeteria open?* – contains the requirement that there be no contextual evidence against the proposition that “surfaces” in the question (the *prejacent* of the question). For instance, we cannot ask *Is the cafeteria open?* if our colleague, who hates microwave food and only eats it when the cafeteria is closed, comes into our office with a steaming hot package of microwave food: this would be evidence against the proposition *the cafeteria is open*.

In addition to the bias profile, questions may differ with respect to what exactly the speaker wishes to achieve by asking the question, apart from finding out about the truth of p or $\neg p$. For instance, Ladd (1981) argued that a negative interrogative question may be used to double-check – in modern parlance – the evidential bias, i.e. what might be true in view of the contextual evidence, or the epistemic bias, i.e. what might be true in view of what the speaker had assumed before perceiving the contextual evidence. This difference is reflected in the difference between the *inner negation* reading vs. *outer negation* reading of a *yes-no* question. Consider the question *Isn't the cafeteria open?* This question is felicitous when there is contextual evidence for $\neg p$ (the cafeteria is not open) and where the speaker had assumed that p , among other contexts. In the cafeteria scenario discussed above, the evidence for $\neg p$ could be our colleague eating microwave food. If our assumptions about the usual opening times of the cafeteria support the truth of p (the cafeteria is open), we can ask *Isn't the cafeteria open?* felicitously. With an inner negation reading, the question double-checks the evidential bias $\neg p$, i.e., a negative proposition. With an outer negation reading, it double-checks the epistemic bias p , i.e. a positive proposition (see Section 2 for more details).

Which bias a speaker wishes to double-check may depend on various factors. The disputability of the actual evidence may play a role: Can the evidence be interpreted in a different way than what first impressions suggest, or can it not? For instance, our colleague might have a very urgent task to finish and has no time to go to the cafeteria. Another factor is the willingness of the speaker to accept the evidence. For example, if our colleague is not eating microwave food but is holding a coffee cup with the cafeteria stamp on it, there is evidence for the proposition *the cafeteria is open*. We might not want to accept the implications of this evidence because we had resorted to microwave food ourselves, thinking that the cafeteria is closed. If that is the case we could ask the rejecting declarative question *Surely the cafeteria isn't open?!* (Seeliger 2015, 2019, Seeliger & Repp

2018). Thus, irritation or indignation resulting from a conflict between evidential and epistemic bias might play a role for the communication of expressive meaning components in a question.

We will call the set of shades of meaning that concern (a) the goal of the question – to double-check the evidential vs. the epistemic bias, or to reject (implications of) the evidence –, and (b) the communication of psychological states like indignation or irritation the *concern* of the question. Question concern is thus about what the speaker wishes to achieve by asking the question, beyond finding out what is the truth. The bias profile, in contrast, is about restrictions on the context in terms of situational evidence for $p/\neg p$ and about speaker-internal assumptions about the truth of $p/\neg p$. We propose to keep question bias and question concern apart in the descriptive framework for polar questions, which often is not done in investigations of *yes-no*-questions. We also propose to keep apart types of speaker bias. Recall that we reserve the term *epistemic bias* for speaker belief. The motivation for such fine-grained distinctions is that subtle shades of meaning might be relevant for the contextual felicity or infelicity of a question. Mixing them might blur the view on appropriateness conditions. For instance, expectations concerning truth might be quite different from previous beliefs, if there is very convincing evidence. Furthermore, questions might not only be incredulous but also confirmative (Jeong 2018, Rudin 2018, Goodhue 2021). Also, the goal of a negative interrogative question might not be to seek information at all but to make a suggestion, e.g. *Don't you want to come in?* (Romero & Han 2004, AnderBois 2019). Importantly, question concern and question bias may interact in specific ways for different question types, for instance a suggestion might have a different bias profile than a double-checking question with the same syntactic form. Overall, we believe that working with precise distinctions will help finding the correct generalizations regarding the contextual appropriateness conditions for *yes-no*-questions.

The goal of this paper is to explore question bias and particularly question concern for negative *yes-no*-questions in Russian. Russian is a language where *yes-no*-questions have a declarative syntax. It is a negative concord language, and the negative marker is a syntactic head directly preceding the verb. Russian is known to use particles to express subtle shades of meaning in questions. We focus on two particles that seem to feature in translations of English negative *yes-no*-questions with an interrogative and/or declarative syntax: *razve* and *neuželi*, both roughly meaning ‘really’. We will argue that questions with these particles have the same bias profile but different question concerns.

The paper is structured as follows. In Section 2, we illustrate the contextual appropriateness conditions (bias, concern) for *yes-no*-questions with different for-

mal characteristics in English, to set the stage for our discussion of Russian. In Section 3, we discuss the appropriateness conditions of Russian questions with the particles *razve* and *neuželi*. We discuss observations from previous literature, which focuses on positive questions, and we present new corpus evidence and intuitive judgements for negative questions with and without particle, probing for potential inner and outer negation readings of negative questions. Section 4 and Section 5 present experimental evidence from two contextual appropriateness acceptability experiments, which tested hypotheses we developed on the basis of the discussion in Section 3. Section 6 puts forth a theoretical proposal for the meaning of *razve* and *neuželi* in Russian negative questions.

2 Question form, question bias and question concern

In this section, we discuss the contextual appropriateness conditions for a variety of English *yes-no*-questions, which shows that these questions differ in their bias profile as well as in their question concern. As we will see in Section 3, the shades of meaning expressed by the Russian particles *razve* and *neuželi* overlap with different question forms in English.

We will continue using our cafeteria example from the previous section and consider two types of context where there is a conflict between the evidential bias and the epistemic bias, as is illustrated in (1) and (2). Other context types will be discussed in Section 4. In the scenario in (1), there is evidence for the cafeteria not being open yet ($\neg p$), whereas the speaker, Amy, had assumed that the cafeteria is open already (p). In (2), there is evidence for the cafeteria being open already (p), whereas Amy had assumed that it is not open yet ($\neg p$). Table 1 and Table 2 list seven question types: positive and negative interrogatives (a–c), positive and negative ‘simple’ declaratives, i.e. without an adverb or particle (d–e), and positive and negative rejecting declaratives, with the adverb *surely* (f–g). As these tables show, it is always either the positive or the negative question that is felicitous in each context. In what follows, we will discuss the different question types in these two contexts.

(1) **Scenario (i): Evidential bias: $\neg p$; Epistemic bias: p**

Question: {*the cafeteria is open, the cafeteria is not open*}

Ben, who hates microwave food, walks into the office with a microwave dish, which suggests that the cafeteria, which has a staff shortage and has reduced opening hours, is not open yet. Amy had assumed that the cafeteria is already open. Amy asks ... (Table 1)

Table 1: Question forms (types) and question concern in English for Scenario (i) in (1).

Example	Question type	Question concern
a. # Is the cafeteria already open?	positive interrogative	-
b. Isn't the cafeteria open yet?	negative interrogative with NPI	checks $\neg p$
c. Isn't the cafeteria already open?	negative interrogative with PPI	checks p
d. # The cafeteria is already open?	positive declarative	-
e. The cafeteria isn't open yet?	negative declarative with NPI	checks $\neg p$
f. Surely the cafeteria is already open?! ^a	positive rejecting declarative	rejects $\neg p$
g. # Surely the cafeteria isn't already open?	negative rejecting declarative	-

^aAdditional context for (f): Amy was going to get some food from the cafeteria in a couple of minutes.

(2) Scenario (ii): Evidential bias: p ; Epistemic bias: $\neg p$

Question: {*the cafeteria is open, the cafeteria is not open*}

Ben walks into the office with a plate full of food that looks like it is from the cafeteria. Amy had assumed that the cafeteria is not open yet. Amy asks ... (Table 2)

Starting with the interrogative questions (a–c), note that for the negative interrogatives we have chosen examples with so-called *preposed negation* (the clitic *n't* attaches to the clause-initial verb: *Isn't the cafeteria...*), which in contrast to questions with non-preposed negation *require* that there be an epistemic bias for p (Romero & Han 2004). Furthermore, one of the negative interrogatives contains a negative polarity item (NPI, *yet*) and one contains a positive polarity item (PPI, *already*). As Table 1 shows, negative questions with a NPI vs. PPI double-check the truth of different propositions. The question with the NPI double-checks $\neg p$, which is the evidential bias, whereas the question with the PPI double-checks p , which is the epistemic bias (Ladd 1981, Romero & Han 2004). Thus, these questions have different question concerns. We already saw in the introduction that

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Table 2: Question forms (types) and question concern in English for Scenario (ii) in (2).

Example	Question type	Question concern
a. Is the cafeteria already open?	positive interrogative	checks p^a
b. # Isn't the cafeteria open yet?	negative interrogative with NPI	-
c. # Isn't the cafeteria already open?	negative interrogative with PPI	-
d. The cafeteria is already open?	positive declarative	checks p
e. # The cafeteria isn't open yet?	negative declarative with NPI	-
f. # Surely the cafeteria is already open?!	positive rejecting declarative	-
g. Surely the cafeteria isn't already open? ^b	negative rejecting declarative	rejects p

^aPositive interrogatives can also be asked out of the blue. It is due to the context that the question in (a) checks p because that context in Scenario (ii) provides evidence for p .

^bAdditional context for (g): Amy believes that the cafeteria is not open yet because she is meeting her friend, who works there, in two minutes, so she has an interest in the cafeteria being closed.

negative interrogatives can have different question concerns. We see now that this difference seems to become “visible” when the question contains polarity-sensitive items.³ Since in a question with a PPI the negation does not seem to anti-license the PPI, this negation has been called *outer negation*, whereas the negation that licenses NPIs is *inner negation* (Ladd 1981, Romero & Han 2004). The idea is that outer negation is “too far out” to anti-license the PPI, whereas inner negation is not. Also recall from Section 1 that an outer negation question

³AnderBois (2011, 2019), who doubts the existence of the inner-outer negation ambiguity, suggests that polarity items are no reliable indicator because they are licensed in a variety of contexts, and that inner negation readings are like outer negation readings with a NPI. We note here that there are other indicators of the ambiguity beyond polarity items, such as the syntactic form of the negation marker (Büring & Gunlogson 2000, Arnhold et al. 2021). We will also argue further below that for Russian the ambiguity is reflected in restrictions on question particles.

checks the truth of a positive proposition, whereas an inner negation question checks the truth of a negative proposition.

There are various analyses of the difference between outer and inner negation. It has been explained in terms of scope relations between the negation operator and an epistemic conversational operator (Romero & Han 2004), as illocutionary vs. propositional negation (the operator *FALSUM* vs. ‘normal’ propositional negation (Repp 2009, 2013), or in terms of scope relations between speech act operators (Reese 2006, Reese 2007, Asher & Reese 2005, Krifka 2015, 2017), see Romero (2020) for a recent review. We will elaborate on some of these theories in Section 6, where we make a theoretical proposal for the meaning contribution of the two Russian particles under investigation in this paper, *razve* and *neuželi*.

Turning next to simple declarative questions without an adverb (d–e), Table 1 and Table 2 indicate that they are felicitous in the same contexts as the corresponding polar interrogatives, and that negative declaratives seem to have the same question concern as negative interrogatives with inner negation. Negative declaratives cannot host a PPI. A difference between interrogatives and declaratives which we cannot observe in the tables is that declarative questions *require* evidence in the situation supporting the expressed proposition, which is not the case for interrogatives. Positive interrogatives can be asked totally out of the blue, and negative interrogatives with an outer negation reading do not require evidence either (e.g. Büring & Gunlogson 2000). Conversely, simple declarative questions do not *require* an epistemic bias for *p* or $\neg p$, in contrast to negative interrogatives, which require an epistemic bias for *p*.

Declarative questions with the adverb *surely* (f–g), so-called *rejecting questions* (Seeliger 2015, 2019, Seeliger & Repp 2018), have a bias profile that seems to be the mirror image of the profile of simple declarative questions, at least to some extent. Table 1 and Table 2 show that the felicity of rejecting declarative questions is reversed in the two scenarios: Positive rejecting questions require evidence for $\neg p$ and previous belief that *p*, and negative rejecting questions require evidence for *p* and previous belief that $\neg p$.⁴ Moreover, the speaker of a rejecting question finds it hard to accept that the evidence is true, hence the term *rejecting question*: the speaker rejects what they perceive. In the table notes, we have suggested specifications of the context scenarios for the rejecting questions, which state that the speaker has a fairly firm belief and/or plans associated with that belief. Thus, rejecting questions do not only have a different bias profile but also a different question concern than simple declarative questions or interrogative questions. They do not (only) double-check a bias, they reject the evidence or the

⁴Positive rejecting questions are often somewhat marked, see Seeliger (2019) for discussion.

implications of the evidence concerning the truth of $p/\neg p$, i.e. they essentially express irritation or indignation, whilst still leaving room for the truth as it is suggested by the evidence. The latter aspect makes them questions, rather than rejections.

Our short review has shown that *yes-no*-questions with different forms are felicitous in different contexts, which can systematically be described in terms of bias profile and question concern. We have no space to review the theoretical literature on the contextual appropriateness conditions of questions here. We already mentioned various theoretical proposals for the role of negation above. Approaches that capture bias beyond negation have modelled biases for instance as arising from conventional implicatures associated with a conversational operator (e.g. Romero & Han 2004, also cf. Repp 2009, 2013), from an interplay of a presupposition brought in by a silent operator with certain pragmatic principles (e.g. Trinh 2014, also cf. Seeliger & Repp 2018), from a requirement on contextual backup of contingent commitments (\approx bare declarative questions, Gunlogson 2008), from a requirement of placing a metalinguistic issue on the conversational table (Malamud & Stephenson 2015), from intonation signaling the suspension of a Gricean maxim (Westera 2017), or, somewhat more narrowly, from lack of speaker commitment (Rudin 2018, Goodhue 2021), to name just a few.

3 The Russian question particles *razve* and *neuželi*

As mentioned in Section 1, Russian *yes-no*-questions have a declarative syntax. Interrogativity is marked prosodically (e.g. Bryzgunova 1980, Odé 1989, Meyer 2004, Meyer & Mleinek 2006). The word order in *yes-no*-questions may vary but this is mainly determined by information-structural features rather than by sentence type (e.g. King 1994). The particles *razve* and *neuželi* occur in sentence-initial position, and they both roughly mean ‘really’. As we will see in this section, both particles occur in questions whose bias profile contains an evidential bias for the denoted proposition, and an epistemic bias for its complement, which is similar to English simple declarative and interrogative questions, schematically shown in Table 3. We will argue that Russian questions with the particles *razve* vs. *neuželi* differ with respect to question concern. With a *razve*-question, the speaker may double-check the epistemic bias or the evidential bias, partly depending on additional formal features of the question. With a *neuželi*-question, the speaker may only double-check the evidential bias. The concern of a *neuželi*-question additionally includes expressing disbelief of the contextual evidence, potentially accompanied by irritation or, in some cases, joy. We first discuss positive questions and then turn to negative questions.

Table 3: Bias profile of positive and negative *razve* and *neuželi*-questions

	Polarity	Evidential bias	Epistemic bias
<i>Razve/Neuželi</i>	$p?$	p	$\neg p$
<i>Razve/Neuželi</i>	$\neg p?$	$\neg p$	p

3.1 Positive questions with particles

We will start our discussion with the particle *razve*. *Razve* has been suggested to indicate moderate surprise or doubt concerning the situational evidence, which is denoted by the prejacent of the question (Apresjan 1980, Rathmayr 1985, Baranov 1986, Kirschbaum 2001, Mat'ko 2014). Furthermore, the speaker is assumed to be fairly sure about his/her own previous belief (*ibid.*, Vostokow 1831). Still, *razve* is argued not to be normally used to indicate strong surprise or indignation. An example with *razve* from Baranov (1986: 126) is shown in (3). According to Baranov (1986), *neuželi* would be infelicitous in this context. In (3) the speaker checks the addressee's (implied) evidence for the denoted proposition p , which is incompatible with his/her original belief that $\neg p$ is true. Baranov (1986) assumes that the speaker's original belief, i.e. the epistemic bias for $\neg p$, is strong because the continuation in the second sentence directly supports that belief: the speaker was told by the protagonist himself that the book was not just bought freely and without difficulties in a shop but had to be organized via some contacts.

- (3) Razve / #Neuželi on svobodno kupil étu knigu? Ved' on govoril, čto
 PART he freely bought this book PART he said that
 eë dostali emu znakomye.
 it.FEM gave.PL him people.he.knows
 'Did he really buy that book without difficulties?⁵ After all, he said that it
 was given to him by some people he knows.'

Turning to *neuželi*, observe that the particle consists of three morphemes: the negative marker *ne* 'not', the word *uze* 'already', and the question particle *li*, which also occurs on its own for instance in questions with a certain focus structure. However, synchronically, *neuželi* is lexicalized as one word and is semantically intransparent. *Neuželi* indicates true disbelief in the situational evidence,

⁵We are translating the questions with interrogatives. It might be the case that English declarative questions are more adequate but this issue requires a comprehensive investigation which is beyond the scope of this paper.

rather than doubt or moderate surprise, so that *neuželi*-questions may express irritation or indignation but may also reflect joy (Apresjan 1980, Kirschbaum 2001, Mat'ko 2014). The irritation might be the result of the speaker's personal involvement concerning his/her original beliefs and the stark contrast between apparent reality and previous assumptions (Rathmayr 1985). Thus, *neuželi*-questions seem to share with English rejecting questions the meaning component that the evidence is hard to believe. However, the bias profile of English rejecting questions and *neuželi*-questions is different: Recall that rejecting questions come with a bias profile that is the "opposite" of that of English interrogative and simple declarative questions, which is not the case for *neuželi*-questions.

An example for a *neuželi*-question is given in (4) (Baranov 1986: 126). According to Baranov (1986: 126), the particle *razve* is unacceptable in this question. We are adding a translation with a negative rejecting question here as this reflects best the indignation or irritation associated with the question. Similar to the parallel *razve* example in (3) above, (4) contains a second clause which motivates the speaker's epistemic bias for $\neg p$ and is incompatible with the implied evidence for p . Unlike in (3), however, the epistemic bias is based on general experience and logical reasoning: In (4), the second clause states that the book is a bibliographic rarity, and we may assume that the speaker reasons that rarities usually cannot be bought freely and without difficulties, so that s/he is convinced that the same applies to the book at issue. Baranov (1986) claims that the epistemic bias is less strong in (4) than in (3) because it is based on an assumption rather than a direct observation. Regarding the situational evidence, Baranov suggests that it is acknowledged by the speaker but that it also irritates him/her.

- (4) Neuželi / #Razve on svobodno kupil étu knigu? Ved' éto
 PART he freely bought this book PART this
 bibliografičeskaja redkost!
 bibliographic rarity
 'Did he really buy that book without difficulties?' or 'Surely he didn't buy
 that book without difficulties?! After all, it is a bibliographic rarity'

We think that Baranov's (1986) claims regarding *neuželi*-questions might not be quite accurate. First, reasoning based on general experience, like the fact that bibliographic rarities are hard to come by, might create rather strong convictions. Furthermore, Rathmayr's (1985) suggestion that *neuželi*-questions highlight a personal involvement of the speaker point to a strong epistemic bias. Also, a strong conviction would be a good motivation for the expressive meaning component of irritation that *neuželi*-questions are suggested to have. If that is the case,

however, the issue arises how exactly – if at all – *razve* and *neuželi*-questions differ in the strength of the epistemic bias. We approach this issue as well as the other (expressive) components of the question concern of *razve* and *neuželi*-questions in our experimental investigation, see Section 4 and Section 5.

3.2 Negative questions with particles

The negation in negative *razve* and *neuželi*-questions, in particular the distinction between inner vs. outer negation, to the best of our knowledge has not been investigated in the literature. In this section we present evidence from the Russian National Corpus (<https://ruscorpora.ru/new/en/index.html>), from which we have extracted negative questions with *razve* and *neuželi* with their previous and subsequent contexts. To investigate potential inner and outer negation readings, we take polarity items as indicator. Recall from Section 2 that NPIs are associated with inner negation readings and PPIs with outer negation readings. Starting with *razve*-questions, (5) shows that the negation in a *razve*-question may license a NPI: it contains the weak NPI *eščë* ‘yet’. By this diagnostic, (5) contains inner negation. (6) shows that the negation in a *razve*-question may co-occur with and hence does not anti-license a PPI: it contains the PPI *uže* ‘already’. Hence, (6) contains outer negation. In both (5) and (6), the negation takes scope over the temporal element (*eščë*, *uže*).

- (5) A: Sejčas ja tebe skažu glavnoe.
now I you tell main
'Now I am telling you the main thing.'
- B: Razve eščë ne skazal?
PART yet not said
'Haven't you told it to me yet?'
- A: No, I am telling you now.

[A. I. Spasovskiy, Bol'saja kniga peremen / Volga
'The big book of changes / Volga', 2010]

- (6) A: Čestnoe slovo, ne znaju, kak vytaščit' tebjā iz prošloga.
honest word not know how drag you out.of past
'Frankly, I don't know how to drag you out of the past.'
- B: Razve ty uže ne vytaščila menja iz prošloga?
PART you already not dragged me out.of past
'Haven't you dragged me out of the past already?'

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A: Even if I have managed, not everybody can see it, it seems...

[Alexander Bogdan, Gennadi Praškewič. Čelovek Č
‘Gennadi Praškevič, Man M’ 2001]

Turning to *neuželi*-questions, (7) and (8) indicate that *neuželi* is compatible with both *eščë* and *uže*. However, the translation in (8) illustrates a problem with *uže*: *uže* takes scope over the negation. More specifically, the question in (8) means: Was it really already the case that women did not wear corsets in 1908? Upon closer scrutiny, our corpus search has revealed that in *neuželi*-questions with *uže*, *uže* always takes scope over the negation. This is not the case in *razve*-questions, as was illustrated in (6) above: In *razve*-questions with *uže*, the negation may take wide scope. We conclude that there is no outer negation scoping over *uže* in *neuželi*-questions.

- (7) “We’ve heard that before!” Masha smiled, looking for another radio station. “Leave it.” said Igor.

“Neuželi tebe éta pesenka eščë ne nadoela?”

PART you.DAT this song.DIM yet not bores

‘Aren’t you bored with this song yet?’

“It’s not about the song.”

[Maksim Milovanov, Rynok tščeslavija ‘Vanity fair’, 2000]

- (8) Pantaloons. Touching, childlike, rather long, pale blue pantaloons, almost all lace.

A gde korset? Neuželi v 1908 ženščiny uže ne nosili korsetov?
but where corset PART in 1908 women already not wore corsets
‘But where is the corset? Did women in 1908 already not wear corsets anymore?’

Although singers probably never wore them – they were too tight on the chest and made it hard to breathe.

[Gennadi Alekseev. Zelénye berega ‘Green shores’, 1983–1984]

Let us explore next whether the negation in the scope of *uže* is inner or outer negation. The *neuželi*-question in (9) is from the Russian National Corpus, the ungrammatical *razve*-question in (10) is constructed. The examples illustrate that there may be a strong NPI – the *n*-word *ničego* ‘nothing’ – in negative *neuželi*-questions with *uže* (9), but not in negative *razve*-questions with *uže* (10). This observation suggests that *ničego* is licensed by inner negation in the *neuželi*-question, whereas the *razve*-question contains outer negation. Again, *uže* in the

neuželi-question is not anti-licensed by the inner negation because *uže* always outscopes the negation, as we observed above. Taken together, (9) and (10) suggest that *neuželi* is incompatible with outer negation.

- (9) When I asked her “Don’t you have a guilty conscience?”, she said “Why should I have a guilty conscience if I was having a good time?

Neuželi dlja nas vsex uže ničego ne značat semejnye cennosti,
PART for us all already nothing not mean family values
ljubov’, predannost’.”
love devotion

‘Does this really already mean nothing for us all: family values, love, devotion.’

[Ženščina + Mužčina: Seks (forum) ‘Woman + Man: Sex (forum)’ (2004)]

- (10) * Razve Marina Petrovna uže ničego ne zabronirovala?

PART Marina Petrovna already nothing not booked

‘Hasn’t Marina Petrovna really booked anything already?’

Another piece of evidence for the missing outer negation reading of *neuželi*-questions, which circumvents the scope problem, is the contextual appropriateness of negative *razve/neuželi*-questions. (11) and (12) are contexts proposed by Romero & Han (2004) to test for outer vs. inner negation in English. In English, negative interrogatives may come with different particles meaning *also*: the PPI *too* and the NPI *either*. The presence of *too* is assumed to indicate an outer negation reading (Ladd 1981): it checks the epistemic bias for *p*. This is illustrated in (11): Speaker S asks whether or not Jane is coming, with the additive particle in the question indicating a parallel between Jane and Stephan, who has come, so S double-checks the epistemic bias that Jane is coming. The negation is outer negation. The presence of *either*, in contrast, is assumed to indicate the inner negation reading (*ibid.*): it checks the evidential bias. In (12), the additive particle indicates a parallel between Jane and Pat, who is not coming. So the question double-checks the evidential bias that Jane is not coming. The negation is inner negation. The Russian counterpart of *also/too/either* is *tože*, which is polarity-insensitive. (11) and (12) illustrate that a *razve*-question with *tože* is felicitous in both contexts whereas a *neuželi*-question is only felicitous in the context licensing an inner negation question: (12). From this we conclude that *neuželi* is indeed incompatible with outer negation: it is infelicitous in a context where the question checks the epistemic bias and thus must have an outer negation reading.

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- (11) Outer negation reading (in English, *too* is acceptable)

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

S: Isn't Jane coming too? (Romero & Han 2004: 610)

Razve/#Neuželi Jana tože ne prijdet?

PART/PART Jana also not comes

- (12) Inner negation reading (in English, *either* is acceptable)

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? (Romero & Han 2004: 610–611)

A: Razve/Neuželi Jana tože ne prijdet?

PART/PART Jana also not comes

To summarise, negative *razve*-questions and negative *neuželi*-questions both have the bias profile given in Table 3 at the beginning of this section but differ in their question concern. This subsection has shown that apart from the difference in expressive meaning that we discussed in Section 3.1, the two questions differ in the bias(es) they double-check. A *razve*-question may double-check either the evidential bias $\neg p$ (inner negation) or the epistemic bias p (outer negation), whereas a *neuželi*-question only double-checks the evidential bias $\neg p$ (inner negation). This restriction ties in well with the assumption that *neuželi*-questions express disbelief in the evidence and come with a strong epistemic bias: the epistemic bias is not something the speaker wishes to double-check.

As a last point, observe that (11) and (12) do not actually seem to differ in the kind of expressiveness that is involved, contrary to what we might expect on the basis of our discussion in Section 3.1. It seems that in both contexts, speaker S might just be in doubt, or might feel disbelief and indignation. As a matter of fact, in many of the questions with inner negation occurring in the Russian National Corpus, *razve* and *neuželi* intuitively seem to be interchangeable. However, we suggest that this, in itself, is not problematic. Often a given context including the speakers' psychological state may be reconstructed / interpreted by the reader in various ways. It is easily conceivable that the presence of certain meaning aspects – especially the ones that are arguably also expressed by prosodic or gestural means like disbelief and irritation – is uncertain and open for interpretive flexibility by the reader. Thus, we note here that the difference between the particles might be subtle in certain contexts because contexts can be enriched / accommodated by readers so that the requirements of the particles are met.

3.3 Negative questions with and without particles: Experimental investigations

We have argued that *razve* and *neuželi* impose different restrictions regarding the concern of a question both in terms of expressive meaning components and in terms of the bias that is checked. An issue that we have not addressed yet is what bias profile Russian negative question without a particle (i.e., “bare” questions) have. Recall that *razve* and *neuželi*-questions have the same bias profile as English negative interrogative questions with preposed negation. Now, English interrogatives may also occur with non-preposed negation, as in *Is the cafeteria not open?* (vs. *Isn’t the cafeteria open?*). For such interrogatives, it has been suggested that they may appear in “neutral” contexts, i.e., in contexts without evidence for $\neg p$, and without an epistemic bias for p (Romero & Han 2004). Given that Russian does not have the option to prepose the negation (the negation invariably attaches to the verbal head), and given that particles indicate a specific bias profile, it may be the case that it is bare negative questions that are felicitous in neutral, “unbiased” contexts. It is usually hard to come by neutral contexts for asking a negative question. The reason is, that usually, one can ask a positive question instead. For instance, instead of asking *Is the cafeteria not open?* one can easily ask *Is the cafeteria closed?*. The positive question is less complex and should be preferred unless particular meaning components are to be expressed. Still, we can imagine a situation where two people want to draw up a list of eating places on campus which are not open on a strike day. This would then be a list of negative propositions.

To explore the bias profile of bare negative questions and to test the generalizations that we proposed in the previous subsections about the question concern of *razve*- and *neuželi*-questions, we conducted two acceptability judgement experiments, which we report in Section 4 and Section 5. In Experiment 1 (Section 4), we examined the difference between Russian negative yes-no-questions with vs. without a particle regarding their bias profile. We compared bare questions to *razve*-questions both in negative list contexts (unbiased contexts) and in contexts with evidence for $\neg p$ and speaker belief in p (biased contexts). We hypothesized that bare negative questions should be felicitous in unbiased list contexts whereas negative *razve*-questions should be infelicitous. Conversely, we hypothesized that *razve*-questions should be felicitous in biased contexts whereas bare questions should be less felicitous/somewhat degraded. We did not expect complete infelicity because negative questions are more complex than positive questions, and the negation in bare negative questions might be taken to indicate a bias even without a particle. Similar observations have been made for English

4 Negative polar questions in Russian: Question bias and question concern

interrogatives with non-preposed negation, which are not restricted to unbiased contexts (Romero & Han 2004).

Still, the use of *razve* maximizes the expression of the appropriate shades of meaning so that in the biased contexts the more complex form should be preferred. Table 4 summarizes our predictions.

Table 4: Predictions for Experiment 1

	Unbiased context negative list	Biased context evidence: $\neg p$, epistemic bias: p
bare negative question	✓	degraded
negative <i>razve</i> -question	✗	✓

In Experiment 2 (Section 5) we explored the subtle meaning differences between *razve* and *neuželi* that we discussed in Section 3.1, applied to negative questions. Specifically, we hypothesized that *neuželi*-questions signal that the speaker experiences a strong conflict between epistemic bias and evidential bias, whereas *razve*-questions do not. To test these different degrees of conflict in the experiment, we manipulated on the one hand the source and “strength” of the epistemic bias: reliable and strong (by hypothesis appropriate for *neuželi*-questions) vs. not so reliable and strong (by hypothesis appropriate for *razve*-question). On the other hand, we manipulated the description of the speaker’s psychological state as merely doubtful (*razve*) vs. truly puzzled (*neuželi*). Together, these manipulations created contexts that licensed what we will call *checking questions*, i.e. questions that by hypothesis contain *razve* rather than *neuželi*, vs. *disbelieving questions*, i.e. questions that by hypothesis contain *neuželi* rather than *razve*.⁶

Table 5 summarizes our expectations for Experiment 2. It shows that we do not expect total infelicity if the “wrong” particle is used, but degradedness. As we highlighted in Section 3.2, the meaning differences between the particles are very subtle and readers might accommodate contextual information that is not explicitly given to ‘make sense’ of the use of a particle. In Section 6 we will give further details on how exactly we implemented the contextual features in Experiment 2.

⁶We do not use the term ‘rejecting question’ despite the similarity between *neuželi*-questions and rejecting questions in expressing disbelief, because of the different bias profiles.

Table 5: Predictions for Experiment 2

	Context for checking question	Context for disbelieving question
negative <i>razve</i> -question	✓	degraded
negative <i>neuželi</i> -question	degraded	✓

To reduce the complexity of the experimental designs, both experiments tested questions with inner negation only (i.e. questions with *eščë*). We included questions that potentially may receive an outer negation reading (i.e. questions with *uže*) in the filler items.

4 Experiment 1: No particle vs. *razve*

Experiment 1 explored the felicity of negative *yes-no*-questions with and without the particle *razve*. The questions were embedded in two types of contexts. Either the goal of the larger conversation was to produce a list of negative propositions such that the prejacent of the question, $\neg p$, was one of them and the purpose of the question was to augment the list by one item (= unbiased context), or the purpose of the question was to check the truth of the proposition $\neg p$ in view of a conflict between an epistemic bias for p and evidential evidence for $\neg p$ (= biased context).

4.1 Method

Participants in Experiment 1 read short scenarios, consisting of a scene-setting passage leading up to a conversation between two interlocutors, Dima and Katja, followed by a question asked by Katja. An example is given in (13). In the scene-setting passage, a larger situation is described which involves Dima, Katja and a third person that has or has not carried out a certain action (Julja in (13)). The question that Katja asks is about that action (Julja wrote some leaflets).

The experiment had a 2×2 design with the factors **BIAS CONTEXT** (neutral vs. biased) and **PARTICLE** (no particle vs. *razve*). The factor **BIAS CONTEXT** was manipulated in the final sentence of the scene-setting passage. That sentence announces the subsequent conversation and the question that Katja asks, including its purpose, i.e. the concern of the question. In the unbiased context, Dima and Katja's conversation is about actions that the third person hasn't carried out yet,

because these are relevant for Dima and Katja's future plans; the conversation starts with Katja asking a relevant negative question. In the biased context, Katja is described as having a prior belief concerning the state of affairs regarding the third person's action at issue: Katja believes that the action has been carried out. This belief is in conflict with the contextual evidence, which suggests that the action has not been carried out: In (13) Dima makes some comments that are interpreted by Katja in this way. By asking the question, Katja wants to find out whether p or $\neg p$. The factor PARTICLE was implemented by the form of the question: It either contained the particle *razve* or it did not. All questions contained the negative marker *ne* 'not' and the weak NPI *eščë* 'yet', and thus by hypothesis contained inner negation. Hence, Katja double-checks $\neg p$ to find out whether p or $\neg p$.

- (13) In the village where Dima and Katja live, there is a very old oak tree that is to be cut down. Dima and Katja have organised a citizen's committee and are opposing the cutting down of the tree. Julja, their friend and environmental activist, helps them prepare leaflets. This afternoon, Dima spoke to Julja and found out that she has already written the text for the leaflets. After lunch, Dima is talking with Katja.

Unbiased context: They speculate about what Julja hasn't done yet to find out how much more time she needs.

Biased context: Katja thought the text for the leaflets was ready, but now she isn't so sure, as Dima has just told her that he wanted to offer Julja help.

- a. Katja: Razve Julja eščë ne napisala tekst dlja listovok? [+particle]
 PART Julja yet not wrote text for leaflets
 'Has Julja really not written the text for the leaflets yet?'
- b. Katja: Julja eščë ne napisala tekst dlja listovok? [-particle]
 Julja yet not wrote text for leaflets
 'Has Julja not written the text for the leaflets yet?'

The experiment contained 24 lexicalizations in the four conditions just described. In half of these lexicalizations, the action by the third person had actually been carried out, in the other half, it had not been carried out. Dima – and the participants (but not Katja) – always knew what was the actual state of affairs.

In addition to the experimental items, there were 24 filler lexicalizations that on the one hand had a balancing function, and on the other hand served as controls. All fillers contained the PPI *uze* 'already', to counterbalance *eščë* in the

experimental items. Also for counterbalancing, 75% of the fillers did not contain a negation. Furthermore, 50% of the fillers had the ‘opposite’ bias profile than in the experimental items (i.e. evidential bias p ; epistemic bias $\neg p$), and the state of affairs was p ; the other 50% had no bias and the state of affairs was $\neg p$. We implemented these balancing aspects in four filler types. One filler type (NOBIAS.uže.POS), contained as target question a simple positive question presented in a neutral context. This type served as control because there should be no doubt about the high contextual appropriateness of a positive question in an unbiased context. Another non-biased filler type (NOBIAS.li.uže.POS) contained a target question with a clause-initial verb followed by the particle *li*. We expected this filler type to be fairly acceptable. The opposite-biased-context fillers had as target *razve*-questions with negation (OPP.razve-uže.NEG) or without (OPP.razve-uže.POS). We expected OPP.razve-uže.NEG questions to be unacceptable because their bias profile is violated, whereas OPP.razve-uže.POS questions were expected to be acceptable. These last two filler types served to double-check our core assumptions concerning the bias profile of *razve*-question (see Table 3 in Section 3), which on the basis of previous literature, we consider uncontroversial.

The 48 lexicalizations were distributed over four lists in a Latin square design so that each list contained 24 experimental and 24 filler items. In addition, there were two practice items on each list.

The task of the participants was to judge the acceptability of the question in the given context situation on a seven-point scale. The end points of the scale were labelled with *soveršenno ne podchodit* ‘does not fit at all’ or *očen chorošo podchodit* ‘fits very well’. For the statistical analysis, these end points were transformed to the numbers 1 and 7, respectively, with the other scale points sitting in between. In addition to giving the acceptability judgment, participants had to verify a statement about the context (e.g. *Dima knows that Julja has not yet written the text for the leaflets* in (13)), to ensure that they read the contexts carefully. The verification statement was shown to the participants on an individual screen page after they had read the test item and given the acceptability judgment.

The experiment was run as a web experiment on *soscisurvey.de*. 36 participants (27 female, 9 male; mean age: 34.8; age range: 20–56) with Russian as their native language were recruited via *prolific.com*. Before taking part in the experiment, they gave informed consent. They were paid for participation.

4.2 Results

The data from four participants were excluded from the statistical analysis because they did not judge at least 80 per cent of the verification statements cor-

rectly, because they clicked the same scale point throughout the entire experiment, and/or because they did not give the expected judgements for those fillers which left absolutely no room for degrees of acceptability (simple positive questions). This left the data from 32 participants for analysis. The analyses were conducted by fitting a cumulative link mixed model for ordinal data (R package ordinal, Christensen 2019). **BIAS CONTEXT** and **PARTICLE** were fixed factors. They were sum-coded. Participant and lexicalization were random factors. The final, maximal model contained random intercepts and slopes for the experimental factors and their interaction.

Figure 1 shows the results for the experimental conditions in terms of proportions of rating levels. The median for *razve*-questions in unbiased contexts is 6, for all other conditions it is 7.

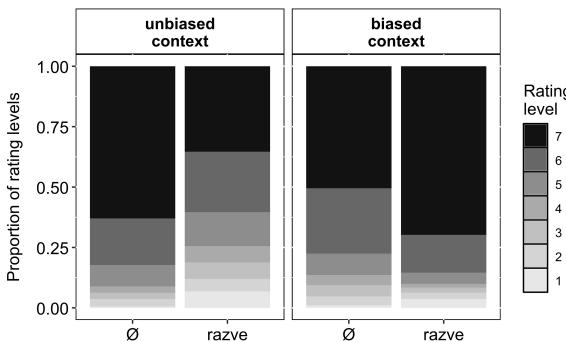


Figure 1: Proportion of rating levels for the experimental conditions in Experiment 1. Darker bars reflect greater contextual appropriateness.

Table 6 shows the model estimates for the effect of the two experimental factors. There was a main effect of **BIAS CONTEXT**, which was modulated by an interaction of **BIAS CONTEXT** and **PARTICLE**. We resolved the interaction by forming a subset for *razve*-questions and a subset for bare questions. *Razve*-questions were judged to be more suitable in biased contexts than in unbiased contexts ($b = 1.01$, $SE = 0.24$, $z = 4.16$, $p < 0.001$), and bare questions were judged to be more suitable in unbiased than in biased contexts ($b = -0.38$, $SE = 0.14$, $z = -2.71$, $p = 0.0017$).⁷

We checked a potential influence of the actual state of affairs, which was balanced across lexicalizations, because knowing what was actually the case might

⁷Due to convergence issues this model did not contain random slopes for lexicalization.

Table 6: Model estimates for the experimental factors in Experiment 1.

	estimate	SE	z-value	p-value
BIAS CONTEXT	0.32	0.14	2.36	0.02*
PARTICLE	-0.08	0.13	-0.60	0.55
BIAS CONTEXT × PARTICLE	0.72	0.16	4.46	<0.001***

have influenced participants' judgements: Participants might have developed their own bias(es). The analysis revealed that the questions were judged as less suitable when the action at issue had been carried out, which suggests that the knowledge about the actual state of affairs did influence the assessment of the contextual evidence by the participants. Importantly, there was no interaction with the experimental factors.

The results for the fillers are given in Figure 2. We can see that, as predicted for the OPP.*razve-uže.NEG* fillers, negative *razve*-question with the PPI *uše* are not acceptable in a context with the “opposite” bias from the experimental bias contexts, i.e. epistemic bias for $\neg p$ and evidential bias for p . The median for these questions is 2, which we take to reflect contextual inappropriateness. *Razve*-questions with *uše* but without negation (OPP.*razve-uže.POS*) are suitable in such contexts (median: 7). We take these results to confirm our (uncontroversial) core assumptions regarding the bias profile of *razve*-questions. As the presence of *uže* rather than *ešče* should not play a role for the acceptability of these questions – recall that our corpus investigations showed that both *uže* and *ešče* are felicitous in *razve*-questions –, we assume that it is indeed the altered context that is responsible for these results. Questions with the particle *li* seem to be somewhat degraded in unbiased contexts, although the median is also 7.

4.3 Discussion

The results suggest that negative polar questions with the weak NPI *ešče* but without a question particle are more acceptable in unbiased list contexts than in contexts with an epistemic bias for p and an evidential bias for $\neg p$. Negative polar questions with *ešče* and with the particle *razve* are more acceptable in the biased contexts than in the unbiased contexts. The results also indicate that the difference between the question forms in the different context types are small. The median judgement for bare questions in biased contexts is the highest one possible. Similarly, the presence of *razve* in an unbiased list context does not lead

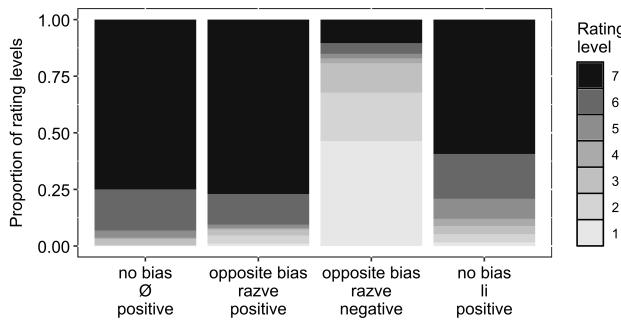


Figure 2: Proportion of rating levels for the four filler types in Experiment 1.

to straight contextual inappropriateness: The median judgement is the second-highest possible.

Overall, we interpret the findings from Experiment 1 as supporting our hypothesis that Russian negative yes-no-questions without a particle or with the particle *razve* have the contextual appropriateness conditions that we suggested. *Razve*-questions are felicitous in contexts where there is evidence for the prejacent of the question and additionally an epistemic bias for the complement of the prejacent of the question. The question concern is to resolve the conflict between the biases by checking one of them – in questions with *eščë*, this is the evidential bias. Bare questions are most felicitous in contexts where there are no biases for p or $\neg p$. Thus, their contextual appropriateness conditions are more similar to English interrogative questions with non-preposed negation than to English interrogative questions with preposed negation or negative declaratives. Thus, *razve* changes the bias profile of a negative question, as we had hypothesized, but it seems to do that only to a degree.

Regarding the high acceptability of bare questions in biased contexts, our results suggest that a negative question *per se* – independently of the presence of *razve* – is indeed a more complex and thus a more marked form than a positive question, and a marked form is likely to be interpreted as signalling a marked meaning, for instance a particular bias. Our results suggest that the additional presence of *razve* is not strictly necessary to mark a bias, although it is preferred. Furthermore, our results clearly suggest that the correlation of bias signalling and preposing is language-specific: In Russian there is no preposing. Note, however, that even English or German negative questions presented out of context

can be understood as being biased independently of the position of the negation (cf. Romero & Han 2004). Future research, especially corpus investigations must show in what contexts bare negative questions in Russian are predominantly used and in how far these contexts come with biases.

Regarding the results for the acceptability of bare questions in unbiased list contexts, we found that they are highly felicitous, as expected. Interestingly, though, they are not actually judged to be “perfectly” acceptable in the unbiased contexts: only 82 percent received the highest or the second highest scale point (7: 63%; 6: 19%). This contrasts with the bare positive questions in the fillers, 93% percent of which received the highest scale points (7: 75%; 6: 18%). One reason for this finding might be that, as mentioned above, making lists of actions that have not been carried out is, arguably, an unusual activity. A straightforward alternative to making such a list is making a to-do list. It may also be the case, of course, that our experimental manipulation did not make the negative list idea sufficiently prominent for the participants, so that there was room for a biased interpretation of the context. This latter aspect might also be responsible for the fairly high contextual acceptability of *razve*-questions in the unbiased contexts. Another aspect that might contribute to explaining this finding is that participants may always interpret *razve*-questions as biased and assume that the speaker will have had a reason to express the bias – due to previous beliefs that are not mentioned in the scene-setting passage but that might be present in the larger conversation. Participants might thus just enrich the context as they see fit.

5 Experiment 2: *Razve* vs. *neuželi*

In Experiment 2, we explored the idea that questions with the particles *razve* and *neuželi* have the same bias profile but signal different concerns of the question, as discussed in Section 3. Specifically, we investigated the source and presumed strength of the biases, which by hypothesis impact the extent of the conflict between the biases as experienced by the speaker, and his/her psychological state (emotional attitude). In Experiment 1, the source for the epistemic bias for p in *razve*-questions was left unspecific: Katja in (13) just thought that something was the case, and in other experimental items assumptions, beliefs etc. were mentioned. The source for the evidential bias was an utterance by Dima, which suggested that there might be evidence for $\neg p$. Thus both biases had rather weak sources and were based on indirect signs rather than direct observation. There was no indication of a major conflict experienced by the person asking the ques-

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tion, Katja. In Experiment 2, we manipulated the above-mentioned ingredients of question concern for *razve* vs. *neuželi*-questions.

On the basis of our considerations in Section 3, we hypothesized that *razve*-questions are *checking questions*, and that *neuželi*-questions are *disbelieving questions* (also see Section 3.3). Table 7 summarizes how we implemented these hypotheses by manipulating various parameters in the scene-setting passage.

Table 7: Meaning contributions of *razve* and *neuželi* in terms of bias source, speaker attitude, and ensuing conflict between speaker preference and likely true state of affairs as assessed by the speaker.

	<i>razve</i> checking question	<i>neuželi</i> disbelieving question
conflict between speaker preference and likely true state of affairs	weak	strong
epistemic bias for p	based on one piece of direct evidence in one previous situation	based on a general belief that builds on experience gathered in many previous situations
evidential bias for $\neg p$	based on one piece of indirect but plausible evidence	based on one piece of fairly unequivocal evidence
psychological state (speaker attitude)	doubt, uncertainty	irritation, puzzlement, disbelief

For *razve*-questions, i.e. checking questions, we assumed that the (psychological) conflict experienced by the speaker is weak (similar to Experiment 1). The source of the epistemic bias is the speaker's previous observation of a single piece of direct evidence for p . The evidential bias for $\neg p$ is indirect but potentially plausible. Due to this constellation, the speaker has doubts s/he wishes to dispel. For *neuželi*-questions, i.e. disbelieving questions, we assumed that the (psychological) conflict the speaker experiences is strong. The epistemic bias for p stems from a rather firmly held belief that has developed from multiple previous observations, i.e. from general experience in the past. Recall from Section 3 that we do not follow Baranov's (1986) suggestion that assumptions which are not based

on direct observation can only provide weak support for epistemic bias. Rather, we think that firm beliefs can be built on the basis of common experience and reasoning about what the world is like in general. This will then have consequences for the speaker's beliefs about individual situations. The source of the evidential bias for *neuželi*-questions is unequivocal, more or less direct evidence in the contextual situation. The speaker is puzzled or irritated because s/he has a preference for keeping the original belief which in view of the evidence seems difficult.

5.1 Method

Like in Experiment 1, participants in Experiment 2 read short scenarios, consisting of a scene-setting passage leading up to a conversation starting with a question. Experiment 2 had a 2×2 design with the factors BIAS CONTEXT (or question type): *checking question context* vs. *disbelieving question context*, and PARTICLE (*razve* vs. *neuželi*). An example is given in (14).

- (14) In the village where Dima and Katja live, there is a very old oak tree that is to be cut down. Dima and Katja have organised a citizen's committee and are opposing the cutting down of the tree. Julja, their friend and an environmental activist, helps them prepare leaflets. This afternoon, Dima spoke to Julja and found out that she has already written the text for the leaflets. After lunch, Dima is talking with Katja.

Checking question context: Katja saw Julja put some text on Petja's desk. She thought it was a ready-made text for the leaflets, but now she has doubts as Dima has just told her that he wanted to offer Julja help. To dispel her doubts, Katja asks:

Disbelieving question context: Julja is usually very quick with her tasks, so Katja was sure that the text for the leaflets was ready a long time ago, and today she agreed with her friends to hang them up. But when she heard from Dima that he wanted to offer Julja help with preparing the leaflets, she was puzzled and asked:

Katja: Razve / Neuželi Julja ešče ne napisala tekst dlja listovok?
PART Julja yet not wrote text for leaflets
‘Has Julja really not written the text for the leaflets yet?’

The experiment contained 24 lexicalizations in four conditions. As in Experiment 1, the actual state of affairs was balanced across the lexicalizations, and

there were 24 filler lexicalizations in four types, all of which contained the PPI *uže* ‘already’. Three of the filler types were the same as in Experiment 1: OPP.*razve-uže.NEG*, OPP.*razve-uže.POS* and NOBIAS.*uže.POS*. The fourth type, containing *neuželi*, had the same bias context as the experimental conditions but *neuželi* occurred in a negative question with *uže* (*neuželi-uže.NEG*). The filler types OPP.*razve-uže.NEG* and *neuželi-uže.NEG* were expected to be unacceptable: the first one because the bias is inappropriate (replication of Experiment 1), the second one because according to our deliberations in Section 3.2 *neuželi* seems to be incompatible with *uže* in negative questions unless *uže* scopes over the negation, which was not a plausible reading in these filler items.

The 48 lexicalizations were distributed over four lists in a Latin square design so that each list contained 24 experimental and 24 filler items. In addition, there were two practice items on each list.

The task of the participants was the same as in Experiment 1. Experiment 2 was also run as a web experiment on *soscisurvey.de*. 35 participants (26 female, 9 male; mean age: 34.7; age range: 18–56) with Russian as their native language were recruited via *prolific.com*. Before taking part in the experiment, participants gave informed consent. They were paid for participation.

5.2 Results

The data from three participants were excluded from the statistical analysis based on our exclusion criteria. This left the data from 32 participants for analysis. Four individual experimental items had to be excluded because there was a text error, which was detected and reported to us by one participant early on and subsequently corrected. This left 764 experimental items for the analysis.

As in Experiment 1, the statistical analysis was conducted by fitting a cumulative link mixed model for ordinal data (R package *ordinal*, Christensen 2019). **BIAS CONTEXT** and **PARTICLE** were fixed factors. They were sum-coded. Participant and lexicalization were random factors. The final, maximal model contained random intercepts and slopes for the experimental factors and their interaction.

Figure 3 shows the results for the experimental conditions in terms of proportions of rating levels. The median for all target questions was 7. Table 8 shows the model estimates for the effects of the two experimental factors. There was a main effect of **BIAS CONTEXT**, and a marginal interaction of **BIAS CONTEXT** and **PARTICLE**. Overall, the questions were judged to be more suitable in the disbelieving question contexts. To explore the effect of **BIAS CONTEXT** for the two particles separately, we resolved the interaction by subsetting the data by **PARTICLE**.

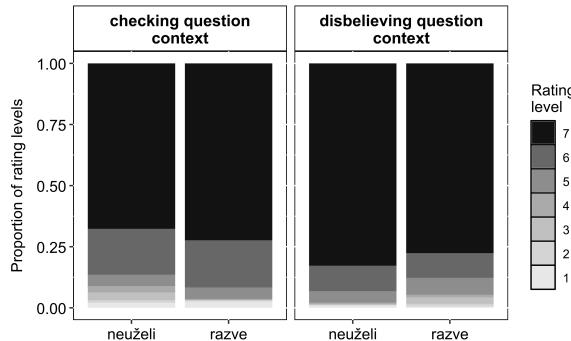


Figure 3: Proportion of rating levels for the experimental conditions in Experiment 2.

The analysis revealed that the effect was only significant for the questions with *neuželi* ($b = 0.65$, $SE = 0.15$, $z = 4.23$, $p < 0.001$ (model with intercepts only)).

Table 8: Model estimates for the experimental factors in Experiment 2.

	estimate	SE	z-value	p-value
BIAS CONTEXT	0.50	0.20	2.58	<0.01**
PARTICLE	-0.24	0.21	-1.13	0.260
BIAS CONTEXT × PARTICLE	-0.35	0.19	-1.84	0.066

As in Experiment 1, we explored the influence of (the balancing factor of) the state of affairs on the judgements of the participants. The questions were judged as slightly less suitable when the action at issue had been carried out. There was no interaction with the experimental conditions.

The results for the fillers are given in Figure 4. These replicate the findings of Experiment 1 for the three left-most filler types in the figure (medians 7, 7 and 2, from left to right). The new filler type, on the right, received low acceptability ratings, as predicted (median = 2).

5.3 Discussion

The results of Experiment 2 indicate that our manipulation of the context with respect to the source and strength of the biases as well as of the psychological state

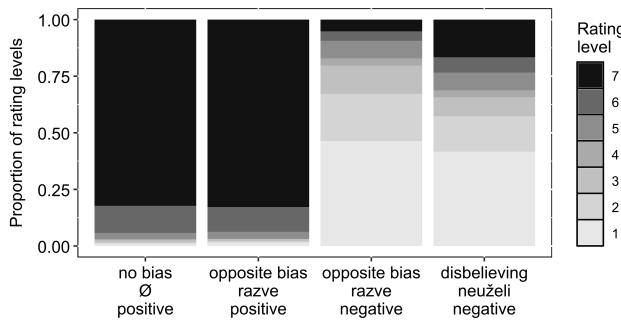


Figure 4: Proportion of rating levels for the filler types in Experiment 2.

of the speaker produced small effects on the acceptability of the questions under investigation. For *neuželi*-questions we found that they are more acceptable in contexts where the question concern includes expressing disbelief of the contextual evidence than in contexts where the question concern includes double-checking the evidential bias and dispelling doubt that has come up in view of the contextual evidence. This finding supports our hypothesis concerning *neuželi*-questions, but we note that the difference between the context types is small. It is clearly not the case that *neuželi*-questions are unacceptable in checking question contexts. As a matter of fact, 86.5 percent of the *neuželi*-questions received a median corresponding to one of the two highest scale points (7: 67.7%; 6: 18.6%) in these contexts, in comparison to 93 percent in disbelieving question contexts (median of 7: 82.8%; 6: 10.4%). We take this to mean that *neuželi*-questions are acceptable in both contexts with a slight preference for our rendering of disbelieving question contexts. For *razve*-questions we found no effect. These questions were highly acceptable in both contexts: 92 percent of the *razve*-questions received a very high median in the checking-question context (7: 72.4%; 6: 19.3%), and 88 percent in the disbelieving question context (7: 77.7%; 6: 10.1%). It is clear that the judgements for *razve*-questions in our rendering of disbelieving question contexts are far away from any kind of contextual inappropriateness.

Overall, our results suggest that the manipulation of the question concern that we applied makes some difference but only a small one. There might be several reasons for this. It is possible that the conflict between the speaker's original belief and the apparent state of affairs in the disbelieving question context was not strong enough to make *razve* inappropriate. Similarly, the doubt described

in the checking question context still allowed an accommodation of an irritated or indignant psychological state of the speaker. We assume that the participants in the experiment, being cooperative language users, applied an accommodation strategy and enriched the context situation in order for the respective particle to match the context. This assumption needs to be tested in future research with different research methodologies, such as a forced choice experiment (choice: *razve* vs. *neuželi*) mimicking production. Importantly, our conceptual deviation from Baranov's (1986) claim that reasoning does not create strong beliefs cannot be responsible for the results because we still applied the difference between direct observation vs. reasoning that Baranov identified as crucial for the choice between *razve* vs. *neuželi* in the creation of the experimental conditions.

Briefly turning to our proposal regarding the restriction of *neuželi*-questions to inner negation readings (Section 3.2), recall that we double-checked this in the fillers with *neuželi*-questions containing *uže* in our usual biased context. As expected, these questions were judged to be unacceptable. We suggest that the reason is indeed the presence of *uže* because – as we just saw – the same type of question with *ešče* is highly acceptable. This finding supports our proposal that *neuželi*-questions cannot contain outer negation – which would be compatible with the PPI *uže*. *Neuželi*-questions can only contain inner negation: They express disbelief in the truth of a negative proposition, the evidence that $\neg p$.

6 General discussion

Overall, our investigation has shown that negative questions without a particle, with the particle *razve* and with the particle *neuželi* are all felicitous in contexts supporting an evidential bias for the proposition denoted by the prejacent of the question, $\neg p$, and an epistemic bias for the complement of that proposition, p . However, they differ in the degree of felicity.

Bare negative questions are most acceptable in contexts without such a bias, that is in negative list contexts. The particle *neuželi* seems to be most acceptable if the conflict between epistemic and evidential bias experienced by the speaker is strong rather than weak, and if the speaker does not want to accept what the evidence suggests. So *neuželi* is particularly well-suited to mark a disbelieving question, and it is better suited to mark a disbelieving than a checking question. Furthermore, on the basis of our qualitative corpus investigation, on the basis of the Russian versions of *too/either*-questions (12–13), and on the basis of the experimental results for the fillers, we argued that *neuželi* cannot occur in questions with outer negation, even in a context supporting the bias and question concern

that by hypothesis are appropriate for an outer negation reading. In sum, we thus suggest that the concern of a *neuželi*-question is about the evidence in the situation: this is what is “disbelieved”. The concern of the question is to find out whether the evidence can be believed, because it is unexpected and because of the speaker’s desire to keep his/her original belief (epistemic bias). For *razve* we did not find differences in the felicity between disbelieving and checking questions. The concern of a *razve*-question is just to dispel doubt. To achieve that, it can either double-check the evidential bias (inner negation reading) or the epistemic bias (outer negation reading).

In view of the small differences in our experimental results, it is important to highlight that *double-checking* evidence and *signaling disbelief* in evidence eventually are very similar question concerns. Thus, in the end it is not surprising that *razve* vs. *neuželi*-questions are similarly appropriate in the same contexts. We mentioned this issue in several places before: readers may accommodate subtle shades of meaning. Note that this also holds for the fairly high felicity of bare negative questions in biased contexts, which we addressed in our discussion of Experiment 1. The mere presence of a negation might trigger an interpretation of a question as signaling some bias, which readers may do by accommodating richer contexts. This issue is an interesting methodological challenge for experimental investigations of contextual felicity, which must be addressed in future research.

In the remainder of this section, we will address the difference between *razve* and *neuželi* in their (in)ability to double-check the epistemic bias. This difference is interesting for theories of inner and outer negation. We will put forth a theoretical proposal that accounts for the difference but for space reasons will not discuss other theories on question bias and question concern.⁸ Our proposal builds on accounts of biased questions which assume that such questions contain conversational epistemic operators (Romero & Han 2004, Repp 2006, 2009, 2013, Romero 2015). Romero & Han (2004) suggest that preposed negation obligatorily introduces a conversational epistemic operator VERUM (based on Höhle 1988, 1992), which expresses that the speaker is sure that the proposition in its scope should be added to the common ground. A question with VERUM thus asks whether or not the speaker is sure that a given proposition should be added to the common ground. VERUM interacts scopally with the negation operator, see (15). VERUM may scope under negation (15a), which produces an outer negation reading: the question asks whether the positive proposition in the scope of VERUM should not

⁸Checking question and disbelieving questions of sorts have been discussed under the labels *confirmative* and *incredulous* questions (e.g. Jeong 2018, Rudin 2018, Goodhue 2021).

be added to the common ground. VERUM may also scope over the negation (15b), which produces an inner negation reading: the question asks whether the negative proposition in the scope of VERUM should be added to the common ground. Regarding non-preposed negation, Romero & Han suggest that biased readings are possible – as we mentioned earlier –, thus, we assume that preposing is not required to signal the presence of VERUM.

- (15) a. Outer negation reading

$$[Q [neg \text{VERUM} [p]]] = \{\text{neg FOR-SURE-ADD } p, \neg \text{neg FOR-SURE-ADD } p\}$$

- b. Inner negation reading

$$[Q [\text{VERUM} [neg p]]] = \{\text{FOR-SURE-ADD neg } p, \neg \text{FOR-SURE-ADD neg } p\}$$

Repp (2006, 2009) discusses some difficulties of Romero & Han's VERUM account for outer negation readings and suggests that outer negation is better analysed as involving a kind of negative counterpart of VERUM, namely FALSUM. FALSUM expresses that the speaker is sure that the proposition in its scope should not be added to the common ground (also see Romero 2015). FALSUM is denoted by the negation marker in an outer negation question. It thus scopes over a positive proposition (unless there are several negation markers). For inner negation, Repp keeps Romero & Han's VERUM analysis. VERUM and FALSUM, being illocutionary operators, always scope over all propositional operators. (16) shows the difference between the two negation readings in Repp's account. Note that the occurrence of PPIs in outer negation questions, and of NPIs in inner negation questions is predicted by both accounts because only in the latter is there propositional negation.

- (16) a. Outer negation reading: $[Q [\text{FALSUM} [p]]]$

- b. Inner negation reading: $[Q [\text{VERUM} [neg p]]]$

We propose that this account can be applied to Russian. As for English, we assume that it is not necessary to have preposed negation in a question with VERUM or FALSUM, which is an option that is not available in Russian anyway due to the syntax of negation in this language. We assume that the mere presence of a negative marker is sufficient to signal the presence of VERUM or FALSUM. However, recall from Experiment 1 that even though bare negative questions are fairly felicitous in biased contexts, they are less felicitous than *razve*-questions. This observation can be explained if we assume that when choosing between question forms the speaker will choose the better (or best) option. This better option would be a *razve*-question. To explain why this might be the case, we turn to the meaning contributions of *razve* and *neuželi*.

Recall that both particles can roughly be translated as ‘really’. Romero & Han (2004) observe that English *really* is only compatible with inner negation. They show this for non-preposed negation and polarity-sensitive additive particles, see (17a) and (18a). Romero & Han suggest that *really* is an instantiation of the conversational epistemic operator VERUM. If we assume with Repp (2006, 2009, 2013) that outer negation is FALSUM, the fixed scope relation *really* > *negation* (inner negation) is predicted because FALSUM and VERUM cannot occur in the same utterance: their illocutionary meaning contributions conflict, see (17b) vs. (18b).

- | | | |
|------|--|--------------------------------|
| (17) | a. * Is Jane really not coming too? | <i>outer negation intended</i> |
| | b. * [Q [VERUM FALSUM <i>Jane is coming</i>]] | |
| (18) | a. Is Jane really not coming either? | <i>inner negation</i> |
| | b. [Q [VERUM <i>Jane is not coming</i>]] | |

Turning to Russian, our data suggest that *neuželi* is similar to *really*, whereas *razve* is not. Let us therefore assume that *neuželi* is an instantiation of VERUM, which scopes over a negative proposition if it occurs in a negative question. This gives us the restriction to the inner negation reading of *neuželi*-questions because outer negation corresponds to FALSUM, which is incompatible with VERUM. Importantly, in *neuželi*-questions with *uže*, which are infelicitous unless *uže* scopes over the negation, *uže* can scope under VERUM and still scope over the negation, which gives us the scope relations that we observed for such questions in Section 3:

- (19) Negative question with *neuželi* (and *uže*): *inner negation*
 [Q [VERUM (*uže*) neg *p*]]

Turning to *razve*, which can occur both in outer and in inner negation questions, we assume that it does not denote VERUM because, as we just said, questions with outer negation would contain VERUM and FALSUM, which is ill-formed from an illocutionary point of view. We propose that *razve* is not an illocutionary operator but a semantic epistemic operator that is compatible with FALSUM and with VERUM. Either illocutionary operator may occur in a *razve*-question and scope over *razve*, and – if applicable – over propositional negation.

- | | | |
|------|-------------------------------------|-----------------------|
| (20) | Negative question with <i>razve</i> | |
| a. | [Q [FALSUM <i>razve p</i>]] | <i>outer negation</i> |
| b. | [Q [VERUM <i>razve neg p</i>]] | <i>inner negation</i> |

An interesting question arising here is how the presence of VERUM/FALSUM is marked in negative *razve*-questions if *razve* does not express VERUM. The answer is: essentially in the same way as in bare negative questions. As already mentioned, we assume that the presence of negation opens up the possibility that the question contains an illocutionary operator – as is also the case in English. Furthermore, as also already mentioned, choosing a negation vs. no negation in a question must be motivated because the choice involves a more complex form. Marking the presence of VERUM/FALSUM would be one such motivation. However, given that bare negative questions in Russian and negative questions with non-preposed negation in English are not restricted to biased contexts and can also be used in unbiased negative list contexts, we must assume that adding additional markers or cues to the question helps the identification of VERUM/FALSUM (cf. Grosz 2012 for the use of particles or intonation as (cumulative) *cues* to identify speech acts). Such markers/cues most likely are language-dependent and may also involve prosody (cf. Arnhold et al. 2021). For Russian we assume that *razve* is such a cue.⁹ This assumption accounts for our finding that negative *razve*-questions are more felicitous in biased contexts than bare negative questions are, and also that bare negative questions are not unacceptable in such contexts.

Finally, note that our assumptions carry over to positive *razve* and *neuželi*-questions. In a positive *neuželi*-question, the particle expresses VERUM. In a positive *razve*-question, the particle is a cue signaling the presence of VERUM, most likely in combination with other cues such as intonation.

In future work, the choice between different question forms with or without different kinds of markers/cues and syntactic forms needs to be addressed in a comprehensive, systematic theoretical investigation. There are suggestions in the literature addressing the choice issue for various question types in various languages (e.g. Gunlogson 2008 or Trinh 2014 for bare declarative and interrogative questions in English; Seeliger 2019 for rejecting, bare declarative and interrogative questions in Swedish and German, etc.). Before we embark on such an endeavor for Russian and with regard to our concrete proposal for the role of illocutionary operators in questions, more empirical work is needed because Russian has more particles – or cues – that contribute to the marking of question

⁹We are leaving the precise semantics of *razve* for future research. The particle can also occur together with the complementizer *čto* ‘that’ or with the particle *tol'ko* ‘only’ expressing the meaning *except that*, which *prima facie* seems to be a rather different meaning. Zalizniak (2020) proposes that *razve* used to have an exclusion meaning which predates the question particle meaning, and suggests a diachronic development of *razve* from expressing the exclusion of an object to expressing the exclusion of a(n alternative) situation, finally taking on the meaning of the question particle as we have sketched it here.

bias and question concern. Furthermore, as we suggested earlier, the application of different experimental methodologies will be helpful in identifying the subtle shades of meaning that each of these cues contributes.

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Chapter 5

Bias in tag questions

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We study various kinds of reverse-polarity tag questions in English, arguing that the speaker biases that such questions convey differ across three dimensions: optionality, strength, and polarity. We propose that the bias profile in each case primarily depends on the shape of the tag, while pointing at the central role of polarity focus and answer salience in generating these biases.

1 Introduction

Tag questions are composed of two elements: a *declarative anchor* and a *tag*. While such questions require a response from the addressee, they also seem to convey some prior belief on the part of the speaker as to what the true answer is. Specifically, they seem to convey a belief or bias on the part of the speaker that the proposition expressed by the anchor is true.¹ For example, (1–3) suggest that it is indeed raining.

¹Henceforth, when we talk about a question conveying ‘bias’, we are referring to this speaker-oriented type of belief (i.e., ‘epistemic bias’ or ‘original bias’). Other kinds of question bias that have been discussed in the literature include ‘contextual bias’, or bias that has to do with evidence available in the context (Büring & Gunlogson 2000, Romero & Han 2004, Sudo 2013, Northrup 2014, Domaneschi et al. 2017), as well as ‘answer bias’, or bias about which answer the addressee is going to provide (cf. Krifka 2015, Malamud & Stephenson 2015, AnderBois 2019). While we have some ideas about how these biases could ultimately be derived from speaker bias, a proper presentation and exploration of these ideas goes beyond the scope of this paper.



- (1) It's raining, isn't it?
- (2) It's raining, right?
- (3) It's raining, eh?

While, as (1–3) show, there are a variety of forms the tags can take, we will be focusing here on questions with final rising boundary tones and so-called *reverse-polarity tags*, like (1). These are questions with a syntactically interrogative tag that is of the opposite polarity to its declarative anchor. We will refer to the variants with negative tags as *negative-tag questions* and the variants with positive tags as *positive-tag questions*.²

As noted in Ladd (1981), reverse-polarity tag questions have been associated with two kinds of intonation patterns: *nuclear* and *post-nuclear*. The nuclear intonation pattern involves a short pause after the anchor and a separate pitch accent on the tag. We will signal this intonation contour by placing a ‘||’ between the anchor and the tag, and by capitalizing the auxiliary verb in the tag, as shown in (4). In contrast, the post-nuclear intonation pattern involves no clear pause after the anchor and no separate pitch accent on the tag, with the pitch contour on the tag merely being a continuation of the contour of the anchor. This pitch accent will be signalled by placing a ‘=’ between the anchor and the tag, as shown in (5).³

- | | |
|---|----------------|
| (4) You don't believe in Santa Claus DO you? | (nuclear) |
| (5) You don't believe in Santa Claus = do you? | (post-nuclear) |

As presented in Table 1, these two axes of variation (tag polarity and intonation pattern) generate four distinct kinds of tag questions, all of which we will be exploring in the current paper.

For each of the tag questions in Table 1, we have two goals. The first is to identify the bias profile associated with it. The second is to propose an analysis that derives this profile. We claim that the bias profiles for each of these questions are composed of three elements: polarity (positive vs. negative), strength (weak vs. strong), and optionality (optional vs. obligatory). We will now present each of these elements in turn, including examples of their different settings. In doing so,

²For recent discussions regarding how falling boundary tones and/or matching-polarity tags affect the meaning conveyed by tag questions, see Reese & Asher (2009), Malamud & Stephenson (2015), and Krifka (2015).

³From a more theoretical point of view (Selkirk 2005), these two prosodic patterns reflect the fact that nuclear tags form their own IntP, while post-nuclear tags are included in the IntP associated with the anchor.

Table 1: Typology of tag questions.

	positive-tag	negative-tag
post-nuclear	<i>Timmy can't swim = can he?</i>	<i>Timmy can swim = can't he?</i>
nuclear	<i>Timmy can't swim // CAN he?</i>	<i>Timmy can swim // CAN'T he?</i>

we will also present the diagnostic tests that we will use throughout this paper to identify the bias profiles of our targeted tag questions.

We start with bias polarity, which has two possible settings: positive and negative. In this paper, we will not be using any special diagnostics to determine the polarity of the bias associated with our targeted tag questions. This is because the bias polarity is intuitively clear and uncontroversial, and moreover this polarity is revealed by one of our diagnostic tests for bias strength (outlined below). Notice also that, as shown in (6) and (7), the bias inference has a polarity that matches the polarity of the anchor and is the opposite of the tag's polarity.

- (6) You like pasta, don't you? (positive bias)
⇒ The speaker believes that you like pasta.
- (7) You don't like pasta, do you? (negative bias)
⇒ The speaker doubts that you like pasta.

Now for bias strength, which we claim can be *weak* or *strong*. We will use two novel diagnostic tests to determine the strength of the bias; we call these the Follow-up Test and the Weighted Coin Test. In the Follow-up Test, a question is followed up with an epistemic statement which ostensibly reports the strength of the bias conveyed by the original question. Infelicity is expected to be generated when there is a mismatch between the strength of the bias conveyed by the question and the strength of the epistemic follow-up expression. For example, the question in (8) is felicitous when combined with a weak epistemic expression like *suspect* but less felicitous when combined with a strong epistemic expression like *be sure*.⁴ The pattern presented in (9) is the opposite. This indicates that post-nuclear negative-tag questions convey a weak bias, whereas nuclear negative-tag questions convey a strong bias.⁵ Here and below, in paired examples we will use

⁴We chose *suspect* and *be sure* because these expressions are commonly used in English and because they clearly differ in modal strength. More generally, we hypothesize that epistemic expressions of similar strengths give rise to similar judgments.

⁵Notice that (8b) and (9a) are unacceptable for two different reasons. (8b) is bad because it overstates the bias of the tag question, a Quality violation, while (9a) is bad because it understates that bias, a Quantity violation. The same applies to the Weighted Coin Test, discussed below.

‘#’ to mark a contrast in acceptability, without committing to how strong the claimed contrast is.

- (8) This is your book = isn’t it? That is to say, ... (weak bias)
- I suspected it was.
 - #I was sure it was.
- (9) This is your book || ISN’T it? That is to say, ... (strong bias)
- #I suspected it was.
 - I was sure it was.

Our second diagnostic for bias strength is the Weighted Coin Test. This test involves a context with a coin that is weighted to land on heads/tails to some degree. The degree of this weighting dictates the strength of the prior belief, which is expected to match the strength of the bias conveyed by the question. When there is a mismatch between the strength of that prior belief (dictated by the weighting of the coin) and the strength of the question bias, we expect the question to be infelicitous. In contrast, when there is a match between these two elements, the question should be felicitous. For example, the post-nuclear negative-tag question in (10a) is felicitous only when combined with the weaker prior belief (i.e., a more weakly weighted coin), indicating that this question conveys a weak bias. In contrast, the nuclear negative-tag question in (10b) is more felicitous when combined with the stronger prior belief (i.e., a more strongly weighted coin), indicating a strong bias.

- (10) Mary and John are playing with a coin that they both know is designed so that it lands on tails $N\%$ of the time. Mary tosses the coin and it lands on the other side of John’s legs, such that only John can see the result. John looks confused, causing Mary to say:
- 70% / #99%: It landed on tails = didn’t it? (weak bias)
 - #70% / 99%: It landed on tails || DIDN’T it? (strong bias)

Finally, we claim that there is also variation with regard to the optionality of the bias conveyed by a tag question, which can be optional or obligatory. To determine the optionality features, we will use the By Any Chance Test, proposed in Sadock (1971). This test is based on the observation that the discourse marker *by any chance* only combines with questions that can receive a neutral interpretation, or questions for which any associated bias was only optionally conveyed. This means that an infelicitous combination of *by any chance* and a question can

be taken as evidence that the question is obligatorily biased. For example, the felicity of the post-nuclear positive-tag question in (11) indicates that the bias it may convey is optional, while the infelicity of the post-nuclear negative-tag question in (12) indicates that the bias conveyed is obligatory.

- (11) By any chance, Julia isn't here = is she? (optional bias)
- (12) #By any chance, Julia is here = isn't she? (obligatory bias)

Our analysis of tag questions is predicated on the assumption that the bias properties of such questions primarily follow from the properties of the tag itself, as previously proposed in Romero & Han (2004). That is, we analyze tag questions as complexes consisting of a declarative and an elliptical question, where the latter conveys a bias with the very same features as would the corresponding independent non-elliptical question. This means that, for example, the post-nuclear negative-tag question in (13) and the high negation question in (14) share the same bias profile.

- (13) Julia is here = isn't she?
- (14) Isn't Julia here?

Against this general parallelism between tags and independent questions, we will show how our analysis can capture the polarity, strength, and optionality settings for each of our chosen tag questions. We will argue that the trigger of bias in tag questions is ‘polarity focus’, i.e., focus marking on some polar element, such as negation or a covert VERUM operator. Specifically, we will claim that polarity focus triggers a bias that is obligatory and weak, while the semantics of the focused operator determines the polarity feature and may further boost the strength of the bias.

In the following sections of this paper, we will present and apply the pieces of our analysis gradually, going through the following steps: (i) present a piece of our analysis, (ii) present the profile of the bias conveyed by one or more tag questions, and (iii) explain how the analytical pieces unveiled so far can account for this bias profile. Specifically, in Section 2 we present a general analysis of tag questions and show how this analysis can capture the bias profile of post-nuclear positive-tag questions. In Section 3, we provide some short background on polarity focus and show how its effects raise the salience of one of the answers and derive the bias profile of post-nuclear negative-tag questions. Section 4 introduces the phenomenon of VERUM accent and brings together all of the machinery to capture the bias properties of nuclear tag questions. Section 5 evaluates previous accounts and Section 6 is the conclusion.

2 Tag questions

We start by laying out a general analysis of question tagging and then show how our analysis can be fruitfully applied to post-nuclear positive-tag questions.

2.1 General analysis

It has been noted by many that tag questions of the form discussed here appear to be hybrid sentences. That is, they combine a declarative and a (VP-elliptical) interrogative clause in a single structure. It is for this reason that previous work dubbed them ‘queclaratives’ (Sadock 1971), ‘part statement and part question’ (Rando 1980), ‘double-barreled speech acts’ (Ladd 1981), ‘complex speech acts’ (Reese 2007), ‘speech act disjunctions’ (Krifka 2015), etc. Although the details of these characterizations and their associated analyses differ, the important point is that tag questions encode a regular proposition and a question partition, and these meanings are not further combined into a single semantic object. The core motivation for this claim seems to be that, if the two parts were to be collapsed into a single meaning, the output would either be a regular question (thus losing the bias) or a regular proposition (thus losing the interrogative force). In order to preserve both of these effects, we assume that the link between these two parts of tag questions is mediated by a covert TAG operator. What this operator does is take the anchor meaning and the tag meaning as arguments, and create out of them a complex ‘dot’ object of the form $\Diamond p \bullet Q$, where Q corresponds to the tag question and $\Diamond p$ corresponds to the anchor proposition prefixed by an epistemic possibility operator. An appropriate meaning for TAG with these properties is given in (15).⁶

$$(15) \quad [\![\text{TAG}]\!] = \lambda Q \lambda p. \Diamond p \bullet Q$$

Such metalinguistic dot operators have been previously used as separators between two aspects of meaning that are associated with the same linguistic structure (see Pustejovsky 1996; Potts 2005; Asher 2011). What we intend the dot operator to do for us is ship the (modalized version of the) anchor proposition and the tag question partition to the pragmatic component, where these are treated as engendering two separate speech acts, i.e., a modal assertion and a polar question. With this basic analysis of tag questions in place, we will now show how it can account for the bias profile of post-nuclear positive-tag questions.

⁶One plausible line is that the epistemic possibility operator introduced by TAG is contributed by the rising boundary tone on the question tag. We leave the issue of the provenance of this operator to future work.

2.2 Post-nuclear positive-tag questions

Post-nuclear positive-tag questions, like (16), are composed of a negative anchor plus a positive tag, and contain no perceivable pause after the anchor and no separate pitch accent on the tag. As with all the tag questions we will explore, its bias profile is characterized by its optionality, polarity and strength settings.

- (16) You don't eat fish = do you?

Starting with optionality, as mentioned in Section 1, we diagnose its setting with the By Any Chance Test. As shown in (17), post-nuclear positive-tag questions can be felicitously combined with the discourse marker *by any chance*, indicating the possibility of a neutral reading of this question. In other words, the bias conveyed by post-nuclear positive-tag questions is optional.

- (17) By any chance, you don't speak Romanian = do you?

Additional evidence for this neutral reading comes from Reese & Asher (2009), who point out that in a context like (18) the tag question does not convey any bias. This optionality of bias in post-nuclear positive-tag questions was also noted in Sadock (1971) and Ladd (1981).

- (18) A and B are trying to complete a task at which neither is proficient, but at which Julie is known to be.

A: We need someone who has consulted for us before.

B: Julie isn't here = is she?

While the bias conveyed by such questions is optional, we would still like to identify the features it has when it is present. As already mentioned, we will employ the same diagnostic tests to identify both the strength and the polarity settings of our targeted biases, starting with the Follow-up Test. As the contrast in (19) shows, the bias conveyed by post-nuclear positive-tag questions is negative and weak.

- (19) Mark isn't a body-builder = is he? That is to say, ...

- a. I suspected he wasn't.
- b. #I was sure he wasn't.

Our second diagnostic test for strength, the Weighted Coin Test, provides further support that the bias conveyed by post-nuclear positive-tag questions is weak. As shown in (20a), such questions are infelicitous when the speaker's prior belief that the coin would not land on tails is very high. The cause of this infelicity as

coming from the strength of the bias is confirmed by the felicity that occurs when the chance of the coin landing on heads is decreased significantly, as shown in (20b).

- (20) Mary and John are playing with a coin that they both know is designed so that it lands on tails $N\%$ of the time. Mary tosses the coin and it lands on the other side of John's legs, such that only John can see the result. John looks confused, causing Mary to say:
- 1%: #It didn't land on tails = did it?
 - 30%: It didn't land on tails = did it?

In sum, the bias profile of post-nuclear positive-tag questions is optional, negative, and weak. We will now show how this profile can be accounted for with the elements of our analysis introduced so far.

On our analysis, post-nuclear positive-tag questions are the most basic form of tag question. That is, as presented in (21), they are composed of a modalized proposition in the anchor and an elliptical positive polar question.

- (21) Mary doesn't eat fish = does she?
- $[[_{CP} \text{Mary}_i \text{ not eat fish}] [\text{TAG} [_{CP} Q \text{she}_i \text{ eat-fish}]]]$
 - $\Diamond \lambda w. \neg eat_w(mary, fish) \cdot \left\{ \begin{array}{l} \lambda w. eat_w(mary, fish), \\ \lambda w. \neg eat_w(mary, fish) \end{array} \right\}$

This analysis makes two good predictions about post-nuclear positive-tag questions. The first good prediction is that it does not say that the anchor proposition is plainly asserted. Instead, we merely predict that the *possibility* of the anchor proposition is asserted. If the anchor proposition was plainly asserted, we would create something like an illocutionary contradiction, where the speaker is both certain about the truth of the anchor proposition (by the norm of assertion) and ignorant about it (by the norm of questioning). Indeed, such a sequence of discourse moves would not be felicitous under normal circumstances (cf. *#Mary doesn't eat fish. Does she eat fish?*).

The second good prediction our analysis makes is that post-nuclear positive-tag questions need not convey any bias. This is because the anchor merely asserts the possibility of the relevant proposition, a very weak statement. Moreover, we analyze the tag as an (elliptical) positive polar question, which is the canonical non-biased polar question form. Since post-nuclear positive-tag questions present a combination of a (negative) possibility and a plain positive polar question, it is unsurprising that such questions need not convey a bias at all. That

said, the fact that the negated proposition in the anchor is presented as a possibility may suggest that the speaker is slightly biased in this direction. But because this kind of pragmatic triggering is not directly linked to the semantic properties of the tag, the bias is cancelable.

In sum, our general analysis of tag questions presented here straightforwardly captures the bias profile (optional, negative, weak) of post-nuclear positive-tag questions.

3 Polarity focus

Another crucial piece of our analysis is ‘polarity focus’, or focus applied to a polar element. Therefore, we will start by providing a short background on focus as a general phenomenon, followed by a discussion of its effect when applied to polar elements, especially in post-nuclear negative-tag questions.

3.1 Background on focus interpretation

A prominent theory of focus, known as ‘alternative semantics’, models focus as a feature F that marks syntactic constituents and generates relevant alternatives (Rooth 1985, 1992, 1997; see also Jackendoff 1972, Hamblin 1973, Kratzer 1991, Selkirk 1995, Schwarzschild 1999, Beaver & Clark 2008, Büring 2019; a.o.). According to this theory, each linguistic expression has two semantic values: ‘ordinary’ and ‘focus’. The ordinary semantic value of an expression α is rendered as $\llbracket \alpha \rrbracket^o$ and corresponds to its usual denotation. The focus semantic value of α is rendered as $\llbracket \alpha \rrbracket^f$ and is always a set, although the nature of its content depends on whether the expression is F -marked or not. When α is not F -marked, its focus value is the singleton set comprised of the ordinary value of α . In contrast, when α is F -marked, its focus value is the set comprised of all alternative objects that are of the same semantic type as the ordinary value of α . When it comes to complex expressions, the focus semantic value is derived compositionally from the focus values of the immediate constituents, and so focus alternatives project up the tree. Formally, this process is generated via the recursive procedure shown in (22–23).

- (22) a. *Non-focused lexical items*

$$\llbracket \alpha \rrbracket^f = \{ \llbracket \alpha \rrbracket^o \}$$
- b. *Focused expressions (lexical or complex)*

$$\llbracket \alpha_F \rrbracket^f = \{ x \in D_\tau \mid \llbracket \alpha \rrbracket^o \in D_\tau \}$$

(23) *Pointwise Function Application*

If $\llbracket \alpha \rrbracket^o \in D_{\sigma \rightarrow \tau}$ and $\llbracket \beta \rrbracket^o \in D_\sigma$, then

$$\llbracket \alpha \beta \rrbracket^f = \llbracket \beta \alpha \rrbracket^f = \{ x(y) \in D_\tau \mid x \in \llbracket \alpha \rrbracket^f \text{ and } y \in \llbracket \beta \rrbracket^f \}.$$

Consider the sentence in (24) as an example. (23) and (22a) tell us that the focus semantic value of the predicate *drinks beer* is the singleton set {drinks beer}. In turn, (22b) tells us that the focus semantic value of $Mary_F$ is the set comprised of all individuals in the domain, e.g. {Mary, Jane, Susan}. Combining the two focus values via the compositional rule in (23), we obtain the entire range of alternatives, i.e. {Mary drinks beer, Jane drinks beer, Susan drinks beer}. This is formalized in (24).⁷

(24) MARY drinks beer.

- a. $[\text{TP } Mary_F \text{ [VP drink beer]}]_\phi$
- b. $\llbracket \phi \rrbracket^o = \lambda w. drink_w(mary, beer)$

$$\llbracket \phi \rrbracket^f = \left\{ \begin{array}{l} \lambda w. drink_w(mary, beer), \\ \lambda w. drink_w(jane, beer), \\ \lambda w. drink_w(susan, beer) \end{array} \right\}$$

The *F*-feature was traditionally thought to lump together two distinct functions of focus, i.e., new information or contrast. However, there is mounting evidence that focus proper is always contrastive and that the new/given information marking is due to an independent discourse strategy (Kratzer 2004, Féry & Samek-Lodovici 2006, Selkirk 2008, Katz & Selkirk 2011, Beaver & Velleman 2011, Rochemont 2013, Büring 2019, Kratzer & Selkirk 2020, Goodhue 2022). We will adopt this view without discussion and, from here on out, always view focus as signaling a contrast.

Focus marks a phrase whose referent is juxtaposed with the referent of a similar phrase. For example, in (25a), *Mary* is contrasted with *Jane* and the sentence is felicitous, while in (25b) *beer* finds no appropriate contrasting phrase and so the sentence is odd.

- (25) a. Jane drinks beer and MARY drinks beer (too).
 b. #Jane drinks beer and Mary drinks BEER (too).

More formally, in order for a contrast to be felicitous, there must be an antecedent that is among the focus alternatives of the focus domain but is different from the

⁷Note that *beer* and other non-human objects seem, at least in this example, to be excluded from the focus value of *Mary*. We could capture this by imposing plausibility restrictions on focus alternatives, thus excluding alternatives like *beer drinks beer*.

ordinary meaning of that domain. This relationship is outlined in (26), where C is the antecedent and the presuppositional ‘squiggle’ operator \sim marks the focus domain ϕ .

- (26) *Contrasting elements* (cf. Rooth 1992: 90)
 $\phi \sim C$ is felicitous only if $C \in [\phi]^f$ and $C \neq [\phi]^o$.

Applied to the second conjunct in (25a), an appropriate antecedent is presented in (27). This antecedent is a member of the focus value of the second conjunct and also differs from its ordinary value, as shown in (28). The constraint in (26) then correctly predicts that (25a) is felicitous. However, the second conjunct (25b) is expected to be out, as can be seen in (29). In this latter case, the first condition in (26) is violated. That is, (27) is not a member of (29)’s focus value.

- (27) $C = [\text{Jane drinks beer}]^o = \lambda w. drink_w(\text{jane}, \text{beer})$

- (28) MARY drinks beer.

- a. $[\text{TP Mary}_F [\text{VP drinks beer}]]_\phi \sim C$
- b. $[\phi]^o = \lambda w. drink_w(\text{mary}, \text{beer})$
 $[\phi]^f = \left\{ \begin{array}{l} \lambda w. drink_w(\text{mary}, \text{beer}), \\ \lambda w. drink_w(\text{jane}, \text{beer}), \\ \lambda w. drink_w(\text{susan}, \text{beer}) \end{array} \right\}$
- c. $C \in [\phi]^f \checkmark, C \neq [\phi]^o \checkmark$

- (29) Mary drinks BEER.

- a. $[\text{TP Mary} [\text{VP drinks beer}_F]]_\phi \sim C$
- b. $[\phi]^o = \lambda w. drink_w(\text{mary}, \text{beer})$
 $[\phi]^f = \left\{ \begin{array}{l} \lambda w. drink_w(\text{mary}, \text{beer}), \\ \lambda w. drink_w(\text{mary}, \text{wine}) \end{array} \right\}$
- c. $C \in [\phi]^f \times, C \neq [\phi]^o \checkmark$

Now that we have shown how the phenomenon of (contrastive) focus works generally, we will consider the effects of its application to polar elements.

3.2 Polarity focus, answer salience, and question bias

Just like any other phrase, focus can mark an element that conveys the polarity of a sentence, a phenomenon that is often called ‘polarity focus’.⁸ The individual items that make up the set of polar elements (the potential carriers of polarity focus) is somewhat controversial. Here we take *not* and *really* as two relatively uncontroversial choices for a negative and a positive polar element (cf. Romero & Han 2004). Other candidate positive elements include *totally*, *so*, and *definitely*.⁹ Crucially, we do not take an accented finite auxiliary to necessarily express polarity focus. In Section 4, we will argue that such forms spell out a covert VERUM operator whose interpretational effects differ from these of polarity focus. We now discuss the semantics of *not* and *really*, along similar lines to proposals put forward in Wilder (2013), Samko (2016), Goodhue (2018), and Gutzmann et al. (2020).

We should note that, as outlined in Bill & Koev (2022), there are good reasons to posit analyses of *really* and certain forms of negation (i.e., ‘high’ or ‘light’ negation), which model them as degree adverbs that are capable of modifying the degree of a speaker’s commitment to the prejacent proposition. For simplicity, we will put aside this aspect of their meaning and treat their ordinary semantics as straightforwardly conveying the polarity of the prejacent proposition.

Starting with negation, we take its ordinary semantics to denote set-theoretic complementation. Its focus semantics has a bit more going on. When *F*-marked, *not* denotes the set consisting of its ordinary value and its positive counterpart. The formal definitions are provided in (30).

- (30) a. $\llbracket \text{not}_F \rrbracket^o = \llbracket \text{not} \rrbracket^o = \lambda p. \bar{p}$
 b. $\llbracket \text{not}_F \rrbracket^f = \{\lambda p. p, \lambda p. \bar{p}\}$

As for *really*, with the simplification noted above, its ordinary meaning can be modeled simply as the identity function on propositions, rendering its plain use redundant and thus infelicitous. Following up on this reasoning, we assume

⁸The label ‘polarity focus’ is a bit of a misnomer, as it seems to infer that this is some special type of focus. In reality, it is merely run-of-the-mill focus targeted at a polar element. That is, whatever effects polarity focus is claimed to exert should be derived from the semantics of the polar element plus the general theory of focus.

⁹Notice that, in addition to their polar use, these elements also have a degree modifier use, as in *really tired*, *totally full*, or *so happy* (Romero & Han 2004, Beltrama 2018). This is why in order to block the degree modifier use we will avoid sentences with gradable predicates in them altogether. See Bill & Koev (2022) for a proposal of how these two uses can be derived from the same basic semantic content.

that *really* is inherently *F*-marked, as previously argued in Romero & Han (2004). Its focus value is the same as that of negation and denotes the positive and the negative alternative. This is spelled out in (31).

- (31) a. $\llbracket \text{really}_F \rrbracket^o = \lambda p.p$
 b. $\llbracket \text{really}_F \rrbracket^f = \{\lambda p.p, \lambda p.\bar{p}\}$

In other words, we treat *really* and *not* as polar opposites that give rise to the same set of focus alternatives.¹⁰

As outlined in (32), the focus semantic value of a declarative sentence with polarity focus amounts to the ordinary Hamblin (1973)-style denotation of the respective polar question. Such a sentence will typically be used in order to assert the positive prejacent (i.e., *Alex got married*), thus contrasting it with the negative alternative (i.e., *Alex didn't get married*).

- (32) Alex REALLY got married.
- a. $\llbracket_{\text{PolP}} \text{really}_F [\text{TP Alex got married}] \rrbracket$
 - b. $\llbracket [\text{TP Alex got married}] \rrbracket^f = \{\lambda w.\text{get.married}_w(\text{alex})\}$
 $\llbracket \text{really}_F \rrbracket^f = \{\lambda p.p, \lambda p.\bar{p}\}$
 $\llbracket_{\text{PolP}} \text{really}_F [\text{TP Alex got married}] \rrbracket^f = \left\{ \begin{array}{l} \lambda w.\text{get.married}_w(\text{alex}), \\ \lambda w.\neg\text{get.married}_w(\text{alex}) \end{array} \right\}$

What about cases where *really* occurs in a polar question, as in (33)? Assuming the analysis in (31), *really* makes no extra contribution to the ordinary semantics of this question. However, it does invoke as focus alternatives the prejacent proposition and its complement. Therefore, a polar question with *really* receives the analysis shown in (33), where the only possible focus antecedent is the negative polar alternative in (33b). Since this alternative entails (in fact, is equivalent with) the negative cell of the question partition, it naturally raises the salience of that cell. We propose that it is for this reason that the negative speaker bias is generated. Also, since this kind of raised salience indicates a mere preference on the part of the speaker, by default this bias is expected to be weak.¹¹ As for the

¹⁰This does not mean that *really* and *not* occupy the same syntactic slot or that they are in complementary distribution. As it turns out, these two elements can co-occur in the same sentence, cf. *Oliver REALLY isn't from Australia*. In such cases only *really* is obligatorily focus-marked and the utterance contrasts with the positive alternative *Oliver is from Australia*.

¹¹However, application of the Follow-up Test and the Weighted Coin Test suggests that polar questions with *really* convey a strong bias. This can be derived by proposing a more realistic semantics for *really*, according to which this operator raises the level of commitment to the prejacent proposition and thus strengthens the bias (see Bill & Koev 2022).

bias being obligatory, this follows from the fact that the utterance would be infelicitous unless, as required by (26), the felicity condition (the contrastive focus interpretation) of the squiggle operator is met.

- (33) Does Susan REALLY do weightlifting?

- a. $[\text{CP } Q \text{ [PolP really}_F \text{ [TP Susan do weightlifting]]}_\phi \sim C]$
- b. $C = \lambda w. \neg do_w(susan, weightlifting)$
- c. $\llbracket \text{PolP} \rrbracket^o = \lambda w. do_w(susan, weightlifting) = \llbracket \phi \rrbracket^o$
 $\llbracket Q \rrbracket^o = \lambda p. \{p, \bar{p}\}$
 $\llbracket \text{CP} \rrbracket^o = \left\{ \begin{array}{l} \lambda w. do_w(susan, weightlifting), \\ \lambda w. \neg do_w(susan, weightlifting) \end{array} \right\}$
- d. $\llbracket \text{TP} \rrbracket^f = \{\lambda w. do_w(susan, weightlifting)\}$
 $\llbracket \text{really}_F \rrbracket^f = \{\lambda p.p, \lambda p.\bar{p}\}$
 $\llbracket \text{PolP} \rrbracket^f = \left\{ \begin{array}{l} \lambda w. do_w(susan, weightlifting), \\ \lambda w. \neg do_w(susan, weightlifting) \end{array} \right\} = \llbracket \phi \rrbracket^f$
- e. $C \in \llbracket \phi \rrbracket^f \checkmark, C \neq \llbracket \phi \rrbracket^o \checkmark$

We propose a very similar analysis for high negation questions like (34), namely the structure in (34a). The main difference is that, in contrast with the question with *really*, focus in high negation questions is manifested by the high structural position of negation rather than by a pitch accent.¹² Following Rizzi (1997), we call this high structural position FocP.

- (34) Doesn't Laura live in Italy?

- a. $[\text{CP } Q \text{ [FocP not}_F \text{ [TP Laura live in Italy]]}_\phi \sim C]$
- b. $C = \lambda w. \neg live.in_w(laura, italy)$
- c. $\llbracket \text{FocP} \rrbracket^o = \lambda w. \neg live.in_w(laura, italy) = \llbracket \phi \rrbracket^o$
- d. $\llbracket \text{FocP} \rrbracket^f = \left\{ \begin{array}{l} \lambda w. live.in_w(laura, italy), \\ \lambda w. \neg live.in_w(laura, italy) \end{array} \right\} = \llbracket \phi \rrbracket^f$
- e. $C \in \llbracket \phi \rrbracket^f \checkmark, C \neq \llbracket \phi \rrbracket^o \checkmark$

¹²Note that when a sentence signals focus structurally, typically a pitch accent is also placed on the focused element (e.g., in cleft constructions). We argue that this does not happen with high negation questions since it would also produce a verum accent, which – as we will argue in Section 4 – conveys the presence of a VERUM operator. Therefore, signaling polarity focus structurally and without a pitch accent allows high negation questions to convey that the underlying structure contains polarity focus but not VERUM.

The derivation of the bias profile is virtually identical to that for questions with *really*, except that in this case the scope of the squiggle operator is the negative focus alternative. That is, given the nature of polarity focus as generating just two polar alternatives, the only possible antecedent that contrasts with the negative focus alternative is the positive alternative in (34b). Since this alternative entails (really, matches exactly) the positive cell of the question partition, the salience of that cell is raised and we end up with the intuition of a positive bias. And again, since this salience mechanism indicates a mere preference, the generated bias is weak. Moreover, as with questions with *really*, the bias is obligatory because of the presupposition of the squiggle operator.

In sum, polarity focus in polar questions raises the salience of one of the answers and leads to the generation of a bias that is weak (by default), obligatory, and of the opposite polarity to the focus domain. We will now show that the same line of explanation applies to tag questions, specifically to post-nuclear negative-tag questions.

3.3 Post-nuclear negative-tag questions

Post-nuclear negative-tag questions, like (35), are composed of a positive anchor and a negative tag.

- (35) You like football = don't you?

To begin, we will identify its bias profile. Starting with optionality, as shown in (36), such questions are infelicitous when combined with the *by any chance* discourse marker. This indicates that a neutral reading of this question is not possible. That is, the bias conveyed by post-nuclear negative-tag questions is obligatory.

- (36) #By any chance, you speak French = don't you?

Next, we will explore the strength and optionality settings of this bias, starting with the Follow-up Test. As shown by the felicity of the weak but not the strong epistemic follow-up in (37), the bias conveyed by post-nuclear negative-tag questions is positive and weak.

- (37) Mary is a vegan = isn't she? That is to say, ...
- I suspected she was.
 - # I was sure she was.

The Weighted Coin Test in (38) provides further support that the bias is weak. That is, as shown in (38a), such tag questions are degraded when the speaker's

prior belief that the coin would land on tails is very high. The cause of this infelicity as coming from the strength of the bias is confirmed by the increase in felicity that occurs when the chance of the coin landing on tails is decreased, as shown in (38b).

- (38) Mary and John are playing with a coin that they both know is designed so that it lands on tails $N\%$ of the time. Mary tosses the coin and it lands on the other side of John's legs, such that only John can see the result. John looks confused, causing Mary to say:
- 99%: ?It landed on tails = didn't it?
 - 70%: It landed on tails = didn't it?

In sum, the bias profile of post-nuclear negative-tag questions is obligatory, positive, and weak. We will now show how this profile can be accounted for using the elements of our analysis introduced so far.

The structure that we assume for post-nuclear negative-tag questions is presented in (39). We have our general tag question shape, here consisting of a declarative anchor and an elliptical high negation question. Recall from Section 2.2 that a tag on its own does not necessarily convey bias, as displayed by the fact that post-nuclear positive-tag questions are only optionally biased. We argue, therefore, that the obligatory nature of the bias in post-nuclear negative-tag questions is coming from the tag, an (elliptical) high negation question. And as we presented in Section 3.2, the bias associated with high negation questions is weak, positive and obligatory, exactly the same as the bias associated with post-nuclear negative-tag questions. Therefore, we propose that the bias in such questions is generated in precisely the same manner. That is, it arises because the only possible antecedent that contrasts with the negative focus alternative is the positive alternative in (39c). And since this alternative entails the positive cell of the question partition denoted by the tag, the salience of that cell is raised and we get the intuition of a positive bias. And again, this salience mechanism indicates a mere preference, so the generated bias is weak. Moreover, the fact that this focus is derived from the necessary structure of the tag means that the bias is obligatory. This is based on the same explanatory mechanism as with all high negation questions.

- (39) Phillip rides to work = doesn't he?
- $[[_{CP} \text{Phillip}_i \text{ ride to work}] [\text{TAG} [_{CP} Q [_{FocP} \text{not}_F [_{TP} \text{he}_i \text{ ride to work}]]]_\phi \sim C]]]$
 - $\Diamond \lambda w. \text{ride.to}_w(\text{phillip}, \text{work}) \cdot \left\{ \begin{array}{l} \lambda w. \text{ride.to}_w(\text{phillip}, \text{work}), \\ \lambda w. \neg \text{ride.to}_w(\text{phillip}, \text{work}) \end{array} \right\}$

- c. $C = \lambda w. ride.to_w(phillip, work)$
- d. $\llbracket \phi \rrbracket^o = \lambda w. \neg ride.to_w(phillip, work)$
- e. $\llbracket \phi \rrbracket^f = \left\{ \begin{array}{l} \lambda w. ride.to_w(phillip, work), \\ \lambda w. \neg ride.to_w(phillip, work) \end{array} \right\}$
- f. $C \in \llbracket \phi \rrbracket^f \checkmark, C \neq \llbracket \phi \rrbracket^o \checkmark$

Next, we will introduce another important element of our analysis, the VERUM operator. We will follow by an explanation of how, with this additional element, we can capture the bias conveyed by nuclear tag questions.

4 Verum

The phenomenon of ‘verum accent’ involves a pitch accent on the finite auxiliary and – in the case of a declarative sentence – has the effect of emphasizing the truth of the expressed proposition (Höhle 1992). Thus, by uttering *Oliver IS from Australia*, the speaker stresses their belief that it is indeed true that Oliver is from Australia. This section presents the core data on verum accent and our account of it, and then discusses the role of verum accent in deriving the bias profiles of nuclear tag questions.

4.1 Core data on verum accent

There are certain restrictions on the occurrence of verum accent that any account of it should capture. As Gutzmann et al. (2020) point out, verum accent is felicitous in two kinds of contexts: ‘contradictory’ and ‘affirmative’. Contradictory contexts are more common and arise when there is some dispute about whether the prejacent is true or false, as in (40).

- (40) A: Oliver is not from Australia. (contradictory context)
 B: He IS from Australia.

In turn, affirmative contexts come about when the speaker and the addressee agree on the prejacent. We note that this use typically involves ‘extreme’ adjectives, like *amazing*, *awesome*, *excellent*, etc. (Cruse 1986, Paradis 2001, Rett 2008, Morzycki 2012). An example of such a context is presented in (41).¹³

¹³In an affirmative context, verum accent is also possible with regular predicates, although the result is once again an “extreme” interpretation. For example, if *It IS raining* has been uttered as a reaction to *It's raining*, it would suggest a heavy rain and not just a light drizzle (cf. Umbach 2011 on extreme verbs).

- (41) *After a colloquium talk:* (affirmative context)
- A: Paula is an amazing linguist.
B: She IS an amazing linguist.

Crucially, a verum accent is not possible in neutral contexts, e.g., when a new issue has been raised by a neutral polar question (Wilder 2013, Samko 2016, Goodhue 2018, Gutzmann et al. 2020). This is illustrated in (42).

- (42) *Out of the blue:* (neutral context)
- A: Is it raining outside?
B: #It IS raining.

That is, in order for a verum-marked declarative to be felicitous, the issue must have already been discussed in prior discourse, as in (40–41) above.

Just like in declaratives, when a verum accent features in polar interrogatives, we typically get the intuition of some kind of bias (Romero & Han 2004). For example, the question in (43) seems to convey a negative bias.

- (43) IS Oliver from Australia?
~~> *The speaker doubts that Oliver is from Australia.*

Importantly though, the bias associated with verum accent in polar interrogatives is optional, as it can disappear in certain contexts. One such context is (44), where evidence for and against the prejacent has been provided by other parties and the speaker herself does not take a stand. The examples in (45) and (46) are drawn from the literature and make the same point.

- (44) DID Mary join the team? Because some say she did, others say she didn't.
~~> *The speaker doubts that Mary joined the team.*
- (45) A: Did Karl kick the dog? (Gutzmann et al. 2020: 41)
B: No, Karl didn't kick the dog.
C: No, he DID kick the dog.
A: Which is it? DID he kick the dog?
~~> *The speaker doubts that Karl kicked the dog.*
- (46) *B wants to know whether Jill will be at a meeting for members of a club.*
But B lacks an opinion about whether Jill is a member. (Goodhue 2019: 473)
B: Will Jill be at the meeting?
A: If she's a member, she will.

B: IS she a member?

↗ The speaker doubts that Jill is a member.

The By Any Chance Test gives rise to the same result, as shown in (47), providing further evidence that the bias conveyed by a verum accent in polar questions is optional.

- (47) DID Mary join the team, by any chance?

Though optional, notice that the bias triggered by verum accent is strong. This is attested by the Follow-up Test, as shown in (48).

- (48) IS Oliver from Australia? That is to say, ...
- ?I suspected he wasn't.
 - I was certain he wasn't.

We will now present our analysis of verum accent and show how it is able to capture the effects of this accent in declarative and polar interrogative sentences.

4.2 VERUM as a covert operator

There are two main approaches to analyzing verum accent. The “focus approach” posits that verum accent involves focus on a polarity head and manifests itself as a pitch accent on some element in the left periphery of the sentence (Laka 1990, Wilder 2013, Samko 2016, Goodhue 2018). This approach analyzes verum accent in essentially the same manner as we have polarity focus in Section 3.2, with focus being placed on a syntactically realized polarity head. In turn, the ‘operator approach’ contends that a verum accent signals the presence of a covert operator with certain conversational properties (Romero & Han 2004, Repp 2013, Goodhue 2019, Gutzmann et al. 2020). For reasons that we explore in detail in Bill & Koev (2021), we favor an explanation that is more in line with the latter approach.¹⁴

We propose that verum accent manifests the presence of a purely presuppositional VERUM operator that requires an epistemic conflict regarding the prejacent proposition in the given context. This is stated in (49).

- (49) $\llbracket \text{VERUM} \rrbracket_c^o(p) = p$, provided that there is conflicting evidence about p in c

We assume that conflicting evidence about p involves two mutually exclusive pieces of evidence: a piece of evidence for p and a piece of evidence against p .

¹⁴On the empirical side, the strongest argument comes from Gutzmann et al. (2020), who argue that VERUM is overtly lexicalized in various typologically unrelated languages.

Notice that contrasting evidence alone does not suffice, as such evidence need not produce an epistemic conflict and VERUM may not be licensed. Thus, if the positive and the negative pieces of evidence are presented as mere possibilities, a verum-marked sentence is degraded, as shown in (50).¹⁵

- (50) A: It's possible that Oliver is from Australia.
B: It's also possible that he is from New Zealand (though).
C: ?No, he IS from Australia.

Moreover, note that the strength of the two pieces of evidence does not need to be equal. For example, as shown in (51), it is possible for one side of the evidence to be strong and the other weak, provided the outcome is that they conflict.

- (51) A: Oliver is from Australia.
B: I think he might be from New Zealand, actually.
C: No, he IS from Australia.

In sum, we claim that verum accent indicates the presence of a VERUM operator which contributes no at-issue content but rather a conflicting evidence presupposition. We will now show how this simple semantics can account for the distribution of VERUM in declaratives and polar questions.

Starting with contradiction contexts, recall from example (40), repeated below as (52), that the prototypical use of verum accent is as a denial, targeting negative utterances.

- (52) A: Oliver is not from Australia.
B: No, he IS from Australia.

In this case, the conflicting evidence presupposition conveyed by VERUM is satisfied as follows: the negative evidence comes from the previous utterance, while the positive evidence has two possible sources. One option is that this evidence may be due to a prior positive utterance that A's negative utterance is itself responding to. After all, one would generally not utter a negative sentence if the positive alternative had not been uttered or raised in some way. Even in the absence of such prior utterance, the conflicting evidence presupposition can be accommodated from the fact that the verum-marked sentence is being asserted by B and thus it is strongly supported by the evidence. Either way, the conflicting evidence presupposition is satisfied and VERUM is licensed.

¹⁵Notice that C's utterance in (50) is not entirely out. The reason, we suggest, is that strong positive evidence can be accommodated from C's (verum-marked) assertion, thus deriving the required conflict with B's utterance.

As for affirmation contexts, we noted earlier that such uses typically involve extreme adjectives (or, more generally, extreme readings of predicates). The example in (53) is a repetition of (41) from earlier.

- (53) *After a colloquium talk:*

- A: Paula is an amazing linguist.
- B: She IS an amazing linguist.

Morzycki (2012) proposes that extreme adjectives make use of the far end of the scale associated with the respective regular adjective. Following up on this idea, we can say that in (53) the extreme adjective *amazing* is parasitic on the regular adjective *good*, as it refers to extreme degrees of goodness. This derives the required epistemic conflict as follows. Let us assume that $\langle \text{good}, \text{amazing} \rangle$ forms a Horn-scale, such that a sentence with *amazing* naturally invokes the respective alternative with *good*. In (53), A's initial utterance of *Paula is an amazing linguist* will invoke the weaker alternative *Paula is a good linguist*. Now, if we allow that this latter alternative be strengthened to *Paula is a good but not an amazing linguist* by some standard scalar mechanism, we get an alternative that contradicts B's verum-marked utterance *She IS an amazing linguist*. In other words, the use of an extreme adjective creates an implicit contraction within the same scale by splitting it into two non-overlapping regions. As a result, the conflicting evidence presupposition is met and VERUM is licensed once again.

Finally, our semantics for VERUM straightforwardly derives the observation that verum accent is out in neutral contexts. That is, since such contexts lack conflicting evidence about the prejacent, the presupposition of VERUM is not satisfied and so a verum-marked sentence is out.

As for the effects of verum accent in polar questions like (54), the bias that is generated is strong, negative, and optional, as already established in Section 4.1. We will derive this profile by appealing to the semantics we have presented for VERUM combined with the effects of polarity focus we laid out in Section 3.2. Specifically, we will claim that the polarity is dictated by polarity focus, whereas the strength and optionality are contributions of VERUM.

- (54) DID Mary join the team?

\rightsquigarrow *The speaker doubts that Mary joined the team.*

In order to derive the optionality of the bias, we propose that verum-marked polar interrogatives may be associated with two homophonous Logical Forms, one with and another without focus marking. While both forms contain VERUM and thus require conflicting evidence about the prejacent, only the variant in

which VERUM is *F*-marked conveys a bias. That is, we propose that (54) is ambiguous between (55a) and (55b).

- (55) a. $[\text{CP } Q [\text{PolP VERUM } [\text{TP Mary join the team}]]]$ (unbiased)
 b. $[\text{CP } Q [\text{PolP VERUM}_F [\text{TP Mary join the team}]]]_\phi \sim C$ (biased)

The ordinary meaning of (55a) is the usual question partition that is comprised of the prejacent proposition and its complement. Since this structure also contains VERUM, it generates the presupposition of conflicting evidence about the prejacent. This is illustrated in (56).

- (56) a. $[\text{CP } Q [\text{PolP VERUM } [\text{TP Mary join the team}]]]$
 b. $\llbracket \text{CP} \rrbracket_c^o = \left\{ \begin{array}{l} \lambda w. \text{join}_w(mary, team), \\ \lambda w. \neg \text{join}_w(mary, team) \end{array} \right\},$
 provided that there is conflicting evidence about
 $\lambda w. \text{join}_w(mary, team)$ in c

Notably, no part of the evidence needs to originate from the speaker and it can stem from other contextual sources entirely. This accounts for the optionality of the bias associated with verum-marked polar questions.

In turn, (55b) gives rise to the same question denotation and conflicting evidence presupposition. However, in this case VERUM is focus-marked and thus requires an antecedent. Given the contrastive focus interpretation, the only antecedent that meets the squiggle-imposed condition in (26) is the negative question alternative, as shown in (57).

- (57) a. $[\text{CP } Q [\text{PolP VERUM}_F [\text{TP Mary join the team}]]]_\phi \sim C$
 b. $C = \lambda w. \neg \text{join}_w(mary, team)$
 c. $\llbracket \phi \rrbracket_c^o = \lambda w. \text{join}_w(mary, team),$
 provided that there is conflicting evidence about
 $\lambda w. \text{join}_w(mary, team)$ in c
 d. $\llbracket \phi \rrbracket_c^f = \llbracket \text{CP} \rrbracket_c^o = \left\{ \begin{array}{l} \lambda w. \text{join}_w(mary, team), \\ \lambda w. \neg \text{join}_w(mary, team) \end{array} \right\},$
 provided that there is conflicting evidence about
 $\lambda w. \text{join}_w(mary, team)$ in c
 e. $C \in \llbracket \phi \rrbracket^f \checkmark, C \neq \llbracket \phi \rrbracket^o \checkmark$

The presence of polarity focus in verum-marked polar interrogatives derives the negative speaker bias in the same manner as the other questions with polarity focus. That is, the negative focus antecedent makes salient the negative cell of the question partition, resulting in the generation of negative bias.

Taking stock, we have derived both the optionality and the negative direction of the speaker bias in polar interrogatives with VERUM. The optionality follows from the assumption that VERUM, qua polar operator, may (though need not) carry focus marking. The negative direction is due to the fact that when such marking is present, the contrasting antecedent will be resolved to the negative focus alternative. The final element of the bias conveyed by questions with a verum accent is that it is strong.

We can account for the strength of the bias conveyed by verum-accented questions as follows. Focus marking on a polar element (e.g., negation or *really*) only conveys a preference for one of the question partition cells, and the generated bias is expected to be weak by default. However, VERUM also introduces the presupposition that the context is conflicted about the prejacent, so the bias gets a boost. That is, in a conflicted context, conventionally the level of certainty required to make a contribution is higher than in a neutral context. For this reason, if biased at all, polar interrogatives with VERUM are strongly biased.¹⁶

4.3 Nuclear tag questions

Nuclear positive-tag/negative-tag questions, like (59) and (58), are composed of a negative/positive anchor and an opposite polarity tag. Crucially, the prosodic contour of these questions is such that there is a clear break after the anchor, and there is a pitch accent on the auxiliary verb.

- (58) You haven't watched Star Wars || HAVE you?
- (59) You have watched Star Wars || HAVEN'T you?

Let us identify the bias profiles of these tag questions. Starting with optionality, as shown in (60) and (61), nuclear tag questions of both polarities are infelicitous when combined with *by any chance*. This indicates that a neutral reading of these questions is not possible. That is, the bias conveyed by both positive and negative nuclear tag questions is obligatory.

¹⁶One might wonder how our analysis would go accounting for questions containing both a verum accent and a focused polar element, like (i–iii).

- (i) DO vegetarians REALLY eat fish?
- (ii) DO vegetarians NOT eat fish?
- (iii) DON'T vegetarians eat fish?

Basically, such questions would be analyzed as having a structure that contains both VERUM and polarity focus – this time not on VERUM, but on the other polar element, i.e., *really* or *not*. By applying a parallel reasoning to that above, we correctly predict that the resulting speaker biases are strong, obligatory, and of the opposite polarity to that of the focus domain.

- (60) #By any chance, you don't like dancing || DO you?

- (61) #By any chance, you like dancing || DON'T you?

Now, we will explore the strength and polarity settings of their biases, starting with the Follow-up Test. As shown by the preference for the strong epistemic follow-ups in (62) and (63), the bias conveyed by nuclear tag questions is strong and of the opposite polarity to the tag polarity.

- (62) Susan doesn't hate exercise || DOES she? That is to say, ...

- a. #I suspected she didn't.
- b. I was sure she didn't.

- (63) Susan hates exercise || DOESN'T she? That is to say, ...

- a. #I suspected she did.
- b. I was sure she did.

The Weighted Coin Tests in (64) and (65) confirm that the biases are strong. As shown, these tag questions are infelicitous when the speaker's prior belief regarding the prejacent is relatively weak. The cause of this infelicity as coming from the strength of the bias is confirmed by the fact that we get felicity when the chance of the coin landing on tails is increased/decreased to near certainty one way or the other.

- (64) Mary and John are playing with a coin that they both know is designed so that it lands on tails $N\%$ of the time. Mary tosses the coin and it lands on the other side of John's legs, such that only John can see the result. John looks confused, causing Mary to say:

- a. 30%: #It didn't land on tails || DID it?
- b. 1%: It didn't land on tails || DID it?

- (65) Mary and John are playing with a coin that they both know is designed so that it lands on tails $N\%$ of the time. Mary tosses the coin and it lands on the other side of John's legs, such that only John can see the result. John looks confused, causing Mary to say:

- a. 70%: #It landed on tails || DIDN'T it?
- b. 99%: It landed on tails || DIDN'T it?

In sum, the bias profile of nuclear positive-tag/negative-tag questions is obligatory, negative/positive (respectively), and strong. We now consider how the machinery of our analysis can capture the biases conveyed by nuclear tag questions.

To do so, we need to bring together all the different pieces of our analysis, including our general analysis of tag questions, polarity focus, and VERUM. To start with, we claim that the VERUM operator is necessarily present in nuclear tag questions, due to the prosodic contour associated with the tag. That is, the pitch accent on the auxiliary verb in the tag signals the presence of VERUM and its semantic effects. As for polarity focus, in the case of nuclear negative-tag questions, it is necessarily generated as a result of the high negation structure. For example, the tag question in (66) receives the analysis shown below.

- (66) Paul goes to church || DOESN'T he?

- a. $[[CP \text{ Paul}_i \text{ go to church}] [\text{TAG} [CP Q [\text{FocP} \text{ not}_F [\text{PolP} \text{ VERUM} [TP \text{ he}_i \text{ go to church}]]]_\phi \sim C]]]$
- b. $\Diamond \lambda w. go.to_w(paul, church) \cdot \left\{ \begin{array}{l} \lambda w. go.to_w(paul, church), \\ \lambda w. \neg go.to_w(paul, church) \end{array} \right\}$,
provided the context contains conflicting evidence for and against
 $\lambda w. go.to_w(paul, church)$
- c. $C = \lambda w. go.to_w(paul, church)$
- d. $\llbracket \phi \rrbracket^o = \lambda w. \neg go.to_w(paul, church)$,
provided the context contains conflicting evidence for and against
 $\lambda w. go.to_w(paul, church)$
- e. $\llbracket \phi \rrbracket^f = \left\{ \begin{array}{l} \lambda w. go.to_w(paul, church), \\ \lambda w. \neg go.to_w(paul, church) \end{array} \right\}$
- f. $C \in \llbracket \phi \rrbracket^f \checkmark, C \neq \llbracket \phi \rrbracket^o \checkmark$

The strong, positive and obligatory bias in (66) arises from the characteristics of the tag, which mirror those of the verum-accented question in (57), except that here the polar element focused is negation, instead of VERUM. Recall that the statement made by the anchor is very weak in that it only posits the possibility of the relevant proposition. On the other hand, the tag is comprised of a focused high negation and a VERUM operator. Therefore, as with all the other questions containing polarity focus, an obligatory bias that is of the opposite polarity to that of the focus domain (i.e., a positive bias) is generated. Moreover, the satisfaction of the conflicting evidence presupposition introduced by VERUM increases the strength of the bias, due to the higher certainty requirements conventionally associated with conflicted contexts.

As for nuclear positive-tag questions, their bias is generated in precisely the same manner, except that in their case the focused polar element is VERUM. The details are presented in (67).

- (67) Paul doesn't go to church || DOES he?

- a. $[[_{CP} \text{Paul}_i \text{ not go to church}] [TAG [_{CP} Q [_{PolP} VERUM_F [_{TP} \text{he}_i \text{ go-to} \\ \text{church}]]]_\phi \sim C]]]$
- b. $\Diamond \lambda w. \neg \text{go.to}_w(paul, church) \bullet \left\{ \begin{array}{l} \lambda w. \text{go.to}_w(paul, church), \\ \lambda w. \neg \text{go.to}_w(paul, church) \end{array} \right\}$,
provided the context contains evidence for and against
 $\lambda w. \neg \text{go.to}_w(paul, church)$
- c. $C = \lambda w. \neg \text{go.to}_w(paul, church)$
- d. $[\![\phi]\!]^o = \lambda w. \text{go.to}_w(paul, church)$,
provided the context contains evidence for and against
 $\lambda w. \text{go.to}_w(paul, church)$
- e. $[\![\phi]\!]^f = \left\{ \begin{array}{l} \lambda w. \text{go.to}_w(paul, church), \\ \lambda w. \neg \text{go.to}_w(paul, church) \end{array} \right\}$

One interesting thing to note is that, in the case of nuclear positive-tag questions, a neutral or unbiased interpretation that would arise in the absence of polarity focus seems to be ruled out. This is different from polar questions with a verum accent, which may or may not be biased and thus were assumed to only optionally carry polarity focus (see Section 4.2). One way of capturing this difference is by appealing to the presence of the anchor in nuclear positive-tag questions. That is, the negative anchor presents the negative proposition that would serve as an antecedent for the polarity focus in the tag. Therefore, for discourse coherence purposes, the tag is required to contain polarity focus and a non-biased interpretation is not available.

In this way, the machinery introduced by our analysis – namely, a general model of tag questions, polarity focus, and our novel semantics for VERUM – can capture the biases conveyed by both nuclear positive-tag and nuclear negative-tag questions.

5 Alternative accounts

Broadly, we can divide the alternative accounts of tag questions into two groups, based on whether the relevant bias is derived primarily (or solely) from the anchor or from the tag.

5.1 Anchor-based approach

A lot of accounts of bias in tag questions fall under what we call the ‘anchor-based approach’ (Reese 2007, Reese & Asher 2009, Krifka 2015, Malamud & Stephenson

2015, Jamieson 2018, Woods & Roeper 2021). While there is some variation in the specific architecture of these accounts, they all subscribe to the general notion that the bias conveyed by tag questions is derived primarily from the declarative anchor. The basic idea here is that the usual discourse effects of producing a declarative utterance are carried over to a tag question in the form of question bias. For example, Krifka (2015) assumes a projected discourse development model (called Commitment Space Semantics), where questions are modeled as conversational moves that restrict the possible continuations available to speech participants. In this framework, reverse-polarity tag questions are analyzed as disjunctions of an assertion and a polar question of the opposite polarity. This presents other participants with a choice: they can either ‘join’ the initial speaker in a commitment to the anchor proposition, or can commit themselves to its complement, in which case the initial speaker can either re-commit themselves to the original anchor proposition, or join their interlocutor in accepting its complement. In any case, as far as the typology we are sketching here is concerned, the important thing is that the bias conveyed by tag questions is generated from the anchor component.

While these accounts perform quite well at capturing some of the basic facts about tag question bias (e.g., their polarity properties), we point out that they suffer from both under- and over-generation problems. Starting with undergeneration, they seem to predict greater uniformity in the biases conveyed by different tag questions than appears to be the case. That is, assuming the bias profiles we have outlined above are correct, it is not clear how these accounts can explain them. For example, it is not clear how they can capture the differences we found in the optionality settings of the biases conveyed by post-nuclear positive-tag vs. negative-tag questions. If the bias were indeed derived from the anchor, then this would predict that all tag questions should be obligatorily biased, as they all include such an anchor component. However, as we showed in Section 2.2, post-nuclear positive-tag questions are optionally biased, which presents a challenge for the anchor-based approach.¹⁷ Somewhat less problematic for this approach are the variations in strength that we observed between post-nuclear and nuclear tag questions. These are less problematic because, while the accounts as they currently stand do not predict this variation, they could easily do so by adopting our (or a similar) analysis of the tag component. That is, they could

¹⁷This criticism does not necessarily apply to the account proposed in Reese & Asher (2009), which attempts to explain the optionality of the bias in post-nuclear positive-tag questions by positing the presence of a meta-linguistic negation in the anchor which cancels out the usual assertive contribution of the anchor component. Moreover, the analysis presented in Jamieson (2018) is explicitly restricted to nuclear tag questions.

posit a covert VERUM operator and thus strengthen the bias in the same manner as we propose.

The anchor-based approach also seems to over-generate, in the sense that it predicts the possibility of a post-nuclear tag question comprised of a negative anchor plus a negative tag (i.e., a negative matching tag question). That is, on any analysis where a tag questions is composed of an assertion and a polar question, it is unclear why the positive combination of these two elements should be possible, but not the negative combination, as noted in Cattell (1973) and shown in (68–69).

- (68) John drank beer = did he?
(69) # John didn't drink beer = didn't he?

In contrast, our account is able to capture this asymmetry straightforwardly. That is, the tag component in (69) is an elliptical high negation question. Since the negation in such questions is focus-marked, it is in need of a contrasting positive antecedent and thus clashes in some sense with the presence of a negative anchor. In contrast, the tag question in (68) contains an unbiased positive polar question in the tag component, meaning there is no focus marking in the tag and thus no clash with the positive proposition presented in the anchor.

5.2 Tag-based approach

In contrast to the anchor-based approach, what we call the ‘tag-based approach’ attributes the primary source of the bias associated with tag questions to the tag. The account we have presented in this paper is a member of this approach. The only other account that seems to fit in this approach is that presented in Romero & Han (2004). These authors propose that (reverse-polarity) tag questions always contain a covert VERUM operator within the tag and that their bias properties are derived in the same manner as they are for their matrix question counterparts. Although their VERUM operator is a conversational/epistemic operator stating that the speaker is certain that the prejacent proposition should be added to the common ground, the question bias is derived in a similar way as on our account.

This analysis can comfortably capture the polarity settings of the biases conveyed by tag questions. But it has difficulty capturing the ways in which the question bias varies along the two other dimensions we identified, i.e., strength and optionality. Specifically, because Romero & Han (2004) propose that the tag component of tag questions always contains a VERUM operator, they predict that (other than their polarity settings) the bias profiles should be uniform.

However, as we noted above, there is considerable variation in both the optionality and strength features of tag questions. That is, the bias conveyed by post-nuclear positive-tag questions is optional, whereas the biases conveyed by all the other forms we investigated are obligatory. Similarly, while the strength of post-nuclear tag questions is weak, the strength of nuclear tag questions is strong. These variations in bias profiles are unexpected if they are all derived from the application of the same VERUM operator in the tag component of tag questions.

6 Summary

In this paper we have focused on a variety of reverse-polarity tag questions in English and have made both empirical and theoretical contributions. Starting with the empirical contributions, we have identified that the speaker biases conveyed by tag questions (and certain other biased questions) vary across three dimensions: optionality, strength, and polarity. Moreover, we have identified the specific bias profiles of our targeted tag questions, which turned out to vary along these three dimensions.

As for theoretical contributions, we proposed a modular account of how the bias conveyed by the relevant tag questions is generated. We analyzed tag questions as complex expressions consisting of a declarative and an elliptical polar interrogative, where the latter conveys a bias with typically the same features as would the corresponding independent non-elliptical polar interrogative. Specifically, we argued that bias profiles of the investigated tag questions are determined by the presence of polarity focus and the semantics of a covert VERUM operator. That is, when polarity focus is present, the bias is obligatory, weak and of the opposite polarity to the focus domain. Then, in cases where VERUM is present (i.e., in nuclear tag questions), the strength of the bias is boosted. The bigger point is that there is nothing mysterious about tag questions: their bias profiles can be derived in a composite way from the elements that make up such questions and whose semantic effects are established independently. Our empirical and theoretical contributions are summarized in Table 2.

Finally, we argued that previous accounts of tag questions do not perform as well in capturing the noted variation in tag question bias.

We close the discussion with one speculative remark. An anonymous reviewer wonders what would justify our claim that languages resort to an operator like VERUM in order to mark conflicting evidence, especially in view of the fact that polarity focus can play a similar role. Although we cannot provide a definitive answer to this worry, we point out that the semantic effects of polarity focus

Table 2: Summary of bias profiles and proposed analyses of reverse-polarity tag questions. (Abbreviations: pnPTQ = post-nuclear positive-tag question, pnNTQ = post-nuclear negative-tag question, nPTQ = nuclear positive-tag question, and nNTQ = nuclear negative-tag question)

tag question	optionality	strength	polarity	analysis
pnPTQ	optional	weak	negative	(anchor)
pnNTQ	obligatory	weak	positive	not_F
nPTQ	obligatory	strong	negative	$VERUM_F$ (+ anchor)
nNTQ	obligatory	strong	positive	$not_F + VERUM$

and VERUM are not equivalent. That is, polarity focus merely conveys a contrast, indicating that the opposite polar alternative is salient in the context. It thus says nothing about evidence, truth, or similar notions. In turn, VERUM strengthens this contrast to an epistemic conflict, indicating that there is incompatible evidence regarding the prejacent and that the conversation is in a state of crisis. We hypothesize that it is for this reason that a VERUM operator is overtly lexicalized in a number of typologically unrelated languages (Gutzmann et al. 2020). Notice also that polarity focus cannot exist in a vacuum as it needs to mark *some* polar operator. Thus, given the kinship between the two mechanisms, it seems plausible that polarity focus and VERUM feed each other.

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Chapter 6

Contextual bias and the landscape of Mandarin polar questions

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Mandarin Chinese has at least three kinds of polar questions, positive *ma* questions, negative *ma* questions and A-not-A questions, which have similar semantics but are not totally interchangeable. In particular, they carry different bias connotations. We show that their bias meanings and distribution are best characterized by the notion of contextual bias, which is formalized in terms of the subjective probability distribution within the framework of Farkas & Bruce's (2010) Table model. Our analysis offers a simple lexical semantics for *ma* questions by employing pragmatic competition, and supports the idea that prosodic contours like the Final Fall in A-not-A questions are intonational morphemes that carry semantic contents.

1 Introduction

According to Hamblin's (1958, 1973) seminal theory of questions, a question denotes a set of propositions that count as possible answers to it, which predicts that there is no semantic difference between English positive polar questions, negative polar questions and alternative questions of the form '*p* or not *p*?'. However, a number of subsequent studies present evidence that these questions have different properties and are not always interchangeable (Bolinger 1978, Ladd 1981, Büring & Gunlogson 2000, Van Rooy & Šafářová 2003, Romero & Han 2004, Biezma 2009, Roelofsen & van Gool 2010, Biezma & Rawlins 2012, Sudo 2013, Krifka 2015, Domaneschi et al. 2017, Farkas & Roelofsen 2017, a.o.).



Mandarin Chinese also has three types of polar questions that are not interchangeable: positive *ma* questions (+MAQ), negative *ma* questions (−MAQ) and A-not-A questions (ANAQ). *Ma*-questions, henceforth MAQs, are formed by attaching a question particle *ma* at the end of the sentence as in (1–2). As we will see below, positive and negative *ma* questions are in complementary distribution.

- (1) Xia yu le ma?
fall rain PERF Q
'Did it rain?' (+MAQ)
- (2) Mei xia yu ma?
not fall rain Q
'Did it not rain?' (−MAQ)

A-not-A questions, henceforth ANAQS, conjoin the verb and its negative counterpart and end with an obligatory final boundary low tone L% (henceforth the final Low tone is indicated by as '↓') and an optional question particle *ne*:

- (3) Xia mei xia yu (ne)?↓/L%
fall not fall rain Q
'Did it rain or not rain?' (ANAQ)

While intuitively (1–3) are asking the same question of whether it rained, they are used in different contexts. This naturally raises the following question: What determines the distribution of the three kinds of questions? Yuan & Hara (2019) discuss the syntactic and prosodic differences among the three constructions as well as the differences in compositional semantics. The current paper focuses on the bias profile/type of bias that arise from these constructions.

2 Data

This section presents the main empirical observation regarding Mandarin polar questions. In particular, we show which constructions are available in what kind of contexts.

2.1 Positive *ma* question

Let us first take a look at positive *ma* questions (+MAQ). A +MAQ can be used in out-of-blue contexts where no conversation participants have expressed any bias:

- (4) A researcher uses a questionnaire to investigate the relationship between the weather and people's mental states. The first question in the questionnaire is:

Ni de chengshi zuotian xia yu le ma?
 you GEN city yesterday fall rain PERF ma
 'Did it rain yesterday in your city?' (+MAQ)

It can also be used in positively biased contexts. In (5), Speaker A's assertion of p renders the context biased towards p .

- (5) A: Zuowan (henkeneng) xia yu le.
 last-night probably fall rain PERF
 '(Probably,) It rained last night.'

B: Xia yu le ma?
 fall rain PERF ma
 'Did it rain?' (+MAQ)

+MAQ are also felicitous in contexts that are non-verbally biased towards p :

- (6) B enters A's windowless room wearing a dripping wet raincoat.

A: Xia yu le ma?
 fall rain PERF ma
 'Did it rain?' (+MAQ)

In contrast, when the context is biased toward $\neg p$, a +MAQ cannot be used:

- (7) A and B open the window and find the ground dry. A speaks to B, who stayed up all night.

A: #Zuowan xia yu le ma?
 last-night fall rain PERF ma
 'Did it rain last night?' (+MAQ)

As summarized in Table 1, +MAQs are felicitous when the context is neutral or positively biased.

2.2 Negative *ma* questions

Negative *ma* questions (−MAQs) are in complementary distribution with +MAQs. Thus, they cannot be used in an out-of-the-blue context like (8).

Table 1: Distribution of positive MAQs

	Neutral	biased towards p	biased towards $\neg p$
positive MAQs	✓	✓	#

- (8) A researcher uses a questionnaire to investigate the relationship between the weather and people's mental states. The first question in the questionnaire is:
- # Ni de chengshi zuotian mei xia yu ma?
 you GEN city yesterday NEG fall rain ma
 'Did it not rain yesterday in your city?' (-MAQ)

Negative MAQs are also disallowed in positively biased contexts as in (9–10).

- (9) A: Zuowan (henkeneng) xia yu le.
 last-night probably fall rain PERF
 'It (probably) rained last night.'
- B: #Mei xia yu ma?
 NEG fall rain ma
 'Did it not rain?' (-MAQ)
- (10) B enters A's windowless room wearing a dripping wet raincoat.
- A: #Mei xia yu ma?
 NEG fall rain ma
 'Did it not rain?' (-MAQ)

This raises the questions of when -MAQs can be used. The answer is that they can be used in contexts that exclude +MAQs when the context is biased towards $\neg p$. The bias can arise verbally as in (11) or non-verbally as in (12).

- (11) A: Zuowan mei xia yu.
 last-night NEG fall rain
 'It did not rain last night.'
- B: Mei xia yu ma?
 NEG fall rain ma
 'Did it not rain?' (-MAQ)

- (12) B leaves A's windowless room carrying a raincoat. When B returns, A notices that B's raincoat is dry.

A: Mei xia yu ma?
 NEG fall rain ma
 'Did it not rain?' (-MAQ)

Table 2 summarizes the distribution of MAQs. Positive and negative MAQs are in complementary distribution. Negative MAQs are uttered when the context is biased towards $\neg p$ while positive MAQs are uttered elsewhere, i.e., when the context is neutral or biased towards p .¹

Table 2: Distribution of MAQs

	Neutral	biased towards p	biased towards $\neg p$
positive (+) MAQs	✓	✓	#
negative (-) MAQs	#	#	✓

2.3 A-not-A question

A-not-A questions are used only in neutral contexts as in (13).

¹In Mandarin, there is another type of polar questions that contains a negation morpheme *bu-shi*. *Bu-shi* questions, like English inner high negation questions, are used when the speaker has a prior bias toward the positive answer but the utterance context is biased toward the negative one as in (i). This example was suggested by the reviewer, and the reviewer pointed out that this example is a high negative polar question. We clarify that this paper only discusses the semantics of unmarked negative *ma* questions which are comparable to low negative polar questions in English, and we don't discuss the semantics of *bu-shi* questions (which are comparable to high negative polar questions in English).

- (i) B told A that he was married. On the next day, A found B at a bachelor party.

A: ni bu-shi jiehun-le ma?
 you not-SHI married-ASP Q
 'Aren't you married?'

bu-shi questions are distinct from (negative) MAQs. *Bu-shi* questions are comparable to high negative polar questions in English and unmarked negative MAQs are comparable to low negative polar questions in English. See Fu (2021) for an analysis that uses Romero & Han's (2004) VERUM operator.

- (13) A researcher uses a questionnaire to investigate the relationship between the weather and people's mental states. The first question in the questionnaire is:

A: Ni de chengshi zuotian xia mei xia yu?↓
you GEN city yesterday fall not fall rain
'Did it rain or not rain yesterday in your city?' (ANAQ)

Once the context is biased towards either answer, questioning with an ANAQ becomes infelicitous. In (14–15), the context is positively biased and the ANAQ is ruled out:

- (14) A: Zuowan xia yu le.
last-night fall rain PERF
'It rained last night.'
B: #Xia mei xia yu?↓
fall NEG fall rain
'Did it rain or not rain?' (ANAQ)

- (15) B enters A's windowless room wearing a dripping wet raincoat.

A: #Xia mei xia yu?↓
fall NEG fall rain
'Did it rain or not rain?' (ANAQ)

Likewise, in (16–17), the context is negatively biased and the ANAQ is infelicitous.

- (16) A: Zuowan mei xia yu.
last-night NEG fall rain
'It did not rain last night.'
B: #Xia mei xia yu?↓
fall NEG fall rain
'Did it rain or not rain?' (ANAQ)
- (17) B leaves A's windowless room carrying a raincoat. When B returns, A notices that B's raincoat is dry.
- A: #Xia mei xia yu?↓
fall NEG fall rain
'Did it rain or not rain?' (ANAQ)

Table 3: Distribution of MAQs and ANAQs

	neutral	biased towards p	biased towards $\neg p$
positive MAQs	✓	✓	#
negative MAQs	#	#	✓
ANAQs	✓	#	#

Table 3 summarizes the distribution of $+/-$ MAQs and ANAQs.

The next question we will address is what kind of bias is involved. Put another way, what exactly does it mean to say ‘the context is biased/neutral’?

3 Question bias in traditional grammar

Traditional grammarians attempted to analyze the meanings of MAQs and ANAQs with regard to the speaker’s bias. On the one hand, most traditional linguists conclude that the speaker of a ANAQ is neutral between a positive and a negative answer. On the other hand, the nature of the bias expressed by MAQs was controversial. According to Wang (1943: 168), for instance, MAQs are confirmation-seeking questions that encode the speaker’s bias towards the prejacent proposition p , whereas Chao (1968: 356) and Shao (1996: 72) claim that MAQs signify the speaker’s bias towards the negation of the prejacent proposition $\neg p$.

We regard these traditional approaches as problematic in several respects. First, the semantics of MAQs and ANAQs and their biases are not compositionally derived but stipulated (see Yuan & Hara 2019 for compositional semantics of these questions). Second, empirical data shows that the bias is not lexically encoded in MAQs. To illustrate, the speaker of the $+MAQ$ in (6) seems to be biased towards the positive answer while the speaker in (4) seems to be neutral. As shown in (18), furthermore, the same $+MAQ$ can be uttered in various contexts with different speaker biases. If a $+MAQ$ were a lexically biased question, that is, if a $+MAQ$ obligatorily denoted the speaker’s bias towards the positive answer, then (18a) and (18c) would be unacceptable since the continuations contradict the semantic content of the $+MAQ$.

- (18) Xia yu le ma? ...
 fall rain PERF ma
 ‘Did it rain? ...’

- a. ... Wo bu juede.
I NEG think
'... I don't think so.'
 - b. ... Wo cai xia le.
I guess fall PERF
'... I guess it rained.'
 - c. ... Wo wanquan bu qingchu.
I totally NEG clear
'... I totally have no idea.'
- (+MAQ)

Furthermore, the speaker does not need to be neutral about the answers when she utters an ANAQ. The speaker in (4) is probably neutral regarding the answers, while she can hold a private bias toward either answer in some other contexts. For instance, A in (19) can felicitously utter an ANAQ even though she is privately biased towards the positive alternative *You have questions*:

- (19) A believes that his audience usually have questions to raise after his speech:

A: Nimen you mei you wenti?↓
you have not have questions
'Do you have or not have questions?' (ANAQ)

Similarly in (20), A is only privately biased towards the proposition *He looks like you*, that is, the other discourse participant does not know that A is biased towards p.²

- (20) A and B are in the museum. A finds a portrait that looks like B.

A: (Kan!) Ta xiang bu xiang ni?
look he resemble not resemble you
'(Look!) Does he look like you or not like you?'

Finally, the notion of the speaker bias seems too strong to characterize the bias that arises from -MAQs. That is, the speaker does not need to have a strong belief that $\neg p$ in uttering a -MAQ. In (21), for instance, speaker A only considers a (slight) possibility of $\neg p$ or just reports that someone else other than the speaker mentioned $\neg p$, yet the context licences the use of the -MAQ.

²We owe example (20) to an anonymous reviewer.

- (21) A1: Zuowan keneng mei xia yu.
 last-night maybe NEG fall rain
 ‘Maybe it did not rain last night.’

A2: Wo bu juede zuowan xia yu le.
 I NEG think last-night fall rain PERF
 ‘I don’t think that it rained last night.’

A3: John shuo zuowan mei xia yu.
 John say last-night NEG fall rain
 ‘John said that it did not rain last night.’

B: Mei xia yu ma?
 NEG fall rain ma
 ‘Did it not rain?’

In summary, the speaker bias is not in the lexical specification of either MAQs or ANAQs. As we argue below, the notion of ‘contextual bias’ is more appropriate to characterize the semantics and pragmatics of MAQs and ANAQs.

4 Proposals

To derive the distribution of the polar questions sketched in Section 2, we make the following proposals.

- (22) a. The bias meaning involved in Mandarin polar questions are best characterized by the notion of contextual bias ('evidential bias' in Sudo 2013)

b. As for MAQs, only the negative MAQ lexically encodes the bias meaning.

c. The contextual neutrality of ANAQ is derived by the exhaustivity operator denoted by the final low tone ↓/L%.

When the context is biased toward $\neg p$, a $-MAQ$ is the most optimal. Accordingly, a $+MAQ$ is used elsewhere, i.e., in neutral and positively biased contexts as we have seen in Table 2, repeated here as Table 4. In Section 7.1, we show how the elsewhere condition explains the complementary distribution of positive/negative MAQs.

As for ANAQs, we argue that the exhaustive interpretation that arises from the final low tone ↓L% is the source of the neutrality requirement. In a nutshell, ↓ expresses that the Hamblin alternatives presented by the A-not-A construction,

Table 4: Distribution of MAQs

	Neutral	biased towards p	biased towards $\neg p$
positive +MAQs	✓	✓	#
negative -MAQs	#	#	✓

i.e., p and $\neg p$, are the only live options. Thus, if the context is biased towards one of them, the context does not match the semantics of \downarrow .

In the next sections, we formalize the notion of contextual bias/neutrality and show how the distribution pattern of Mandarin polar questions can be derived.

5 Formalizing contextual bias

In formalizing the contextual bias, we start with the following working definition: A context c is biased toward p when someone's bias towards p is public:

- (23) Contextual bias (informal version)
- A context c is biased toward p iff
- a. it is a common belief that some individual x entertains the possibility of p , and
 - b. there is no individual who entertains the possibility of $\neg p$.

To characterize some individual's epistemic state, we use the notion of subjective probability distribution (Jeffrey 2004, Potts 2007, McCready & Ogata 2007, Davis et al. 2007). In implementing the "common belief" part, we employ Farkas & Bruce's (2010) Table model.

5.1 Subjective probability distribution

The current paper follows the formulation given by Davis et al. (2007) and models a proposition (i.e., a set of possible worlds) as a probability distribution:

- (24) A probability distribution for a countably finite set W is a function P^W from subsets of W into real numbers in the interval $[0,1]$ obeying the conditions:
- a. $P^W(W) = 1$
 - b. $P^W(\{w\}) \geq 0$ for all $w \in W$

- c. If p and q are disjoint subsets of W , then $P^W(p \cup q) = P^W(p) + P^W(q)$.³
 (Davis et al. 2007: 77)

The epistemic state of an individual a is denoted by a proposition Dox_a , which is a finite set of possible worlds that are doxastically accessible to a . Now, the conditionalization of a uniform distribution is given in (25).

- (25) Let $P(-|p)$ be the function that maps any proposition q to

$$P(q|p) = \frac{P(q \cap p)}{P(p)}$$

where P is a probability distribution. That is, $P(-|p)$ maps propositions to their conditional probabilities (for P) given p . $P(q|p)$ is undefined if $P(p) = 0$.
 (Davis et al. 2007: 77)

Based on this uniform distribution, a function Cred_a (*Cred* for ‘credence’) models the epistemic state of an individual a as in (26). The function Cred_a returns a ’s degree of belief in p :

- (26) The subjective probability distribution for an individual a :

$$\text{Cred}_a = P(-|\text{Dox}_a)$$

in which P is a uniform distribution over W , i.e., $P(\{w\}) = \frac{1}{|W|}$ for all $w \in W$.
 (Modified from Davis et al. 2007: 77)

Thus, an individual a ’s degree of belief in a proposition p is calculated as follows:

- (27)

$$\text{Cred}_a(p) = P(p|\text{Dox}_a) = \frac{P(p \cap \text{Dox}_a)}{P(\text{Dox}_a)}$$

Now let us calculate different belief states using (27). If a is committed to the proposition p , p is true in all the worlds in Dox_a , i.e., $\text{Dox}_a \subseteq p$. Since $p \cap \text{Dox}_a = \text{Dox}_a$, $\text{Cred}_a(p)$ returns 1:

- (28)

$$\text{Cred}_a(p) = P(p|\text{Dox}_a) = \frac{P(p \cap \text{Dox}_a)}{P(\text{Dox}_a)} = \frac{P(\text{Dox}_a)}{P(\text{Dox}_a)} = 1$$

³We henceforth suppress the superscript W .

If a is committed to $\neg p$, p is true in no worlds in Dox_a . Thus, $\text{Cred}_a(p) = 0$:

(29)

$$\text{Cred}_a(p) = P(p|\text{Dox}_a) = \frac{P(p \cap \text{Dox}_a)}{P(\text{Dox}_a)} = \frac{\frac{0}{|W|}}{P(\text{Dox}_a)} = 0$$

Finally, agent a entertains the possibility of p when $\text{Cred}_a(p)$ is greater than 0:

(30) a entertains the possibility of p iff

$$\text{Cred}_a(p) > 0$$

where $a \in A$ and A is a set of epistemic agents.

Let us see how (30) works with linguistic examples. In (31) the speaker is committed to the proposition p *It rained*. That is, $\text{Cred}_{\text{spkr}}(p) = 1 > 0$, so the speaker entertains the possibility of p .

- (31) Zuowan xia yu le.
 last.night fall rain PERF
 ‘It rained last night.’

Similarly, in (32), John believes p to be true, so $\text{Cred}_{\text{john}}(p) \geq 0.98 > 0$, thus John entertains the possibility of p .

- (32) John shuo/juede zuowan xia yu le.
 John said/believes last.night fall rain PERF
 ‘John said/believes that it rained last night.’

In (33), the fact that B wears a wet raincoat is regarded as contextually compelling evidence (Büring & Gunlogson 2000) for the proposition p *It rained* that raises A’s degree of belief in p to a value greater than 0.5 ($1 > \text{Cred}_A(p) > 0.5$, see McCready & Ogata 2007). Since $\text{Cred}_A(p) > 0$, agent A entertains the possibility of p .

- (33) B enters A’s windowless room wearing a wet raincoat.

This section formalized the “entertaining” part of the definition of contextual bias using the subjective probability distribution. Agent a entertains the possibility of p when $\text{Cred}_a(p)$ is greater than 0 as defined in (30).

We next turn to the rest of the definition, that is, how someone’s epistemic state becomes a common belief of all conversation participants.

5.2 The Table model

We follow Farkas & Bruce's (2010) idea that when an issue that contains a proposition is pushed onto the conversation "Table", the proposition becomes a common belief. Thus, in our case, the context is biased towards p when an issue that contains the proposition that some individual entertains the possibility of p is pushed onto the Table, and no issue that contains $\neg p$ is pushed onto the Table.

The Table is one way to represent Questions Under Discussion (Roberts 1996) and defined as in (34). Let I be an issue, a set of propositions of type $\langle\langle s, t \rangle, t \rangle$. A Table T is a stack or an ordered pair of issues.

- (34) The Table T :

Let I be an issue, a set of propositions.

- a. $\langle \rangle$ is a Table.
- b. If I is an issue and T is a Table, then $\langle I, T \rangle$ is a Table.
- c. Nothing else is a Table.
- d. If T is a Table, then $|T|$ is the length of the table and $T[n]$ is the n th element in the Table ($1 \leq n \leq |T|$; counting from 1 at the top).

If the Table is not empty, there is some issue to be solved. The topmost issue on the Table is the most-pressing issue that needs to be resolved. The ultimate goal of the conversation is to resolve all issues and empty the Table.

Stack operations such as push and pop are also introduced as operations for the Table in Farkas & Bruce (2010). Performing $\text{push}(I, T)$ outputs a new stack by adding I to the top of the stack T :

- (35) For any issue I and Table T :

$$\text{push}(I, T) = \langle I, T \rangle$$

The 'pop(I, T)' operation removes the topmost issue I from T :

- (36) For any issue I and Table T :

$$\text{pop}(I, T) = T \text{ if } T \neq \langle \rangle; I \text{ otherwise.}$$

Each Table is relativized to a context c , which has a basic semantic type c (see also Davis 2011).⁴ Thus, T is now a function from contexts to Tables:

⁴In Farkas & Bruce's (2010) framework, a context state is understood as a tuple of elements such as the Common Ground, the Table, etc (see also Roelofsen & Farkas 2015). Speech act operators such as **ASSERTION** and **QUESTION** take sentences as arguments and yield functions from input context states to output context states.

(37) The Table in context:

Let c be a context, $T(c)$ is a Table at context c .

Similarly, the Stalnakerian (1978) Common Ground is obtained by a function CG that takes a context c and returns a set of propositions:

(38) The Common Ground:

Let c be a context, $\text{CG}(c)$ is a set of propositions that are shared by all the discourse participants at context c .

Speech acts are defined as functions from input contexts to output contexts. The **ASSERT** operator is of type $\langle(s, t), \langle c, c \rangle \rangle$ and it takes a proposition p and yields a context change potential of type $\langle c, c \rangle$:

(39) CCP of ASSERT (first version):

$\text{ASSERT}(p)(c) = c'$ such that

- a. $\text{CG}(c') = \text{CG}(c) \cup (\text{Cred}_{\text{spkr}}(p) \geq 0.98)$
- b. $T(c') = \text{push}(\{p\}, T(c))$

As can be seen in (39), an assertion of p updates the context in two ways. First, it adds to the $\text{CG}(c)$ a proposition that the speaker has a very high degree of belief in p ($\text{Cred}_{\text{spkr}}(p) \geq 0.98$). Second, it pushes $\{p\}$ onto the top of the Table.⁵ This second update is one of the core features of Farkas & Bruce's (2010) Table model. In (40), A's assertion of p *It rained* is directly asserted or dissented with by B. In other words, not only a question but also an assertion can raise an issue. Thus, as soon as p is asserted, it is considered as an at-issue proposition on the Table that affects the future direction of the discourse (Farkas & Bruce 2010, Tonhauser 2012, Northrup 2014).

(40) A: Zuowan xia yu le.

last-night fall rain PERF

'It rained last night.'

B: Shide, xia yu le. / Bu-shide, mei-you xia yu.

yes fall rain PERF NEG-yes NEG-have fall rain

'Yes, it rained'/'No, it did not rain.'

⁵The second update on the Table will be dispensable as the first part automatically pushes p to the Table, so (39b) will be removed later.

Besides conversational moves such as an assertion or a question that are extensively discussed in Farkas & Bruce (2010), we propose that contextual compelling evidence is another conversational move that affects the context. For instance in (41), the fact that B wears a raincoat counts as evidence for the proposition *p It rained* which in turn increases A's degree of belief that *p* to some degree above 0.5.

- (41) B enters A's windowless room wearing a wet raincoat.

Thus, contextual compelling evidence yields a context change potential. We define CCE based on McCready & Ogata's (2007) semantics of Japanese evidentials as in (42). The operator CCE presupposes that some evidence *q* has led *a* to raise her subjective probability of *p* above 0.5. For example, suppose that *a* holds a background knowledge $q \rightarrow p$ '*If someone wears a wet raincoat, it is raining*'. When *a* learns that *q* is true, by modus ponens, the probability of *p* ($P(p|\text{Dox}_a \cap q)$) becomes higher than before leaning *q* and 0.5. If the presupposition is satisfied, CCE combines with the proposition *p* and returns a CCP, which changes the context *c* by adding the proposition that '*A's degree of belief in p is larger than 0.5*' into the CG(*c*) and pushing the issue of *p* onto the Table *T(c)*.⁶

- (42) CCP of CCE (contextual compelling evidence) (first version):

Let *p, q* be propositions and *a* be a discourse participant,

- a. $\text{CCE}_a(p)(c)$ is defined iff
 $\exists q. P(p|\text{Dox}_a \cap q) > P(p|\text{Dox}_a) \wedge P(p|\text{Dox}_a \cap q) > 0.5$
- b. If defined, $\text{CCE}_a(p)(c) = c'$ such that
 - i. $\text{CG}(c') = \text{CG}(c) \cup (\text{Cred}_a(p) > 0.5)$
 - ii. $T(c') = \text{push}(\{p\}, T(c))$

It follows that *p* is at-issue and up for debate, just like the issues pushed onto the Table by prototypical conversational moves such as assertion and question. Therefore, discourse participants can respond to a piece of contextual compelling evidence for the proposition *p It rained* by showing their agreement or disagreement with *p*, as illustrated in (43). Also, A's use of the anaphoric expression *zheyang* 'this' in (43) referring to *p* ('*I expected it rained*'/'*I don't believe it rained*') demonstrates that the existence of the contextual compelling evidence for *p* enables *p* to be the antecedent of the anaphor. This is possible because the contextual compelling evidence for *p* raises an issue $\{p\}$ that can be discussed in the subsequent discourse (see Snider 2017 for the discussion of at-issueness and anaphoric salience).

⁶(42b-ii) will be removed later as *a*'s high credence on *p* being part of the common ground is enough for *p* to be an issue on the Table.

- (43) B enters A's windowless room wearing a wet raincoat.

A: Wo jiu zhidao (hui zheyang).

I PART know can this-like

'This is what I expected.'

A': Bu keneng, wo bu xiangxin (hui zheyang).

NEG possible I NEG believe would this

'No way, I don't believe this (would happen).'

As can be seen from (40) and (43), as long as some individual publicly entertains the possibility of p , p becomes an issue that is on the Table for discussion. To implement this intuition, we propose that as long as some individual's consideration of the possibility of p is made public in a context c , the issue $\{p\}$ is pushed onto the Table at c :

- (44) Pushing an issue onto the Table:

If $CG(c') = CG(c) \cup (\exists x. x \in A(c) \& Cred_x(p) > 0)$,

Then $T(c') = \text{push}(\{p\}, T(c))$.

where c' and c are the output context and input context respectively and $A(c)$ is the set of epistemic agents at c .

Now that (44) allows an issue $\{p\}$ to be on the Table as long as some individual considers p possible, the definitions of ASSERT and CCE are simplified as below:

- (45) CCP of ASSERT (final version):

$\text{ASSERT}(p)(c) = c'$ such that $CG(c') = CG(c) \cup (\text{Cred}_{\text{spkr}}(p) \geq 0.98)$

- (46) CCP of CCE (final version):

Let p, q be propositions and a be a discourse participant,

a. $\text{CCE}_a(p)(c)$ is defined iff

$\exists q. P(p|Dox_a \cap q) > P(p|Dox_a) \wedge P(p|Dox_a \cap q) > 0.5$

b. If defined, $\text{CCE}_a(p)(c) = c'$ such that $CG(c') = CG(c) \cup (\text{Cred}_a(p) > 0.5)$

Finally, we can formalize the contextual bias and neutrality. First, A context c is biased towards a proposition p if the issue $\{p\}$, but not $\{\neg p\}$, is on the Table in c :

- (47) Contextual bias (final version)

A context c is biased towards a proposition p iff

$\{p\} \subseteq \bigcup_{x=1}^n T(c)[x]$ and $\{\neg p\} \not\subseteq \bigcup_{x=1}^n T(c)[x]$,

where $n = |T(c)|$.

We also define context neutrality as follows: The context is neutral with respect to p if no issue is on the Table or if both p and $\neg p$ are on the Table. More precisely, the context is neutral when the union of all the issues at each stack member of the Table amount to an empty set or contains the issue $\{p, \neg p\}$:

- (48) The context c is neutral with respect to p iff $\bigcup_{x=1}^n T(c)[x] = \emptyset$ or $\{p, \neg p\} \subseteq \bigcup_{x=1}^n T(c)[x]$,
where $n = |T(c)|$.

To sum up, we formalize the notion of contextual bias using the subjective probability and the Table model. A context is biased towards p when the proposition that someone entertains the possibility of p becomes an issue of the Table.

6 Semantics of Mandarin polar questions

Before looking at how our notion of contextual bias derives the pattern summarized in Section 2, we briefly review the semantics of MAQ and ANAQ given by Yuan & Hara (2019). Furthermore, this paper adds felicity conditions on the semantics of \neg MAQ.

6.1 Ma Questions

Yuan & Hara (2019) claim that a MAQ like (49) has the syntactic structure given in (50).

- (49) Li he jiu ma?
Li drink alcohol Q₁
'Does Li drink alcohol?'

- (50)
- ```

ForceP
 / \
 TP Force
 / \ |
 Li VP ma/Q1
 \ /
 he jiu

```

The semantics of the particle *ma/Q<sub>1</sub>* is defined as in (51). The particle takes its sister proposition *p* as an argument, creates a Hamblin alternative  $\{p, \neg p\}$  as an issue and pushes the issue onto the Table:

- (51) CCP of *Q<sub>1</sub>*:

$$Q_1(p)(c) = c' \text{ such that } T(c') = \text{push}(\{p, \neg p\}, T(c))$$

Now, we claim that *-MAQs* have a felicity condition (Searle 1965) in addition to the usual felicity condition of questions that *+MAQs* also have.<sup>7</sup> In a nutshell, a *\neg p-ma* is felicitous only when the context is biased towards *\neg p*, i.e.,  $\{\neg p\} \subseteq \bigcup_{x=1}^n T(c)[x]$  and  $\{p\} \not\subseteq \bigcup_{x=1}^n T(c)[x]$ :

- (52) Felicity condition of *-MAQ*:

The use of a negative MAQ, i.e., a MAQ containing NegP as the maximal I-projection which denotes *\neg p*, is felicitous in a context *c* only if *c* is biased towards *\neg p*.

## 6.2 A-not-A questions

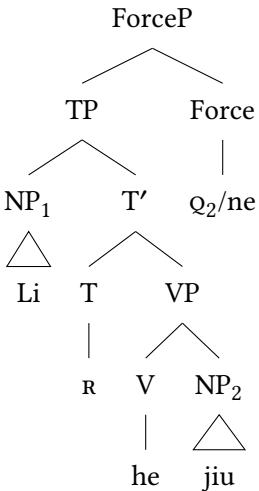
Turning to ANAQs, Yuan & Hara (2019) propose that an ANAQ like (53) has the structure in (54), adopting Huang's (1991) analysis. The feature *r* represents the reduplication of the predicate with the negative marker *bu*. The optional particle *ne* is the phonological realization of another question operator *Q<sub>2</sub>*.

- (53) Li he bu he jiu (ne)?↓  
 Li drink not drink alcohol *Q<sub>2</sub>*  
 'Does Li drink or not drink alcohol?'

---

<sup>7</sup>See Trinh (2014) for an alternative analysis of the felicity conditions for positive and negative polar questions. Trinh (2014) makes two generalizations about the felicitous use of polar questions: 1. A polar question is felicitous only if its prejacent does not contradict the answer implied by contextual evidence; 2. In contexts where there is neither evidence for *p* nor evidence for *\neg p*, the question denoting  $\{p, \neg p\}$  is felicitous only if it is an inverted positive question. Trinh (2014) explains the first generalization by adopting the Principle of Maximize Presupposition and explains the second one by adopting the Maxim of Manner: in a neutral context where there is neither evidence for *p* nor evidence for *\neg p*, the speaker will choose a positive polar question instead of a negative one because the former is simpler in syntactic form.

(54)



The reduplication feature  $R$  is responsible for creating a Hamblin set:

(55) Semantics of reduplication  $R$ 

$$[\![R]\!] = \lambda P. \lambda x. \{P(x), \neg P(x)\}$$

The particle  $Q_2/ne$  pushes the Hamblin set created by  $R$  to the Table:

(56) CCP of the operator  $Q_2$ :

$$Q_2(Q)(c) = c' \text{ such that } T(c') = \text{push}(Q, T(c))$$

Finally, an ANAQ has to be uttered with a final L% boundary tone (↓). Following Biezma & Rawlins's (2012) analysis of English final falling tone of alternative questions, Yuan & Hara (2019) argue that the Mandarin final ↓/L% is a closure operator which indicates that there is no issue on the Table or the issue presented by the ANAQ is the only issue on the Table. The current paper proposes the following semantics for ↓:<sup>8</sup>

<sup>8</sup>An ANAQ followed by the particle *ne* can be uttered with final H%, as pointed out by an anonymous reviewer. We speculate that when an ANAQ containing *ne* is uttered with H% tone, the L% tone is overridden by H%. Thus, the source of neutrality is still L%. Our intuition is that when an ANAQ containing *ne* is uttered with H% tone, the speaker is more anxious to know the answer, compared with ANAQs without *ne*. This is why Shao (1996) argues that the semantics of *ne* reinforces the interrogative force. We believe that this reinforcing meaning is not due to *ne*, but due to the H% boundary tone. Following Bartels (1997) and Hara & Davis (2013), the H% tone indicates that the utterance is directed at the addressee and the speaker expects the addressee to resolve the issue. Thus, when uttering ANAQs containing *ne* with H% tone, the speaker sounds more anxious in seeking an answer. Another complexity is that whether the

(57) Semantics of ↓

$$[\![\downarrow]\!] = \lambda\varphi.\lambda c. \bigcup_{x=1}^n T(c)[x] = \varphi \text{ or } \emptyset, \\ \text{where } n = |T(c)|$$

Thus, when an ANAQ (i.e., *p-or-not-p*) is uttered with ↓, it expresses that the Table has no issue or that only issue on the Table is {*p*, *¬p*}.

## 7 Deriving the distribution

Let us illustrate how our notion of contextual bias (47), repeated here as (58), together with the notion ‘pushing an issue on the Table’ (44), repeated here as (59), correctly predicts the felicity of MAQs and ANAQs in different contexts.

(58) Contextual bias (final version)

A context *c* is biased towards a proposition *p* iff  
 $\{p\} \subseteq \bigcup_{x=1}^n T(c)[x]$  and  $\{\neg p\} \not\subseteq \bigcup_{x=1}^n T(c)[x]$ ,  
 where  $n = |T(c)|$ .

(59) Pushing an issue onto the Table:

If  $CG(c') = CG(c) \cup (\exists x. x \in A(c) \& Cred_x(p) > 0)$ ,  
 Then  $T(c') = \text{push}(\{p\}, T(c))$ .

where *c'* and *c* are the output context and input context respectively and *A(c)* is the set of epistemic agents at *c*.

### 7.1 Positive/Negative *ma* questions

As summarized in Section 2, +MAQs and -MAQs are in complementary distribution. Recall that a *¬p-ma* has a specific felicity condition (52) that dictates that the Table must contain the issue {*¬p*}. On the other hand, positive MAQs do not have such a contextual requirement. MAQs. That is, *p-ma* is unacceptable when the context is biased towards *¬p* while it is acceptable when the context is neutral or biased towards *p*. We show in this section that the distribution is straightforwardly explained in terms of pragmatic competition.

---

particle *ne* carries the final H% or L% depends on the lexical tone of the previous syllable. Thus, in (i) when the previous syllable carries a high level lexical tone (55), the particle *ne* cannot carry a H%.

- (i) Kai55 bu kai55 chuang55 ne?  
 open not open window ne  
 ‘Shall we open the window or not?’

### 7.1.1 Neutral context

In (60), there is no issue on the Table, thus  $\neg\text{MAQ}$  is ruled out, while  $+\text{MAQ}$ , which does not have such an extra condition, is okay:

- (60) The first question in a questionnaire investigating the relationship between weather and people's mental states is:

- Q: Ni de chengshi zuotian xia yu le ma?  
 you GEN city yesterday fall rain PERF ma  
 'Did it rain yesterday in your city?' (+MAQ)
- Q': # Ni de chengshi zuotian mei xia yu ma?  
 you GEN city yesterday NEG fall rain ma  
 'Did it not rain yesterday in your city?' (-MAQ)

### 7.1.2 positively biased context

As shown in (31), repeated here as (61), A has asserted the proposition  $p$  *It rained*. That is,  $\text{CG}(c') = \text{CG}(c) \cup (\text{Cred}_A(p) \geq 0.98)$ , hence the issue  $\{p\}$  is pushed onto the Table and the context is biased towards  $p$ . A default  $+\text{MAQ}$  is felicitous in such a positively biased context. In contrast,  $\neg p\text{-}ma$  is infelicitous since unlike  $+\text{MAQs}$ ,  $\neg\text{MAQs}$  have a contextual requirement that the context needs to be negatively biased.

- (61) A: Zuowan xia yu le.  
 'It rained last night.'
- B: Xia yu le ma?  
 fall rain PERF ma  
 'Did it rain?' (+MAQ)
- B': # Mei xia yu ma?  
 NEG fall rain ma  
 'Did it not rain?' (-MAQ)

The assertion of bare  $p$  is not the only way to mark the context as biased towards  $p$ , but a modalized or embedded  $p$  as in A1–A3 of (62) is enough to make the context  $p$ -biased. Recall from the definition of ‘pushing an issue onto the Table’ (44) that  $p$  is pushed onto the Table as long as there is some individual  $x$ , who is not necessarily a conversation participant, that entertains the possibility of  $p$  ( $\exists x. x \in A(c) \& \text{Cred}_x(p) > 0$ ). Thus, since all the A-utterances in (62) make the context biased towards  $p$ , only the  $+\text{MAQ}$  is felicitous:

- (62) A1: Zuowan keneng xia yu le.  
           yesterday possible fall rain PERF  
           ‘Maybe it rained last night.’
- A2: Wo juede zuowan xia yu le.  
       I think last.night fall rain PERF  
       ‘I think that it rained last night.’
- A3: John shuo zuowan xia yu le.  
       John said last.night fall rain PERF  
       ‘John said that it rained last night.’
- B: Xia yu le ma?  
       fall rain PERF ma  
       ‘Did it rain?’ (+MAQ)
- B': # Mei xia yu ma?  
       NEG fall rain ma  
       ‘Did it not rain?’ (-MAQ)

Similarly, in (63) the contextually compelling evidence pushes  $p$  onto the Table (see (46) and (59)), thus the context is biased towards  $p$  and  $p\text{-}ma$  is okay while  $\neg p\text{-}ma$  is unacceptable:

- (63) B enters A’s windowless room wearing a wet raincoat.
- A: Xia yu le ma?  
       fall rain PERF ma  
       ‘Did it rain?’ (+MAQ)
- A': # Mei xia yu ma?  
       NEG fall rain ma  
       ‘Did it not rain?’ (-MAQ)

In short, a  $-\text{MAQ}$  cannot be used in neutral nor positively biased contexts as it has a felicity condition that requires negatively biased contexts. A  $+\text{MAQ}$  does not have such a requirement, thus it is a default polar question that can be used in both neutral and positively biased contexts.

### 7.1.3 negatively biased contexts

Now, let us look at the contexts where  $-\text{MAQs}$  are used. As long as the context suggests that someone entertains the possibility of  $\neg p$  as in the following,  $\neg p$  is pushed onto the Table and the context is biased towards  $p$ . Since this is the

context that the felicity condition of  $\neg p\text{-}ma$  (52) requires,  $-\text{MAQ}$  wins over  $+\text{MAQ}$  as a result of pragmatic competition:

- (64) A1: Zuowan (keneng) mei xia yu.  
last-night possible NEG fall rain  
'(Maybe) it did not rain last night.'
- A2: Wo bu juede zuowan xia yu le.  
I NEG think last-night fall rain PERF  
'I don't think that it rained last night.'
- A3: John shuo zuowan mei xia yu.  
John say last-night NEG fall rain  
'John said that it did not rain last night.'
- B: Mei xia yu ma?  
NEG fall rain ma  
'Did it not rain?' ( $-\text{MAQ}$ )
- B': # Xia yu le ma?  
fall rain PERF ma  
'Did it rain?' ( $+\text{MAQ}$ )

Similarly, when the contextually compelling evidence supports  $\neg p$ ,  $\neg p$  is pushed onto the Table, thus the context is biased towards  $\neg p$ . Thus,  $\neg p\text{-}ma$  is acceptable, while  $p\text{-}ma$  is not:

- (65) B leaves A's windowless room carrying a raincoat. When B returns, A notices that B's raincoat is dry.
- A: Mei xia yu ma?  
NEG fall rain ma  
'Did it not rain?' ( $-\text{MAQ}$ )
- A': # Xia yu le ma?  
fall rain PERF ma  
'Did it rain?' ( $+\text{MAQ}$ )

Furthermore, the felicity condition of  $-\text{MAQ}$  (52) accounts for the availability of the negative MAQ in (66), which is translated from the English example used by Romero & Han (2004) to show that English low negative questions can convey the speaker's epistemic neutrality towards answers.

- (66) 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 he Mary bu hejiu.  
 Jane and Mary NEG drink-alchol  
 'Jane and Mary do not drink.'

S: Haode. Bill ne? Ta (ye) bu hejiu ma?  
 good-ATTR Bill ne? 3SG too NEG drink-alchol ma  
 'OK. What about Bill? Does he not drink (either)?' (-MAQ)

In (66), the goal of the discourse is to '[supply] non-alcoholic beverages' and A has asserted '*Jane and Mary do not drink*', thus we can infer that the current question under discussion is a negative *wh*-question 'Who does not drink?'. This means that what is on the Table is the issue,  $\{\neg\text{drink}(j), \neg\text{drink}(m), \neg\text{drink}(b)\}$ . Then, A's assertion pushes  $\neg\text{drink}(j)$  and  $\neg\text{drink}(m)$  onto the Table. Therefore,  $\bigcup_{x=1}^3 T(c)[x] = T(c)[1] \cup T(c)[2] \cup T(c)[3] = \{\neg\text{drink}(m)\} \cup \{\neg\text{drink}(j)\} \cup \{\neg\text{drink}(j), \neg\text{drink}(m), \neg\text{drink}(b), \dots\} = \{\neg\text{drink}(j), \neg\text{drink}(m), \neg\text{drink}(b), \dots\}$ .<sup>9</sup> The resulting Table contains  $\neg\text{drink}(b)$  but not  $\text{drink}(b)$ . Thus, the context is biased towards  $\neg\text{drink}(b)$ , even though the speaker does not have any epistemic bias. Since our definition only requires the context, not the spaker, to be biased, it correctly predicts the use of the negative MAQ in (66) to be felicitous.

In contrast, a negative MAQ is infelicitous in (67), where the goal of the conversation is now to find out who drinks. The context is biased towards  $p$  rather than  $\neg p$ , thus a  $\neg$ -MAQ cannot be used.

- (67) The speaker is organizing a party and she is in charge of supplying all the alcoholic beverages for (alcoholic) drinkers. The speaker is going through a list of people that are invited. She has no previous belief or expectation about their drinking habits.

S: # John bu hejiu ma?  
 John NEG drink-alchol ma  
 'Does John not drink?' (-MAQ)

In summary, we explain the complementary distribution of positive and negative MAQs summarized in Table 5 in terms of pragmatic competition.

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<sup>9</sup>We could also treat S's utterance of *Haode* 'OK' as an acceptance of A's assertion, thus  $\neg\text{drink}(j)$  and  $\neg\text{drink}(m)$  may be already removed from the Table.

Table 5: Distribution of positive and negative MAQs

|               | neutral | biased towards $p$ | biased towards $\neg p$ |
|---------------|---------|--------------------|-------------------------|
| positive MAQs | ✓       | ✓                  | #                       |
| negative MAQs | #       | #                  | ✓                       |

The felicity condition of  $\neg$ -MAQs (52) plays a crucial role. A  $\neg$ -MAQ has a more specific condition that the context has to be negatively biased. Thus, whenever this rule applies,  $\neg$ -MAQs win over  $+$ MAQs, which are uttered elsewhere, i.e., in neutral and positively biased contexts. We do not need to stipulate any contextual requirement for  $+$ MAQs, which are default polar questions. Note also that our definition allows us to uniformly deal with bias arising from default assertions, contextual compelling evidence and possibility claims.

## 7.2 A-not-A questions

Let us finally turn to ANAQs. As summarized in Table 6, ANAQs are only available in neutral contexts.

Table 6: ANAQs in neutral contexts

|       | neutral | biased towards $p$ | biased towards $\neg p$ |
|-------|---------|--------------------|-------------------------|
| ANAQs | ✓       | #                  | #                       |

In Section 5.2, we define contextual neutrality as in (68). The context is neutral with respect to  $p$  when the Table is empty or the Table contains the issue  $\{p, \neg p\}$ .

- (68) The context  $c$  is neutral with respect to  $p$  iff  $\bigcup_{x=1}^n T(c)[x] = \emptyset$  or  $\{p, \neg p\} \subseteq \bigcup_{x=1}^n T(c)[x]$ , where  $n = |T(c)|$ .

Now as discussed in Section 6.2, an ANAQ is always uttered with the boundary tone  $\downarrow/L\%$ , which denotes that all the issues on the Table amount to the Hamblin set denoted by the A-not-A construction or that an empty set:

- (69) Semantics of  $\downarrow$   
 $\llbracket \downarrow \rrbracket = \lambda\varphi.\lambda c.\bigcup_{x=1}^n T(c)[x] = \varphi$  or  $\emptyset$ , where  $n = |T(c)|$

As can be seen from (68) and (69), the presence of  $\downarrow/L\%$  is the source of the neutrality requirement of ANAQs. The intonational morpheme, an exhaustive operator, semantically marks that the context is neutral.

Let us look at specific examples starting with neutral contexts. The context can be neutral in two ways. First, an out-of-the-blue context like (70) is a neutral context, i.e., the Table is empty ( $\bigcup_{x=1}^1 T(c)[x] = \emptyset$ ):

- (70) A researcher uses a questionnaire to investigate the relationship between the weather and people's mental states.

Q: Ni de chengshi zuotian xia mei xia yu? $\downarrow$   
 you GEN city yesterday fall NEG fall rain  
 'Did it rain or not rain yesterday in your city?' (ANAQ)

Second, the context is neutral when both issues,  $\{p\}$  and  $\{\neg p\}$ , are on the Table. In (71), A and B's assertions push  $p$  and  $\neg p$  onto the Table, respectively. Thus, at the context after B's assertion, the Table contains both issues ( $\bigcup_{x=0}^2 T(c)[x] = \{p\} \cup \{\neg p\} = \{p, \neg p\}$ ). Thus, according to (68), the context is neutral and compatible with the semantics of  $\downarrow$ .<sup>10</sup>

- (71) A: Zuowan xia yu le.

'It rained last night.'

- B: Bu, meiyou xia.

'No, it did not rain.'

- C: (Suoyi / Daodi) xia mei xia yu? $\downarrow$

so after.all fall not fall rain

'(So/After all,) Did it rain or not rain?' (ANAQ)

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<sup>10</sup>One may wonder whether it is better to separate unmarked ANAQs from ones marked with the adverb *daodi* as the one in (71) since the  $\{p, \neg p\}$  part in the definition of contextual neutrality in (68) seems to be needed only for *daodi* ANAQs. However, providing independent definitions for unmarked ANAQs and *daodi* questions would not only fail to capture the apparent overlaps in their syntactic structures and meanings but also such definitions would be inconsistent with each other. Suppose that the neutrality requirement for unmarked ANAQs is only that there be no issues on the Table. On the other hand, the adverb *daodi* presupposes that the question it attaches to is an old question (i.e., the question has already been pushed onto the Table but not solved), so the speaker uses *daodi* questions to urge the addressee to provide the answer immediately, yielding what Biezma (2009) calls the cornering effect. As can be seen, the composition would result in contradiction of the two presuppositions: The A-not-A construction presupposes that there is no issue while *daodi* presupposes that the issue denoted by the prejacent is already on the Table. We thus consider both having no issues,  $\emptyset$ , and having a polar issue,  $\{p, \neg p\}$ , as cases of contextual neutrality.

When the context is biased toward  $p$  by an assertion of  $p$  as in (72), the Table contains  $\{p\}$ , i.e.,  $\bigcup_{x=0}^1 T(c)[x] = \{p\}$ , but not  $\{\neg p\}$ . Therefore, the context contradicts the semantics of  $\downarrow$ .

- (72) A: Zuowan xia yu le.  
       ‘It rained last night.’  
     B: # Xia mei xia yu? $\downarrow$   
       ‘Did it rain or not rain?’ (ANAQ)

Similarly, when someone asserts  $\neg p$ , the context is biased towards  $\neg p$  as in (73). Then, the Table contains  $\{\neg p\}$ , but not  $\{p\}$ , and becomes incompatible with the semantics of L%.

- (73) A: Zuowan mei xia yu.  
       ‘It did not rain last night.’  
     B: # Xia mei xia yu? $\downarrow$   
       ‘Did it rain or not rain?’ (ANAQ)

In all other positively and negatively biased contexts discussed in Section 7.1.2 and Section 7.1.3, respectively, an ANAQ is infelicitous. The same explanation applies: The Table contains only either  $\{p\}$  or  $\{\neg p\}$  and not the issue with the opposite polarity, which conflicts with the semantics of  $\downarrow$ .<sup>11</sup>

In short, an ANAQ can be uttered only in neutral contexts because the intonational morpheme  $\downarrow$  that is obligatorily present in the ANAQ semantically expresses that the context is neutral.

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<sup>11</sup>An anonymous reviewer points out that the utterance of *maybe p*, which is supposed to give rise to a positively biased context as seen in (62), can be followed by the phrase *Shuo qingchu dian!* ‘Please be clear!’ and a *daodi* ANAQ:

- (i) A: Zuowan keneng xiayu-le.  
       last.night possible rain-ASP  
       ‘Maybe it rained last night.’  
     B: (Shuo qingchu dian!) Zuowan (daodi) xia mei xiayu?  
       say clear a.bit last.night after.all rain not rain  
       ‘(Please be clear!) Did it rain last night or not?’

We speculate that the issue that the utterance of *maybe p* raises is  $\{p\}$  by default but it could be  $\{p, \neg p\}$ . Our speculation is motivated by the fact that the presence of the phrase *Shuo qingchu dian!* ‘Please be clear!’ and the adverb *daodi* in (i) are crucial since B’s utterance of ANAQ becomes infelicitous without them:

- (ii) A: Zuowan keneng xiayu-le.  
       ‘Maybe it rained last night’

## 8 Concluding remarks

The differences among the three kinds of polar questions, +MAQs, −MAQs and ANAQs, discussed in this paper are very subtle. As argued by Yuan & Hara (2019), they all create a Hamblin issue and push it onto the conversation Table. Previous researchers were also aware that these questions convey different bias meanings, and attempted to characterize the semantics of these questions in terms of the speaker’s bias. In this paper, we show that the speaker’s bias is not suitable to account for their distribution. Instead, we argue that the contextual bias determines the landscape of Mandarin polar questions. The notion of the contextual bias is formalized in terms of subjective probability and Farkas & Bruce’s (2010) Table model. The context is biased towards  $p$  when it is a common belief that some individual entertains the possibility of  $p$  and there is no individual that publicly entertains the possibility of  $\neg p$ . Our formalization can correctly predict not only the biases that arise from the previous assertions in the discourse but also the ones that arise from non-verbal, contextually-compelling evidence, low-possibility claims, and reported assertions made by non-participants.

Our analysis also has important theoretical implications in the interfaces among prosody, semantics and pragmatics. First, by employing the elsewhere condition to explain the division of labor of +/−MAQs, we can maintain a simple semantics for -MAQs and there is no need to stipulate felicity conditions for +MAQ. Second, the current analysis supports the idea that a prosodic contour such as ↓/L% is an intonational morpheme that can bear semantic content that affects the grammaticality of the construction.

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B: # Zuowan xia mei xiayu?

‘Did it rain last night or not?’

The contrast between (i) and (ii) shows that *Shuo qingchu dian!* and *daodi* presuppose that there is an unsolved issue  $\{p, \neg p\}$  on the Table, though the presupposition is not explicitly spelled out in (i). Thus, the use of *Shuo qingchu dian!* and *daodi* coerces the contextual update of uttering ‘*maybe p*’ from pushing  $\{p\}$  onto the Table to pushing  $\{p, \neg p\}$ . This coercion is reasonable given the semantics of existential modal in awareness semantics. The precise semantics of *maybe/keneng* is beyond the scope of the paper, but in awareness semantics (Crone 2018, Bledin & Rawlins 2020), ‘*maybe p*’ translates to ‘an agent is aware of  $p$ ’. Furthermore, if an agent is aware of  $p$ , she is also aware of  $\neg p$ .

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# Chapter 7

## What can Cantonese sentence-final particles tell us about rhetorical questions?

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Rhetorical questions have been analyzed both as utterances equivalent to assertions and as questions. We acknowledge that they have the characteristics of both: their hybrid nature is best captured if we give them an inquisitive semantic treatment. Rhetorical questions can suggest both an empty set answer and a non-empty set answer, and this fact gives rise to an asymmetry in terms of their inquisitiveness and informativity, which is also reflected in their prosody. In a perception experiment, Cantonese speakers associated information-seeking questions and rhetorical questions suggesting an empty set answer with a certain intonational contour on the sentence-final particle, but there was no clear pattern for rhetorical questions with a non-empty set answer. We explain this pattern by the informativity/inquisitiveness of these utterances, which maps to different levels of dependence from the common ground.

### 1 Introduction

Both the meaning and the form of rhetorical questions have received much attention in the literature. As for their meaning, they were first considered in general



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to have “the illocutionary force of an assertion of the opposite polarity from what is apparently asked” (Han 2002: 201). In this sense, Han’s example in (1), when asked as a rhetorical question, means that everybody likes ice-cream. Since under this reading, the set of people who do not like ice-cream is empty, we refer to such rhetorical questions as *empty set* rhetorical questions.

- (1) After all, who doesn’t like ice-cream? (Caponigro & Sprouse 2007: 12)

Later, it has become clear that not all rhetorical questions denote such an empty set answer, a fact also acknowledged by Han (2002: fn 6), because they can denote a non-empty set answer as well. Under such a reading, (1) would be used in a context where it is common ground that someone, known to both the speaker and the addressee, does not like ice-cream. In subsequent studies, rhetorical questions are defined as questions with an obvious answer (Rohde 2006, Caponigro & Sprouse 2007, Biezma & Rawlins 2017). In these accounts, the obviousness of the answer plays a major role, but not the kind of that obvious answer (i.e., empty set or non-empty set answer). Rhetorical questions therefore would form a homogeneous group.

Given the homogeneity in terms of meaning, we expect that rhetorical questions will also form a homogeneous group in terms of their prosody. This is implicitly assumed by Biezma & Rawlins (2017), who refer to a “characteristic (hard to pin down) rhetorical prosody” that characterizes rhetorical questions regardless of the kind of answer they expect.

A number of recent production studies have shown that the prosody of empty set rhetorical questions indeed distinguishes them from information-seeking questions (see Braun et al. 2018 for German, Dehé & Braun 2019 for English, Dehé & Braun 2020 for Icelandic, and Zahner et al. 2020 for Mandarin). But since these studies do not consider the class of non-empty set rhetorical questions, they neither support nor challenge the assumption that the two types of rhetorical questions have the same prosodic form.

However, based on even more recent production experiments by Lo et al. (2019) on Cantonese and Lo & Kiss (2020) on Mandarin, we have reason to believe that the kind of answer rhetorical questions suggest plays a role in their semantics. When participants read the same interrogative in three different contexts – one that gives the interrogative an information-seeking question reading, one that gives it an empty set rhetorical question reading, and one that gives it a non-empty set rhetorical reading – the utterances show a three-way distinction in certain prosodic properties, a contrast that is not predicted by any of the above-mentioned accounts.

If the two kinds of rhetorical questions are marked differently in their form, both from each other and from information-seeking questions, it suggests that the two types of rhetorical questions differ in their semantics. This is the conclusion of Kiss & Lo (2021), who offer an inquisitive semantic analysis that describes the three question types as expressing three distinct kinds of speaker commitment because they form a scale in terms of how informative/inquisitive they are. Namely, information-seeking questions are the least informative, and empty set rhetorical questions are the most informative among the questions on their scale, and non-empty set rhetorical questions are between them.

In this chapter, we test these claims by means of a perception experiment done with native speakers of Cantonese; participants hear string-identical interrogatives which all have their sentence-final particle *aa*<sup>3</sup> prosodically manipulated.<sup>1</sup> The experiment allows us to test whether there is indeed a three-way prosodic distinction among these question types, and indirectly, it allows us to see if the three question types indeed form a scale in terms of their informativity / inquisitiveness, which maps onto different degrees of context-dependence, which in turn may affect how strongly speakers associate a certain contour with one or the other question type.

To our knowledge, ours is the first study to compare both empty set and non-empty set rhetorical questions to each other and to information-seeking questions in a perception experiment. As such, it contributes to what we know about rhetorical questions, and to what we know about intonation and the *aa*-family of sentence-final particles in Cantonese.

The paper is organized as follows. In Section 2, we present arguments for the claim that rhetorical questions are questions, and distinguish empty set and non-empty set rhetorical questions. In Section 3, we present Farkas & Roelofsen's (2017) inquisitive semantic analysis of questions and extend it following Kiss & Lo (2021) so that it comprises information-seeking and rhetorical wh-questions. Section 4 presents previous work on the prosody of rhetorical questions, including Cantonese ones. In Section 5, the perception experiment is described, which is followed by the general discussion in Section 6 and by the conclusion in Section 7.

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<sup>1</sup>The numbers 1 and 3 indicate the lexical tone of the particles. 1 is high level, 2 is high rising, 3 is mid level, 4 is low falling, 5 is low rising, and 6 is low level. See Matthews & Yip (2011) for a detailed characterization of Cantonese tones.

## 2 Rhetorical questions

In Section 2.1, we argue that rhetorical questions are better treated as (biased) questions, as opposed to assertions, and in Section 2.2, we show subtypes of rhetorical questions which differ in their meaning.

### 2.1 Rhetorical questions as questions

It is widely known that rhetorical questions behave differently from genuine or information-seeking questions in discourse, namely they exhibit quite a few properties typically associated with assertions. Using the tests of Sadock (1971, 1974), who differentiates what he calls “queclaratives” from information-seeking questions, Han (2002) showed that rhetorical questions, but not information-seeking ones, can be introduced by *after all* and can be followed by an utterance that is introduced by *yet*.

- (2) a. *After all*, do phonemes have anything to do with language?  
b. Do phonemes have anything to do with language? *Yet* people continue  
to believe in them. Sadock (1971: 225), cited by Han (2002)

*After all* and *yet* can felicitously occur in assertions, but not in information-seeking questions; yet when the interrogative *Do phonemes have anything to do with language?* is interpreted as a rhetorical question, it can appear in such environments.

Another assertion-like property rhetorical questions exhibit is their compatibility with strong negative polarity items or minimizers (Han 2002, Abels 2003, Guerzoni 2004, Biezma & Rawlins 2017).

- (3) When did John *lift a finger* to help us?

Minimizers are felicitous in assertions but not in information-seeking questions. The interrogative in (3) can only have a rhetorical question interpretation, conveying that ‘John never helped us’; thus rhetorical questions behave like assertions in this respect as well.

These and further arguments gave rise to the view that rhetorical questions are assertions (Han 2002), a view that has been challenged by the observations of Rohde (2006) and Caponigro & Sprouse (2007). The latter authors pointed out some inherently question-like properties of rhetorical questions that receive no explanation if they are treated as assertions.

Most importantly, rhetorical questions can also suggest a non-empty answer as shown in (4), not necessarily an empty set answer as in examples (2) and (3).

- (4) Who has fed you and given you a proper education?

(Context: a mother to her son) Rohde (2006) citing Han (1998)

In addition, rhetorical questions can be answered the same way as questions, regardless of the kind of answer they suggest, as shown by the following minimal pair in (5).

- (5) a. SPEAKER: You should stop saying that Luca didn't like the party last night. *After all, who was the only one that was still dancing at 3am?*  
 ADDRESSEE or SPEAKER: Luca.
- b. SPEAKER: You should stop saying that Luca didn't like the party last night. *After all, Luca was the only one that was still dancing at 3am!*  
 ADDRESSEE or SPEAKER: #Luca. (Caponigro & Sprouse 2007: 124)

If rhetorical questions function as assertions, they should be felicitous as answers to information-seeking questions, as in (6a), but this is not always the case, as Biezma & Rawlins (2017) point out.

- (6) a. A: Does Ed McMahon drink?  
 B: Is the Pope a Catholic? (Schaffer 2005: 438)
- b. A: Does Mother Teresa drink?  
 B: #Does Mother Teresa drink? (as a rhetorical question)

While A receives an affirmative answer from B in (6a) who uses the rhetorical reading of *Is the Pope a Catholic?*, (6b) shows that if both the information-seeking question and the rhetorical question given in response are conveyed by the same interrogative, the result is odd. B's utterance in (6b) can at most be interpreted as an echo question, but not a rhetorical question conveying 'Mother Teresa does not drink', which, under the assertion-like analysis, should be an acceptable answer.

However, if we consider the proposal of those who treat rhetorical questions as questions with an obvious answer (Rohde 2006, Caponigro & Sprouse 2007, Biezma & Rawlins 2017), the infelicity of (6b)-B receives a natural explanation. Speaker A raised the issue of whether Mother Teresa drinks, after which B's response is infelicitous for two reasons. First, because B's utterance is a question, too, so despite the obvious answer, it still raises the same issue, which is an infelicitous move. Second, since A's utterance is an information-seeking question, it is evidence that the issue of 'whether Mother Teresa drinks' is not settled. If so, the answer to B's utterance should not be treated as common ground.

Treating rhetorical questions as questions with an obvious answer has further advantages. Unlike in the assertion-like analysis, both rhetorical questions suggesting an empty set answer and ones with a non-empty set answer are included; and it explains why rhetorical questions can be answered. Lastly, Caponigro & Sprouse (2007) point out that rhetorical questions are also like information-seeking questions in that they can have multiple wh-phrases and they can also be embedded.

However, the question-like analysis cannot explain why minimizers can occur in rhetorical questions if the suggested answer is the empty set, to which the assertion-like analysis offers a solution. We nevertheless adopt a question-like analysis of rhetorical questions, and propose that to account for their assertion-like properties, we need to take into account the kind of answer suggested by the utterance (i.e., whether it is an empty set answer or a non-empty answer).

## 2.2 Rhetorical questions are not all alike

Rhetorical questions thus can convey an empty set answer or a non-empty set answer, as shown in examples (7b) and (8b), respectively; however, this distinction does not play a role in the analyses that treat them as questions (Rohde 2006, Caponigro & Sprouse 2007, Biezma & Rawlins 2017).

- (7) Context: David is considering helping his colleagues.
  - a. David: Should I help them?
  - b. Erez: No way! Who helped you when you were in trouble?
- (8) Context: It is common ground that Cleo helped David when he was in trouble.
  - a. David: Who should I trust?
  - b. Erez: Well, who helped you when you were in trouble? (Of course Cleo!)

The only exception known to us is the account of Jamieson (2018), who treats the two rhetorical question types differently. Jamieson (2018) refers to empty set rhetorical questions as *generic* rhetorical questions. This generic interpretation is due to a metavariable  $\epsilon$ , which affects the semantic value of the wh-phrase so that it no longer denotes the ordinary type of domain it is associated with, that is, *who* does not denote humans, *where* does not denote locations, etc. (9). The metavariable guarantees that the answer set becomes empty under its ordinary value, and so the rhetorical question is interpreted as an assertion, as in Han's

approach. Thus, Erez's utterance in (7b) amounts to saying 'Nobody helped you when you were in trouble'.

- (9) a.  $\llbracket \text{who} \rrbracket^o = \lambda w. \epsilon \notin \text{human in } w$   
 b.  $\llbracket \text{where} \rrbracket^o = \lambda w. \epsilon \notin \text{location in } w$  (Jamieson 2018: 324)

Rhetorical questions that suggest a non-empty answer, on the other hand, are referred to by Jamieson as *pragmatic* rhetorical questions: these are questions which owe their assertion-like properties to the context, as they are questions with an already known answer. In agreement with Jamieson (2018), we posit that the two types of rhetorical questions have distinct semantics.

### 3 Rhetorical questions in inquisitive semantics

Previous analyses of rhetorical questions have made it clear that this question type shares several characteristics with assertions, as well as with information-seeking questions. Rhetorical questions are not the only question type with both assertion-like and question-like properties. Tag questions, consisting of a declarative anchor and a reduced interrogative clause, have been analyzed as a hybrid speech act type, being an assertion and a question at the same time, and declarative questions (also known as rising declaratives), which consist of a declarative clause and bear a question-like intonation, share properties of both as well (Gunlogson 2003, Asher & Reese 2007, Farkas & Roelofsen 2017).

The way Farkas & Roelofsen (2017) analyze such non-canonical questions is particularly important for our purposes because the inquisitive semantic framework they use makes it possible to capture both their assertion-like and question-like nature. In addition, they make falsifiable claims about the contribution of the marked form to utterance meaning.

We are primarily interested in wh-interrogatives. This is because, polar interrogatives suggesting a positive answer, which would correspond to rhetorical questions with a non-empty set answer, proved to be considerably more problematic to elicit in experimental settings. That is, in experimental settings, these were much harder to elicit than ones that suggest the empty set as an answer. Polar rhetorical questions suggesting a positive answer nevertheless do exist, as Rohde (2006) reports, a corpus example of which is shown in (10).

- (10) Has the educational system been so watered down that anybody who's above average is now gifted? (Rohde 2006: 135)

While Farkas & Roelofsen (2017) only treat utterance types with a sentence radical, they claim that wh-interrogatives, too, can fit in their model. In this paper, we adopt the proposal of Kiss & Lo (2021) (see Section 3.2) who offer an extension of their inquisitive semantic framework to accommodate wh-interrogatives conveying information-seeking and rhetorical questions, but our claims arguably also hold for polar interrogatives.

### 3.1 Inquisitive semantics

#### 3.1.1 Basic notions

In Farkas & Roelofsen (2017), a proposition  $P$  is modeled not only as a set of possible worlds (Stalnaker 1978) but also as a set of information states, which themselves are sets of possible worlds. Besides their inquisitive content, propositions are also characterized by their informative content, marked as  $\text{info}(P)$ , which is a set of those possible worlds that are members of any of the information states within the given proposition. The inquisitive content of a proposition expresses the issue it raises, and the informative content expresses which possible worlds, if any, can be discarded from the speaker's commitment set.

Any information state  $s$  can have a substate  $t$  such that if a possible world is a member of  $t$ , it is also a member of  $s$ . Substates within an information state form a lattice, and their maximal element is referred to as an alternative. Whenever the possible worlds that make up a proposition  $P$ 's informative content do not form a single alternative, which would be a member of  $P$ 's inquisitive content,  $P$  is inquisitive. And whenever the informative content of  $P$  is a proper subset of the set of all possible worlds  $W$ ,  $P$  is informative.

(11) Informative and inquisitive propositions

- a. A proposition  $P$  is inquisitive iff  $\text{info}(P) \not\in P$
- b. A proposition  $P$  is informative iff  $\text{info}(P) \neq W$  (Ciardelli et al. 2019: 23)

A declarative sentence conveying an assertion consists of one alternative and is therefore informative and non-inquisitive, whereas a polar interrogative conveying an information-seeking question consists of two alternatives, and is therefore inquisitive and non-informative. Both assertions and polar questions have sentence radicals, which we assume, following Stenius (1967), is the part of a declarative or interrogative sentence that signifies its "descriptive content". Utterances with a sentence radical have what Farkas & Roelofsen (2017) call a highlighted alternative, marked by  $\alpha$ , which is the alternative denoted by the sentence radical.

- (12) Inquisitive and informative content of a declarative conveying an assertion
  - a.  $P = \{\alpha\}^\downarrow$
  - b.  $\text{info}(P) = \text{info}(\alpha)$
- (13) Inquisitive and informative content of a polar interrogative conveying an information-seeking question
  - a.  $P = \{\alpha, \bar{\alpha}\}^\downarrow$
  - b.  $\text{info}(P) = W$

The basic discourse context proposed by Farkas & Roelofsen keeps track of the participants, the table, and the commitment sets assigned to each participant, as outlined in (14).

- (14) A basic discourse context is a triple  $\langle \text{PARTICIPANTS}, \text{TABLE}, \text{COMMITMENTS} \rangle$ , where:
    - a. **PARTICIPANTS**: the set of discourse participants;
    - b. **TABLE**: a stack of propositions, representing the proposals made so far;
    - c. **COMMITMENTS**: a function that maps every participant  $x \in \text{PARTICIPANTS}$  to a set of possibilities, those possibilities that  $x$  is publicly committed to.
- (Farkas & Roelofsen 2017: 255)

“The common ground” is the locus of mutual commitments (Stalnaker 1978, Farkas & Bruce 2010), which here is derived from the participants’ commitment sets.

- (15) a. Commitment set:  $cs_x = \bigcap \text{COMMITMENTS}(x)$ 
    - b. Common ground:  $cg = \bigcup \{cs(x) | x \in \text{PARTICIPANTS}\}$
- (Farkas & Roelofsen 2017: 255)

### 3.1.2 Semantic interpretation

The elegance of Farkas & Roelofsen’s (2017) account lies in differentiating what they refer to as the basic conventional discourse effects from the special discourse effects of an utterance, which is summarized by the division of labor principle.

- (16) Division of labor principle
  - a. The discourse effects of unmarked forms should be fully determined by their semantic content and the basic convention of use,  $F_b$ .

- b. The discourse effects of marked forms should always include the discourse effects that are dictated by their semantic content and the basic convention of use  $F_b$ . In addition, they may include special discourse effects connected to the particular sentence type involved.  
(Farkas & Roelofsen 2017: 250)

According to the division of labor principle, declaratives and interrogatives are interpreted by the same principle, and any differences in their interpretation arise from differences in their semantic content. The inquisitive content of utterance  $\phi$  is added to the TABLE and its informative content, to COMMITMENTS<sub>x</sub>.

(17) Basic convention of use

If a discourse participant  $x$  utters a declarative or interrogative sentence  $\phi$ , the discourse context is affected as follows:

- a. The proposition expressed by  $\phi$ ,  $\llbracket\phi\rrbracket$ , is added to the TABLE.
- b. The informative content of  $\phi$ ,  $\bigcup\llbracket\phi\rrbracket$ , is added to COMMITMENTS<sub>x</sub>.

(Farkas & Roelofsen 2017: 265)

In the case of a declarative assertion, the TABLE is updated by an expression consisting of a single alternative, whereas a polar interrogative conveying an information-seeking question places both the highlighted alternative ( $\alpha$ ) and its complement ( $\bar{\alpha}$ ), on the TABLE. The speaker's commitments are updated by a set of worlds compatible with the alternative(s) on the TABLE, that is, with  $\alpha$  in the case of an assertion, and with  $W$  in the case of a polar interrogative.

(18) Conventional discourse effects of  $x$  uttering an assertion:

- a.  $\{\alpha\}^\downarrow$  is added to the TABLE
- b.  $\alpha$  is added to COMMITMENTS<sub>x</sub>

(19) Conventional discourse effects of  $x$  uttering a polar question:

- a.  $\{\alpha, \bar{\alpha}\}^\downarrow$  is added to the TABLE
- b.  $W$  is added to COMMITMENTS<sub>x</sub> (Farkas & Roelofsen 2017: 266–267)

Marked utterances come with special discourse effects in addition to the basic conventional ones. In the case of utterance types with a highlighted alternative, the meaning added by the markedness conveys the level of credence the speaker has in the truth of the highlighted alternative. One way to add special discourse effects to an utterance is by marked intonation.

### 3.1.3 Boundary tones

Special discourse effects do not arise arbitrarily; they are inherently tied to intonation. In marked utterance types such as declarative questions and tag questions, Farkas & Roelofsen (2017) claim that sentence-final tunes play a crucial role in determining these special effects.

- (20) The contribution of sentence-final tunes to the special discourse effects of utterances
- a. ↑ ↔ zero to low credence
  - b. ↓↑ ↔ moderate to high credence
  - c. ↓↓ ↔ high credence
- (Farkas & Roelofsen 2017: 272)

At least in English utterances, the speaker marks high or low credence in the truth of the highlighted alternative by a falling and a rising sentence-final tune, respectively. The association of rises with low credence and of falls with high credence is in alignment with intuitions presented in earlier theoretical work on intonational contours and is also supported by empirical work, according to which sentence-final rising tunes are cross-linguistically associated with uncertainty and questionhood, while falling final tunes are associated with certainty and assertivity (Pierrehumbert & Hirschberg 1990, Gussenhoven & Chen 2000, Gussenhoven 2004). In sum, markedness in form entails markedness in meaning, and in addition, markedness in form maps systematically to markedness in meaning.

## 3.2 Information-seeking and rhetorical wh-questions

Wh-interrogatives do not have a highlighted alternative but a highlighted property (Farkas 2020).<sup>2</sup> Following Ciardelli et al.'s (2017) composition rules, applying *who* to the highlighted property yields a set of alternatives that correspond to a Hamblin-set (Hamblin 1973), which we label A (capital  $\alpha$ ). Consider the following interrogative.

- (21) Who helped David?

Let the domain of *who* in (21) consist of Ann, Ben and Cleo. In this context, A = {‘Ann helped David’, ‘Ben helped David’, ‘Cleo helped David’}. A thus consists of three alternatives.

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<sup>2</sup>See also Roelofsen & Farkas (2015).

We propose that the basic conventional discourse effects of a wh-interrogative conveying an information-seeking question consist of the same two components as those of other utterances considered so far: the TABLE is updated by the inquisitive content of the utterance, and COMMITMENTS<sub>S</sub>, the speaker's commitment set is updated by its informative content. The inquisitive content of a wh-interrogative is  $P$ , an inquisitive proposition, consisting of the alternatives that are elements of  $(A \cup \bar{A})$ . And the informative content of a wh-question is  $W$ , just like in the case of polar interrogatives.

- (22) Basic conventional discourse effects of an information-seeking question
- a.  $A^\downarrow \cup \bar{A}^\downarrow$  is added to the TABLE
  - b.  $W$  is added to COMMITMENTS<sub>S</sub>.

Note that (22) applies to polar interrogatives as well; only  $(A \cup \bar{A})$  is a set consisting of only two alternatives  $\{\alpha, \bar{\alpha}\}$ , since both  $A$  and  $\bar{A}$  are singletons.

Rhetorical questions have the same basic conventional discourse effects as information-seeking questions, but we propose, along with Jamieson (2018), that empty set and non-empty set rhetorical questions are both marked in meaning in their own way. Rhetorical questions that suggest a non-empty answer signal that the actual world is a member of an information state found within  $A$ , and rhetorical questions suggesting an empty set as their answer signal that the actual world is to be found in  $\bar{A}$ .

As for rhetorical questions with a non-empty set answer, the message the addressee receives is that the answer to the question is already known, and it is some member(s) from the domain denoted by the wh-phrase. But the addressee still needs to “consult” the common ground and the alternatives in  $A$  in order to arrive at the intended interpretation of the utterance. The special effect of a non-empty set rhetorical question is shown in (23).

- (23) Special effect of a rhetorical question with a non-empty answer:  
Instead of  $W$ , only  $\text{info}(A) \cap cg$  is added to COMMITMENTS<sub>S</sub><sup>3</sup>

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<sup>3</sup> *Addition* in this case does not mean adding new information, because whatever is in  $cg$  must by definition already be present in all interlocutors' commitments. We use addition in a wider sense, one that includes reading or underlining a certain piece of information. Interlocutors' beliefs and commitments may be steady over time, but this does not mean that these pieces of information are equally accessible to them at all times (Clark 1996). Reminding someone of something they already have committed to therefore is a plausible discourse move, and we treat it as a special case of addition.

Consider again the example domain consisting of Ann, Ben and Cleo, and assume that ‘Cleo helped David’ is common ground. If the addressee hears *Who helped you when you were in trouble?*, they will understand that the answer is already common ground and that it is to be found within A, but the utterance alone does not encode which member of A the answer is, so the addressee needs to find out which information states in A conform to the common ground. Therefore,  $\text{COMMITMENTS}_S$  is updated by only those worlds that are compatible with both A and the *cg*. Thus the entire set of alternatives ( $A \cup \overline{A}$ ) is put on the TABLE just as in the case of information-seeking questions (24a), but the speaker’s commitments get updated only by the intersection of A and the common ground (24b).

- (24) The discourse effects of rhetorical questions with a non-empty answer
- TABLE:  $A^\downarrow \cup \overline{A}^\downarrow$
  - $\text{COMMITMENTS}_S$ :  $\text{info}(A) \cap cg$

Assuming that the speaker takes it as common ground that Cleo helped David (an alternative we will label as  $\gamma$ ), the addressee is invited to infer the following:

$$(25) \quad cg \cap \text{info}(A) = \gamma$$

If  $\gamma$  is a member of the addressee’s version of the common ground as well, the rhetorical question will likely achieve its communicative goal of underlining the fact represented by  $\gamma$ .

Given the definitions of inquisitiveness and informativity in (11), a rhetorical question that suggests a non-empty answer set is both inquisitive and informative. It is inquisitive by virtue of its form: as an interrogative sentence, it updates the TABLE by a (non-empty and non-singleton) set of information states. The utterance is also informative because the informative content of the expression, due to the special effects (24b), is a proper subset of  $W$ .

Rhetorical questions with an empty set answer convey that the answer is in the common ground, and that it is the empty set. The basic discourse effects of such rhetorical questions are the same as the ones of any question: they put the union of A and its complement on the TABLE, and they update  $\text{COMMITMENTS}_S$  by  $W$ . And their special discourse effects restrict the set of possible worlds that update  $\text{COMMITMENTS}_S$  to only those that are members of  $\text{info}(\overline{A})$ .

- (26) Special effect of a rhetorical question with an empty set answer:  
Instead of  $W$ , only  $\text{info}(\overline{A}) \cap cg$  is added to  $\text{COMMITMENTS}_S$

Again, the expression on the TABLE is the same as in the case of any question: the set consisting of all the alternatives that are members of A or  $\bar{A}$ . However, COMMITMENTS<sub>S</sub> does not get updated with the worlds compatible with all of these alternatives, only by the ones compatible with the empty set alternative.

(27) a. TABLE:  $A^\downarrow \cup \bar{A}^\downarrow$

b. COMMITMENTS<sub>S</sub>:  $\text{info}(\bar{A}) \cap cg = \text{info}(\bar{A})$

$\bar{A}$  gets intersected with the common ground, and since  $\bar{A}$  contains just one alternative, COMMITMENTS<sub>S</sub> gets updated by an informative expression.

The two types of rhetorical questions differ crucially in their interpretation. To interpret an empty set rhetorical question, the addressee may or may not rely on the common ground, because across contexts, regardless of whether A gets intersected with the cg or not, the result is the same. As a consequence, a rhetorical question with an empty set answer can be interpreted correctly (i.e., according to the speaker's intentions) even in a defective context, where the addressee does not share the relevant piece of information that the speaker assumes to be common ground. In this sense, rhetorical questions with an empty set answer are less context-dependent than the ones with a non-empty set answer. To interpret a non-empty set rhetorical question, considering the common ground is crucial, as without it, the addressee is not able to understand what the speaker intended to say.<sup>4</sup>

This asymmetry is not predicted by previous question-like analyses of rhetorical questions, which treat them as a homogeneous utterance type. Biezma & Rawlins (2017) propose that rhetorical questions immediately resolve the question under discussion they raise, with which we agree; however, following Jamieison (2018), we argue that this resolution is achieved differently in the two cases, and the root of the asymmetry lies in the kind of answer that is suggested by the rhetorical question.

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<sup>4</sup>As a reviewer notes, it is possible to misinterpret the given rhetorical question, for example, it could happen that a speaker uses an empty set rhetorical question but the addressee interprets it as a non-empty set rhetorical question. Such a scenario can ensue in case of a defective context. If a non-empty set answer is given to a rhetorical question that the speaker said in order to suggest an empty set answer, that non-empty set answer will prove to the speaker that their common ground is not the same. Resolving the issue can happen in a variety of ways, an example of which is to address it explicitly. We only consider ideal cases of conversation (i.e., with contexts where interlocutors actually share the common ground), but we acknowledge that this phenomenon is pervasive enough to be accounted for in discourse models.

### 3.3 Gradient inquisitiveness

Based on their semantic properties, rhetorical questions with a non-empty answer and ones with an empty set answer can be ordered inversely on a scale of inquisitiveness and informativity, which have information-seeking questions and assertions on their two ends (Kiss & Lo 2021).

Table 1: Inquisitiveness and informativity of assertions, rhetorical and information-seeking questions

|                          | Assertion                                  | RQ-                                                   | RQ+                                                   | ISQ                                                   |
|--------------------------|--------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| TABLE                    | $\{\alpha\}^\downarrow$<br>non-inquisitive | $A^\downarrow \cup \bar{A}^\downarrow$<br>inquisitive | $A^\downarrow \cup \bar{A}^\downarrow$<br>inquisitive | $A^\downarrow \cup \bar{A}^\downarrow$<br>inquisitive |
| COMMITMENTS <sub>S</sub> | info( $\alpha$ )<br>informative            | $W\text{-info}(A)$<br>informative                     | $W\text{-info}(\bar{A})$<br>informative               | $W$<br>non-informative                                |

Both the semantic (inquisitive) content, which updates the TABLE, and the informative content, which updates COMMITMENTS<sub>S</sub>, can influence the level of informativity of an utterance. Apart from assertions, any interrogative updates the TABLE with an inquisitive expression, namely with a set of alternatives that together cover logical space. As for COMMITMENTS<sub>S</sub>, which records the informative content of utterances, we distinguish three levels. Assertions and rhetorical questions with an empty set answer (RQ-) both commit the speaker to a single alternative; they are therefore informative to the same extent, which is shown by the equally strong shading. We can say that they are maximally informative, as they both propose just one alternative. Rhetorical questions with a non-empty answer (RQ+) are informative, too, but to a lesser extent than empty set rhetorical questions (as indicated by the lighter shading) because even though they discard the empty set answer (info( $\bar{A}$ )), the resulting expression still contains more than one alternatives. By the assumption that the domain of a wh-interrogative typically consists of more than one individual (otherwise an alternative or a polar interrogative is preferred), it should hold that  $|A| > |\bar{A}|$ . And finally, information-seeking questions (ISQ) update COMMITMENTS<sub>S</sub> with the set of all possible worlds,  $W$ , which means they are not informative.

The update on the TABLE is determined by the basic conventional discourse effects of the utterance, which in turn is determined by clause type; and the update on COMMITMENTS is determined by both the basic conventional and special discourse effects, which is determined both by the clause type and by the non-canonical form of the utterance type. Assertions and information-seeking questions are two “pure” cases, the former being non-inquisitive and informative, and the latter being inquisitive and non-informative. Rhetorical questions fall between the two, in that they are both inquisitive and informative.

The informative content of empty set rhetorical questions are comparable to the informative content of assertions, but they are still inquisitive because of their interrogative clause. Non-empty set rhetorical questions are less informative than empty set rhetorical questions, because even though they discard  $\bar{A}$ , they still contain more than one alternative. Even though informativity is a binary property, it can be treated as a gradient one in the sense that the more alternatives an expression contains, the less informative it is. Similarly, even though inquisitiveness is a binary property of expressions, the scale in Table 1 may be seen as a scale of some sort of global inquisitiveness. Assertions are not inquisitive in any sense; empty set rhetorical questions are only inquisitive by virtue of their syntactic form; non-empty set rhetorical questions are inquisitive both by virtue of their syntactic form and of their meaning, because they denote more than one alternative yet those do not cover logical space; and finally, information-seeking questions are inquisitive and not informative, and as such, they represent the purest case of an inquisitive utterance on this scale.

Note that this analysis only makes reference to the semantic properties of rhetorical questions, leaving out their pragmatic aspect, namely, the role of the common ground in their interpretation. Of course, rhetorical questions with a non-empty set answer become just as informative as rhetorical questions with an empty set answer, once the addressee has consulted the common ground. However, that empty set rhetorical questions are informative at a different level, as they are informative even without knowing the common ground. We argue that it is this kind of meaning that gives rise to markedness.

We assume that if a certain meaning trait gets marked in an utterance type, it has to be one that is generalizable across contexts. The meaning of information-seeking questions is generalizable across contexts as it denotes, in any context, the maximal number of alternatives. Similarly, the meaning of empty set rhetorical questions is generalizable across contexts, because any domain has a complement. The meaning of non-empty set rhetorical questions, however, is a certain answer choice from a set: which answer it is depends entirely on the given common ground, it is therefore not generalizable across contexts in the same sense.

A meaning trait that is generalizable is less dependent on the particular context of utterance, and as such, it is more likely to be marked in a conventionalized way. Prosody is one way by which utterance types with differences in speaker meaning can be distinguished. Assuming that there is a systematic relationship between markedness in form and special discourse effects, as proposed by Farkas & Roelofsen (2017), we expect to find prosodic correlates of these semantic differences. In what follows, we move on from discussing the meaning of rhetorical questions to discussing their form.

## 4 Rhetorical questions in Cantonese

Prosody is one of the ways in which the speaker's epistemic stance is conveyed. Speaker meaning is especially important in biased questions; therefore, biased questions are often prosodically marked. Given that the same interrogative can be used both as an information-seeking or as a rhetorical question, it is expected that the same interrogative will assign different prosodic marking to the different question types it conveys.

### 4.1 Previous work on the prosody of rhetorical questions

Most studies compare information-seeking questions to rhetorical questions with an empty set answer. They unanimously point to the conclusion that all else being equal, the two question types have distinct prosody, although the way they differ is specific for each language. There are two issues that we point out in relation to this body of work.

First, prosodic studies on rhetorical questions typically do not establish form-meaning relations, though some of them do refer back to the introspective judgments of Han (2002), who does propose such relations. Han (2002: 215) claims that a rhetorical question (by which she means a rhetorical question with an empty set reading) has "an intonational contour of an assertion", unlike an information-seeking question, which has "a rising intonation".

While it is not clear whether Han intended her claims to be interpreted for English or for any language, her intuitions receive only partial support by recent empirical studies on various languages. Rhetorical questions indeed tend to have a low final boundary tone (L%) compared to information-seeking questions. This tendency has been observed in English polar interrogatives: a corpus study on English polar questions shows that while both information-seeking and rhetorical questions can end with L%, there is more variation between H% and L% in information-seeking questions (Banuazizi & Creswell 1999); and the experimental results of Dehé & Braun (2019) also confirm that the boundary tone H% in English is reserved for information-seeking polar questions, while L% is produced with an (empty set) rhetorical reading. German rhetorical wh-questions tend to end in L%, while there is more variation in the boundary tone of information-seeking wh-questions (Braun et al. 2018). In Estonian, H% is found significantly more often in information-seeking questions than in (empty set) rhetorical questions (Asu et al. 2020).

However, Dehé & Braun (2019) also observe that English wh-questions can end with L% regardless of which reading is produced; Dehé & Braun (2020) note that the boundary tone is always L% across utterance types in Icelandic; and Braun et

al. (2018) even claim that the boundary tone alone is not sufficient to determine whether an utterance is an information-seeking or a rhetorical question. In addition, most of these studies underline that prosodic cues other than pitch, such as voice quality and duration, too, participate in marking utterance type. For example, Braun et al. (2018) and Dehé & Braun (2019) have found that rhetorical questions (with an empty set reading) in German and English tend to be produced in a breathier voice compared to information-seeking questions, and that rhetorical questions overall tend to have a longer duration for certain constituents or the entire utterance (Braun et al. 2018, Dehé & Braun 2019, Asu et al. 2020). These observations show that the intonational differences between information-seeking and empty set rhetorical questions cannot be reduced to a difference between their sentence-final tunes. In sum, the only candidate for a form-meaning relation proposed in the literature, namely that information-seeking and empty set rhetorical questions differ from each other in their high versus low boundary tones, respectively, is challenged by empirical data.

The second relevant issue that arises when theoretical work on rhetorical questions meets empirical work on this topic is that the majority of the prosodic literature does not consider non-empty set rhetorical questions. The first study known to us that compares both rhetorical question types to information-seeking questions is a production experiment on Cantonese rhetorical wh-questions (Lo et al. 2019). Unlike previous studies, Lo et al. (2019) elicited string-identical wh-interrogatives in three different contexts so that one would favor an information-seeking question reading, another one, a non-empty set rhetorical question reading, and the third one, an empty set rhetorical question reading, see an example item in (28).

- (28) 有 邊個 想 飲 咖啡 呀？  
jau<sup>5</sup> bin<sup>1</sup>go<sup>3</sup> soeng<sup>2</sup> jam<sup>2</sup> gaa<sup>3</sup>fe<sup>1</sup> aa<sup>3</sup>?  
have who want drink coffee SFP  
'Who wants to drink coffee?'

a. Information-seeking question

Context: You are having a family gathering in your home with a lot of people. After lunch, you want to serve tea and coffee, but you don't know how much to prepare. You prepare the coffee first, and you want to find out how many cups are needed. So you ask:

"I don't know how many people want coffee. *Who wants to drink coffee?*"

b. Empty set rhetorical question

Context: Mary is throwing a party. It's 1 am and everybody is about to

leave, but she is wondering if she should still make some coffee. You think nobody would drink any – some of them have already left anyway. So when Mary is telling you that she'll start the coffee machine, you say:

“Mary, wait, you shouldn't start the machine. *Who wants to drink coffee?*”

c. Non-empty set rhetorical question

Context: Mary and you are roommates, and you had a guest from South America who brought you five different South American coffees. But neither you nor Mary drinks coffee, so you suggest to give all the coffee to someone. You just need to find a coffee drinker. The first person that comes in mind to both of you is John, your neighbor, because you both see him with his coffee on the balcony every morning, afternoon and evening – John is a real coffee-holic! So when Mary wonders who you should give all this coffee, you point to John, who's drinking coffee on his balcony right now, and say:

“Just look at that balcony. *Who wants to drink coffee?*” (Lo et al. 2019)

Participants read and heard the context at the same time, after which they were given the reactive move in written form. Participants were supposed to read it out loud as if they were in a conversation with someone. The target question is always the last utterance within the move. Lo et al. (2019) found a three-way contrast in the prosodic realization of the sentence-final particles of the three question types. The production study of Lo & Kiss (2020) on the three question types in Northern Mandarin, which used the same method as Lo et al. (2019), also found a three-way contrast in their prosodic markedness.

In sum, while there is a growing body of literature on the prosody of rhetorical questions, most are production studies, and most consider only the contrast between empty set rhetorical questions and information-seeking questions. As for Cantonese, the only production study involving both kinds of rhetorical questions is the one of Lo et al. (2019), whose results are shown in the next section. There is not one perception study known to us, in Cantonese or any other language, that compares both kinds of rhetorical questions to each other and to information-seeking questions. Thus the question whether the three question types – information-seeking questions, empty set and non-empty set rhetorical questions – can be distinguished in perception is left open.

Answering this question is essential in testing our proposal on the semantics of rhetorical questions, because a perception experiment would show us whether there is a three-way distinction in prosody among the three question types, and in addition, it would show which question types are associated with a certain

prosodic form, which in turn is an indicator of whether they are generalizable across contexts or not. Before we turn to our perception experiment on Cantonese, we discuss intonation and the role of sentence-final particles in this language.

## **4.2 Intonation and sentence-final particles in Cantonese**

Cantonese has a large inventory of sentence-final particles, which appear at the end of utterances (and are therefore also known as utterance-final particles) and often convey affective and epistemic stance (Luke 1990, Matthews & Yip 2011, Sybesma & Li 2007, Wakefield 2019). Each sentence-final particle bears a lexical tone, which changes its meaning. Tonal languages make use of intonation as well; thus, the same channel – pitch – is used to convey both lexical meaning and utterance-level meaning.

It has been claimed that sentence-final particles and intonation share the same function; that is, they divide labor in conveying speaker-oriented meaning. Wakefield (2012), for example, treats the function of the Cantonese sentence-final particle *lo*<sup>1</sup> as equivalent to the utterance-final rise in English declarative questions. Sharing function with intonation is not specific to sentence-final particles; it has also been observed for the wider class of discourse particles of which sentence-final particles are a subtype (see Schubiger 1965 for German modal particles and Prieto & Roseano 2021 for Friulian and Catalan discourse particles).

This division of labor between discourse particles and intonation and the considerable inventory of sentence-final particles in Cantonese together account for the fact that intonation is very restricted in this language compared to intonational languages. Due to this restrictedness, intonation tends to reveal itself on the last syllable of the utterance, which very often is the sentence-final particle itself. Interaction between tone and intonation on the last syllable of the utterance is therefore very strong; intonation can significantly alter the realization of its lexical tone, regardless of the contour of the tone and regardless of whether it is a lexical word or a sentence-final particle (Lee 2004, Ma et al. 2006a,b, Xu & Mok 2012, Tsui & Tong 2018, Wakefield 2019).<sup>5</sup>

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<sup>5</sup>A reviewer notes that if the tone of the final syllable is overridden by intonation regardless of whether it is a sentence-final particle or a lexical word, it may be the case that it is prosodic form alone that matters, and a proper analysis can be built without making reference to sentence-final particles. However, there is reason to believe that sentence-final particles (as well as other discourse particles in other languages) have the same function in conveying speaker meaning as intonation; the answer to this question is therefore not straightforward. Based on the results of Prieto & Roseano (2021), we may expect intonation to show more strongly in the absence of sentence-final particles. However, this needs to be tested empirically, and is for now left for future research.

From this, it is expected that when string-identical wh-interrogatives in Cantonese are uttered in different readings, they would differ from each other in the prosody of their last syllable. In fact, this was the case in the production experiment of Lo et al. (2019) who elicited information-seeking questions and the two types of rhetorical questions in Cantonese: the only significant differences in prosody (at least in terms of pitch and duration) were detected on the last syllable, which were the sentence-final particles *aa*<sup>3</sup> (呀) and *aa*<sup>1</sup> (𠮶).

These two sentence-final particles, along with further members of the *aa*-family, are similar in function. According to Sybesma & Li (2007: 1760), *aa*<sup>3</sup> can occur in declaratives, interrogatives, imperatives and exclamatives, and it “makes the utterance fit more smoothly into the conversational context”. As for *aa*<sup>1</sup>, it is very much like *aa*<sup>3</sup> in terms of its function, but in addition, it “reveals more of the speaker’s emotion or attitude”. The following examples illustrate the difference.

- (29) a. *cin*<sup>4</sup>-*min*<sup>6</sup> *jau*<sup>5</sup> *hou*<sup>2</sup>-*do*<sup>1</sup> *jan*<sup>4</sup> *aa*<sup>3</sup>  
in front have very-many people SFP  
'There are lots of people in front.'
- b. *cin*<sup>4</sup>-*min*<sup>6</sup> *jau*<sup>5</sup> *hou*<sup>2</sup>-*do*<sup>1</sup> *jan*<sup>4</sup> *aa*<sup>1</sup>  
in front have very-many people SFP  
'There are lots of people in front [why did you say there were just a few?]' (Sybesma & Li 2007)
- (30) a. *nei*<sup>5</sup> *heoi*<sup>3</sup> *bin*<sup>1</sup>-*dou*<sup>6</sup> *aa*<sup>3</sup>?  
2s go where SFP  
'Where are you going?'
- b. *nei*<sup>5</sup> *heoi*<sup>3</sup> *bin*<sup>1</sup>-*dou*<sup>6</sup> *aa*<sup>1</sup>?  
2s go where SFP  
'Where are you going?' [challenging] (Sybesma & Li 2007)

In Lo et al.’s (2019) experiment, both *aa*<sup>3</sup> and *aa*<sup>1</sup> were realized with low and level intonation when pronounced at the end of an information-seeking or empty set rhetorical question, and both were realized with rising pitch in non-empty set rhetorical questions. As for their duration, both *aa*<sup>1</sup> and *aa*<sup>3</sup> were significantly longer in empty set rhetorical questions than in other conditions. A summary of Lo et al.’s (2019) results is shown in Table 2.

In sum, sentence-final particles in information-seeking questions were produced with a low, level pitch and a relatively short duration; in non-empty set rhetorical questions, with a rising pitch and a relatively short duration; and in

Table 2: The pitch and duration of the sentence-final particles *aa*<sup>1</sup> and *aa*<sup>3</sup> in Lo et al. (2019).

| Question type                      |       | Pitch      | Duration |
|------------------------------------|-------|------------|----------|
| Information-seeking questions      | (ISQ) | low, level | short    |
| Non-empty set rhetorical questions | (RQ+) | rising     | short    |
| Empty set rhetorical questions     | (RQ−) | low, level | long     |

empty set rhetorical questions, with a low, level pitch and a relatively long duration.

The two prosodic cues of pitch and duration were thus shown to play a role in production as they proved to be sufficient to distinguish the three question types prosodically. It remains to be seen, however, whether a three-way distinction is also present in perception, as the relevance of a prosodic cue is only as strong as the extent to which speakers rely on it in language processing. Thus a three-way distinction found in perception would corroborate those accounts that treat the meaning of information-seeking questions, empty set rhetorical questions and non-empty set rhetorical questions as different, that is, Jamieson (2018) and the one offered in this paper, as opposed to accounts that consider only a two-way distinction between information-seeking and rhetorical questions (Biezma & Rawlins 2017). And in case a three-way prosodic distinction is found, the experiment would also test the prediction that the less dependent an utterance type is on the common ground and the more generalizable across contexts, the more strongly the sentence-final particle is associated with a certain prosodic form.

## 5 Perception experiment

We have proposed a semantic account that makes a distinction among two kinds of rhetorical questions (i.e., ones suggesting an empty set answer and ones suggesting a non-empty set answer) and information-seeking questions. This account has received support from production studies where a three-way distinction has been found (Lo et al. 2019, Lo & Kiss 2020).

However, for a stronger support, we need to see if the three question types also differ from each other in perception. It has been shown by Kharaman et al. (2019) that German rhetorical questions are distinguished from information-seeking questions in perception, but the type of rhetorical question was not an independent variable (and it is not specified in the paper whether non-empty set

rhetorical questions were used at all). The question of whether the three question types are distinguishable from each other in perception still remains open.

In what follows, we present our experiment in which we ask if speakers of Cantonese associate the three question types with distinct prosodic cues. If there is indeed a three-way distinction in meaning, as proposed by us and by Jamieson (2018), we expect a three-way distinction in form to be found in perception as well. On the other hand, if the two types of rhetorical questions are associated with the same prosodic cues, it corroborates the assumption made by the accounts in which rhetorical questions form a natural class based on the obviousness of the answer they suggest and nothing beyond that (Biezma & Rawlins 2017). In this case, rhetorical questions have the same meaning and, as a reviewer suggests, there could be some mechanism ensuring that in case a non-empty answer cannot be found in the common ground, the rhetorical question is by default interpreted as one with an empty set answer.

If a three-way distinction is found in perception, however, there is a further prediction following from our account. Namely, speakers associate certain prosodic forms more readily with those question types that are interpreted more independently of the context, because those are the ones that are more likely to conventionalize their prosodic properties. As we have argued in Section 3.3, the interpretation of information-seeking questions and empty set rhetorical questions is less dependent on the particular context of utterance, because of their semantic properties: they are found on the edges of the informative/inquisitive scale for interrogatives (see the rightmost three columns of Table 1), which means that they are closest to being “purely” inquisitive and “purely” informative. Information-seeking questions express the maximum level of speaker ignorance: they are inquisitive and non-informative at the same time. Empty set rhetorical questions are inquisitive, too; however, their informative content is as informative as possible, since it is reduced to a single alternative. Thus the hearer does not need to consult the common ground in either of these cases: for information-seeking questions, all alternatives are elements of the meaning, and for empty set rhetorical questions, the informative content always covers the empty set answer alone, regardless of the domain. But the intended meaning of a non-empty set rhetorical question cannot be determined without making reference to the common ground.

Note that this latter prediction, too, follows from the account of Jamieson (2018), who calls non-empty set rhetorical questions “pragmatic” rhetorical questions, for the same reason that it cannot be interpreted in the intended way unless the hearer recognizes the referent in the common ground as intended by the speaker.

Lastly, we expect participants to associate the three question types with prosodic forms with which they were produced in Lo et al. (2019) (see Table 2). However, all three question types looked at here can be marked both by *aa<sup>1</sup>* and *aa<sup>3</sup>*. While in production, we can control which sentence-final particle is presented to the participants, in our perception experiment the stimuli were presented auditorily only. Since we cannot know for sure which sentence-final particle they thought they heard, the expectation that we will find the same forms in perception that we found in production cannot be confidently predicted.

### 5.1 Stimuli

Our stimuli were created from natural utterances produced by a female in her thirties, who is a native speaker of Hong Kong Cantonese and a linguist. The sentences were presented to her in written form, and she was instructed to produce them in a natural way as information-seeking questions. There were 12 sentences, all of which ended with the sentence-final particle *aa<sup>3</sup>* (呀). This particle was also used in Lo et al. (2019) for its compatibility with all three relevant question readings (Sybesma & Li 2007: 1760). An example is shown in (31).

- (31) 有 邊個 想 飲 咖啡 呀?  
jau<sup>5</sup> bin<sup>1</sup>go<sup>3</sup> soeng<sup>2</sup> jam<sup>2</sup> gaa<sup>3</sup>fe<sup>1</sup> aa<sup>3</sup>?  
have who want drink coffee SFP  
'Who wants to drink coffee?'

The speaker read the information-seeking version of each utterance in a sound-attenuated booth. The elicited utterances were then manipulated by changing the duration and pitch contour of the sentence-final particle. The duration and pitch dimensions were manipulated orthogonally, with the duration taking on values of 250 ms, 310 ms, 370 ms, 430 ms, 490 ms, and 550 ms, and the pitch contour realized with a rise of 0 Hz, 25 Hz, 50 Hz, or 75 Hz. These values were determined based on the results of Lo et al. (2019), that is, in a way that combining the two prosodic cues, duration and rising in pitch, would include the three contours found in the production experiment (see Table 2). Some of these manipulations are presented schematically in Figure 1.

### 5.2 Procedure

Seventeen native speakers of Cantonese took part in the experiment. In each trial, after listening to the stimulus, the participant completed a three-alternative forced choice task, with each option exemplifying one of the three readings. For

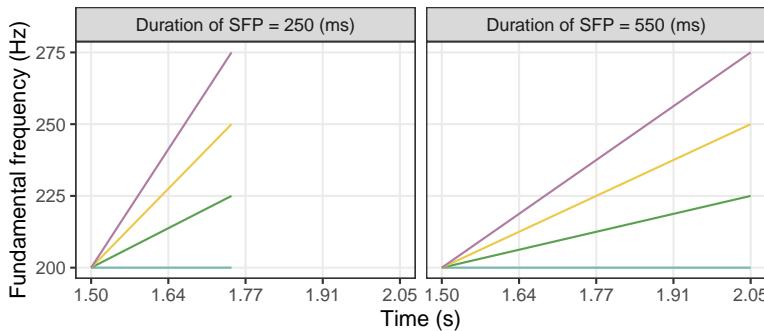


Figure 1: Schematic representation of some manipulations.

instance, upon hearing an utterance like (31), with a prosodically manipulated sentence-final particle, the participant had to pick one of the three options shown in (32) that they thought matched the intonation of the utterance.

- (32) a. 講嘅嘅人唔知道邊個想飲咖啡 (ISQ)  
*gong<sup>2</sup>je<sup>5</sup>ge<sup>3</sup>jan<sup>4</sup> m<sup>4</sup> zi<sup>1</sup>dou<sup>3</sup> bin<sup>1</sup>go<sup>3</sup> soeng<sup>2</sup> jam<sup>2</sup> gaa<sup>3</sup>fe<sup>1</sup>*  
 speaker not know who want drink coffee  
 ‘The speaker does not know who wants to drink coffee.’
- b. 講嘅嘅人認為冇人想飲咖啡 (RQ−)  
*gong<sup>2</sup>je<sup>5</sup>ge<sup>3</sup>jan<sup>4</sup> jing<sup>6</sup>wai<sup>4</sup> mou<sup>5</sup>jan<sup>4</sup> soeng<sup>2</sup> jam<sup>2</sup> gaa<sup>3</sup>fe<sup>1</sup>*  
 speaker think nobody want drink coffee  
 ‘The speaker thinks nobody wants to drink coffee.’
- c. 講嘅嘅人已經知道邊個想飲咖啡 (RQ+)  
*gong<sup>2</sup>je<sup>5</sup>ge<sup>3</sup>jan<sup>4</sup> ji<sup>5</sup>ging<sup>1</sup> zi<sup>1</sup>dou<sup>3</sup> bin<sup>1</sup>go<sup>3</sup> soeng<sup>2</sup> jam<sup>2</sup> gaa<sup>3</sup>fe<sup>1</sup>*  
 speaker already know who want drink coffee  
 ‘The speaker already knows who wants to drink coffee.’

### 5.3 Analysis

Given that there were three possible responses for each trial, we employed a Bayesian multilevel multinomial logistic regression, with a random intercept for each participant but shared fixed effects for all participants (Koster & McElreath 2017). The reference level for the dependent variable was the information-seeking question response. Alongside the intercept, the predictor variables included duration and pitch rise, both of which were  $z$ -transformed before entering the analysis. The priors for all coefficients were a normal distribution with a mean of 0 and a standard deviation of 1. For the correlation structure of the

random intercept, a zero-mean multivariate normal distribution was used with an exponential distribution with rate 1 and an LKJ distribution with  $\xi = 2$  as the priors for the standard deviation and the correlation matrix associated with the covariance matrix.

## 5.4 Results

Overall, the model confirms that different combinations of pitch contours and duration on the sentence-final particle led to different proportions of information-seeking, empty set, and non-empty set rhetorical question responses. Specifically, the model results suggest that, relative to information-seeking question responses, a longer duration led to both more empty set (95% credible interval [CrI] = [0.33, 0.47]) and non-empty set rhetorical question responses (95% CrI = [0.39, 0.60]), even though the posterior predictive pattern for non-empty set rhetorical questions does not show a clear trend (see Figure 2).

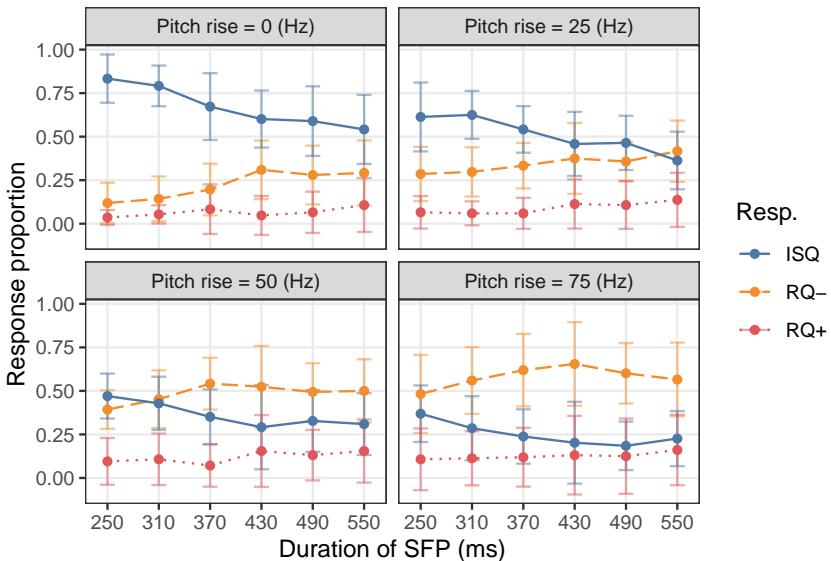


Figure 2: Response proportions of information-seeking questions (ISQ), empty set rhetorical questions (RQ-) and non-empty set rhetorical questions (RQ+) as a function of manipulated duration.

With respect to pitch rise, again a larger pitch rise led to more empty set (95% CrI = [0.66, 0.80]) and non-empty set rhetorical question responses (95% CrI = [0.59, 0.80]), although the trend for non-empty set rhetorical question responses is not as clear (see Figure 3).

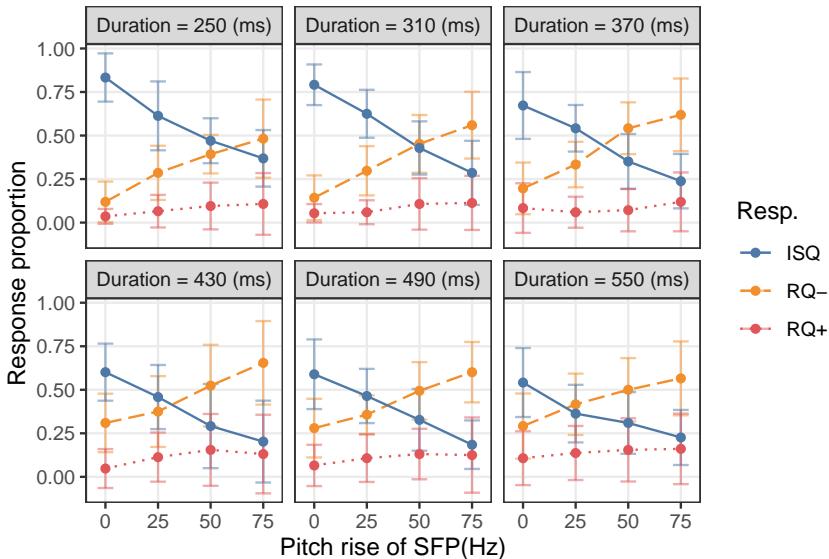


Figure 3: Response proportions of information-seeking questions (ISQ), empty set rhetorical questions (RQ-), and non-empty set rhetorical questions (RQ+) as a function of manipulated pitch rise.

## 5.5 Discussion

The results of the perception experiment do not entirely conform the results of the production experiment of Lo et al. (2019). While the prosodic cues participants associated with information-seeking questions were similar to the prosodic cues of this question type in production (a lower, non-rising pitch and a relatively short duration, see Table 2), rhetorical questions showed some novel patterns. Namely, empty set rhetorical questions (RQ-), which were produced with a low and level pitch, were associated with a rising contour in perception. And rhetorical questions with a non-empty set as answer (RQ+), which were produced with a rising pitch, were not clearly associated with any pitch contour, as shown in Figure 2.

As for duration, Figure 2 shows us that regardless of pitch, the longer the sentence-final particle is, the more likely speakers are to interpret the utterance as an empty set rhetorical question. This is a contrast that was also found to be significant in production (see Table 2). Cantonese wh-questions with the particle *aa*<sup>3</sup> thus provide a further example for the observations made in other languages (see Section 4.1) that boundary tones are not sufficient in characterizing the prosody of information-seeking and rhetorical questions.

In general, a three-way distinction between information-seeking questions, empty set and non-empty set rhetorical questions was found, as in production, even if the three particular forms were somewhat different in production and perception. While we do not know why there was only a partial match between the production and perception of the specific pitch contours, the three way contrast found in both cases can be interpreted as a support for there being a three-way contrast in meaning.

## **6 General discussion**

The results of our experiment confirm that there is a three-way distinction in form between information-seeking, empty set and non-empty set rhetorical questions. These results thus support our proposal for the semantics of these question types.

In addition to that, we posited a conditional prediction that in case there is a three-way distinction, those question types that depend less on the context (i.e., that do not depend on the common ground) in order to be interpreted as intended would be associated with certain prosodic forms more strongly than those that do rely on the common ground. This prediction, too, is borne out: as Figure 2 and Figure 3 show, only information-seeking questions and empty set rhetorical questions were clearly associated with a certain combination of prosodic cues.

We argue that this tendency is explained by an inquisitive semantic analysis. We proposed in Section 3.3 that information-seeking questions, non-empty set rhetorical questions and empty set rhetorical questions form a scale in terms of inquisitiveness and informativity. On the inquisitive end of the scale, we find information-seeking questions which are inquisitive and not at all informative. Considering questions only, on the informative end of the scale we find empty set rhetorical questions, which are both inquisitive and informative. And between the two are rhetorical questions with a non-empty answer, which are also both inquisitive and informative, but which are less informative than the ones with an empty set answer.

We have argued that these properties map to different levels of context-dependence and that there is an asymmetry between the two types of rhetorical questions. If the suggested answer is the empty set, the addressee receives the issue already resolved and there is no need to consult the common ground. This is not the case if the rhetorical question suggests a non-empty answer, which the addressee can only resolve by consulting the common ground. The intended answer itself is not directly encoded by virtue of the marked form of the utterance; it therefore remains highly context-dependent, a property that led Jamieson

(2018) to call them “pragmatic” rhetorical questions. Information-seeking questions, which are inquisitive and not informative, are again less dependent on the context compared to non-empty set rhetorical questions in the sense that the addressee does not need the common ground in order to arrive at the intended interpretation of the utterance.

In sum, only those utterance types which are relatively context-independent have been associated with a clear prosodic pattern: information-seeking questions and empty set rhetorical questions. The explanation we offer is that the utterance types that can be interpreted more independently from the context are also the ones that are more likely to conventionalize their prosodic cues. And if prosodic cues become conventionalized, it explains why participants associated them more strongly with the relevant question types. The reason why non-empty set rhetorical questions were not associated with a certain intonational pattern is because they convey context-sensitive information, namely, they intend to point to an already known answer. But which member(s) of the domain it points to is not grammatically encoded, simply because there is no straightforward way to do so.

As for the mismatch between our production and perception results, we are not in a position to establish straightforward form-meaning mappings for the three wh-question types in Cantonese. The form-meaning relations that we propose here are at a more abstract level, so further research is needed to explore the durational and pitch properties of the sentence-final particle *aa*<sup>3</sup> in the three question types. We speculate that the mismatch found between the production and perception results may be due to perceiving the sentence-final particle as *aa*<sup>1</sup>, especially in empty set rhetorical questions, even though instead of a high level tone, it got associated with a rising contour, which is closest to the high level tone of this particle in terms of its pitch. Cantonese sentence-final particles usually come in families: the same segmental material can wear multiple tones, each of which alters its meaning. So even though intonation has been shown to completely override the lexical tone found on the last syllable of the utterance, we cannot exclude the possibility that the tonal differences between *aa*<sup>3</sup> and *aa*<sup>1</sup> had no effect on the dependent variable.

In addition, the mismatch between production and perception may also be due to prosodic cues that were not included here as independent variables. On the one hand, breathy voice has been shown to be a marker of German rhetorical questions in production (Braun et al. 2018), and the role of intensity in either producing or processing the three utterance types remains unexplored. Considering these cues in future perception experiments may therefore be advantageous. On the other hand, the fact that all stimuli were produced from utterances that were

meant to be information-seeking questions may also have played an important role. Even though Lo et al. (2019) only found significant differences between the prosodic realization of the sentence-final particles of the three question types, further prosodic cues may have characterized the rest of the utterance, which may have affected perception of our stimuli.

As far as the validity of our analysis is concerned, the results of our experiment not only support our analysis but that of Jamieson (2018) as well. In his account, too, “generic” and “pragmatic” rhetorical questions differ in how much the addressee has to rely on the context (namely on the common ground) in order to interpret the question. It is not the goal of this paper to evaluate Jamieson’s account, however; comparing it to the account offered here is left for future work. For now we can only point to one advantage, namely that the “generic” and “pragmatic” nature of empty set and non-empty set rhetorical questions follows from our inquisitive semantic analysis, without having to posit a metavariable in order to derive the meaning of empty set rhetorical questions.

## 7 Conclusion

In this paper, we have argued that when analyzing the meaning of rhetorical questions, the kind of answer they suggest plays an important role in their meaning. Information-seeking questions commit the speaker to all alternatives, empty set rhetorical questions, to the empty set alternative, and non-empty set rhetorical questions, to A, all alternatives except the empty set one. We presented experimental results that we take as a support to this claim. First, a three-way prosodic distinction has been found between these three question types. Second, participants clearly associated information-seeking and empty set rhetorical questions with certain forms. These utterance types are on the two edges of the informative/inquisitive scale of interrogatives, and as such, they have a meaning that generalizes across contexts, as opposed to non-empty set rhetorical questions, which remain context-sensitive.

The question of what the intonational contours of the sentence-final particles in rhetorical questions really look like remains open, along with the question of what other prosodic cues not mentioned here may play a role in shaping the intonation of information-seeking and rhetorical questions in Cantonese. But the claims made here are nevertheless falsifiable and have cross-linguistic relevance, and as such, they invite further work on rhetorical questions.

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# Chapter 8

## A note on bias and polarity in Vietnamese

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Vietnamese has two types of NPIs, simple and complex, and two types of polar questions, yes/no questions and agreement questions. Simple NPIs can occur in both types of polar questions while complex NPIs can occur in yes/no but not in agreement questions. I propose an account for this fact using familiar ingredients of semantic and syntactic analyses. I then discuss some ways in which Vietnamese and English differ with respect to how distinctions in meaning align with distinctions in form.

### 1 Observations

This section describes the differences with respect to distribution and interpretation between two types of NPIs across two types of polar questions in Vietnamese.

#### 1.1 Two types of polar questions

I will use the term *polar questions* to describe questions which ask for the truth value of a single proposition. In other words, polar questions are those which are answered felicitously by assertion of a proposition or assertion of its negation. Vietnamese has two variants of polar questions. The first, which I will call *yes/no questions*, involves bracketing the predicate of the sentence with the words *có* and *không* (Trinh 2005, Duffield 2007). I will gloss *có* and *không* as POS and NEG, for reasons which will be clear shortly.



- (1) a. John đọc Kant  
John read Kant  
'John reads Kant.'
- b. John có đọc Kant không?  
John POS read Kant NEG  
'Does John read Kant?'

I will call (1a) the *prejacent* of (1b). More generally, the prejacent of a yes/no question will be (the proposition expressed by) the sentence derived from the question by removing POS and NEG. Let us now briefly discuss POS and NEG outside the context of a yes/no question. In declaratives, POS and NEG are the positive and the negative auxiliary, respectively.<sup>1</sup>

- (2) a. John có đọc Kant  
John POS read Kant  
'John does read Kant.'
- b. John không đọc Kant  
John NEG read Kant  
'John does not read Kant.'

These words are also used as the positive and the negative short answer to yes/no questions. The question in (1b) can be answered with either *có* (POS), which would mean John does read Kant, or *không* (NEG), which would mean John does not read Kant. We can analyze these short answers as (3a) and (3b), which are elliptical sentences with everything but the auxiliary elided (Holmberg 2016, Krifka 2013).

- (3) a. **Nam** POS read Kant  
b. **Nam** NEG read Kant

The other type of polar questions in Vietnamese is constructed by appending the discourse particle *à* to the end of a declarative sentence (Trinh 2010).

- (4) a. John đọc Kant à?  
John reads Kant A  
'John reads Kant?'

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<sup>1</sup>For arguments that POS and NEG are verbal see Trinh (2005). Verbal negation is attested across languages. Finnish is an example (Bobaljik 1994). Note that similarly to English emphatic *do*, POS appears only when the positive sentence bears verum focus. And similarly to English *not*, NEG is stressed when the negative sentence bears verum focus.

- b. John không đọc Kant à?

John NEG read Kant A

'John doesn't read Kant?'

I will call this type of polar questions *agreement questions*, and the (proposition expressed by) the sentence preceding A the “prejacent” of the agreement question. The term “agreement questions” is due to the fact that these questions can be described, intuitively, as asking the hearer whether she agrees with the prejacent. Thus, (4a) asks whether the hearer agrees that John reads Kant, and (4b), whether she agrees that John does not read Kant.

There are two strategies of answering an agreement question. I will call them the *congruent* strategy and the *non-congruent* strategy. The non-congruent strategy consists in answering the agreement question as if it were a yes/no question, which means answering it with either POS or NEG. Note that POS expresses a positive and NEG expresses a negative sentence independently of whether the prejacent of the agreement question is an positive or a negative sentence. Thus, no matter whether the question is (4a) or (4b), answering it with POS means asserting that John reads Kant, and answering it with NEG means asserting that he does not.

Recall that an agreement question asks the hearer whether she agrees with the prejacent. The “congruent” answering strategy, therefore, should express agreement or disagreement with the prejacent. To express agreement with the prejacent, the response particle *vâng*, which I will gloss as ARG, is employed. The closest translation of ARG is ‘that’s right’, or ‘that’s correct’. Answering (4a) with ARG means asserting that John reads Kant, and answering (4b) with ARG means asserting that he does not, for example.

What if we want to express disagreement with the prejacent? In other words, what is the negative counterpart of ARG? It turns out that there is no such word: Vietnamese has a lexical gap. To convey disagreement with the prejacent of an agreement question, we would have to resort to the non-congruent strategy. Suppose the question is (4a), the disagreeing answer would be *không* (NEG), which means John does not read Kant. If the question is (4b), the disagreeing answer would be *có* (POS), which means John does read Kant. Thus, whereas yes/no questions have a positive and a negative short answer, agreement questions only have a positive short answer.<sup>2</sup>

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<sup>2</sup>Thus, *có* (POS) and *không* (NEG) express “absolute polarity” while *vâng* expresses “relative polarity” in the sense of Roelofsen & Farkas (2015). For descriptions of similar systems see Holmberg (2016), Maldonado & Culbertson (2023).

There is, I believe, a possible functional account of this asymmetry. The account will turn on another fact about agreement questions, namely that it is biased towards the positive answer (Trinh 2010). Suppose the speaker sees John with a copy of *The critique of pure reason* in his hand. In this context, the agreement question in (5a) is felicitous but the yes/no question in (5b) is not.

- (5) Context: the speaker sees John with *The critique of pure reason* in his hand.

- a. John đọc Kant à?  
John read Kant A
- b. # John có đọc Kant không?  
John POS read Kant NEG?

In the very same context, the agreement question in (6a) would be infelicitous, while the yes/no question in (6b) would be felicitous.<sup>3</sup>

- (6) Context: the speaker sees John with *The critique of pure reason* in his hand.

- a. # John đọc cả Hegel à?  
John read also Hegel A
- b. John có đọc cả Hegel không?  
John POS read also Hegel NEG?

We learn two things from (5) and (6). First, if there is contextual evidence that  $\phi$ , a polar question with prejacent  $\phi$  is only felicitous when it is formulated as an agreement question. Second, if there is no contextual evidence that  $\phi$ , a polar question with prejacent  $\phi$  is only felicitous when it is formulated as an yes/no question. In other words, yes/no questions require the context to be “prejacent-neutral”, while agreement questions require it to be “prejacent-biased”.

I conjecture that the prejacent bias of agreement questions might contribute to the functional pressure on the grammar to have a short answer expressing agreement with the prejacent but no short answer expressing disagreement with the prejacent.<sup>4</sup>

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<sup>3</sup>Note that if the context is also such that reading Kant entails reading Hegel, (6a) would be fine. This proves the point I am making. I thank a reviewer for pointing this out.

<sup>4</sup>The idea that answers which agree with the prejacent of the question are preferred by the language system can be found in Roelofsen & Farkas (2015).

## 1.2 Two types of NPIs

Vietnamese is a language that build NPIs from wh-elements. For example, the word *ai*, as an interrogative pronoun, means ‘who’, but as an NPI, means ‘anyone’. Similarly, *gì* means either ‘what’ or ‘anything’ (Bruening & Tran 2006). A non-negated declarative sentence would disambiguate such expressions towards the interrogative reading, while a polar question would disambiguate them towards the NPI reading.<sup>5</sup>

- (7) a. John đang đọc *gì*  
John PROG read what  
‘What is John reading?’
- b. ‘Is John reading anything?’
  - i. John có đang đọc *gì*              không  
John POS PROG read anything NEG
  - ii. John đang đọc *gì*              à  
John PROG read anything A

This ambiguity extends to *which*-phrases. The Vietnamese word for *which* is *nào*, which combines with singular NPs. As Vietnamese is a classifier language of the East Asian variety, singular number is indicated by a classifier (Chierchia 1998, Trinh 2011). I will gloss the classifier as CL.

- (8) a. John đang đọc *quyển* sách *nào*  
John PROG read CL book which  
‘Which book is John reading?’

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<sup>5</sup>Note that a negated declarative sentence would allow these expressions to be ambiguous between the interrogative and the NPI reading, as exemplified in (i).

- (i) John không gặp *ai*  
John not met who  
‘Who did John not meet?’ / ‘John did not meet anyone’

I use the term *NPI* to describe expressions denoting existential quantifiers whose occurrence is limited to environments that must be characterized semantically as involving negation in some sense. For the purpose of this particular discussion, I will take NPIs to be expressions that can be understood as existential quantifiers in polar questions and under negation, but cannot be so understood in non-negated declarative sentences. Thus, it is possible for something to qualify as an NPI even if its distribution turns out to differ from that of English *anything* with respect to other environments. I believe this terminological practice is common in the literature, and thank a reviewer for pointing out the need to make this clear.

- b. ‘Is John reading any book?’
  - i. John có đang đọc quyển sách nào không  
John POS PROG read CL book any NEG
  - ii. John đang đọc quyển sách nào à  
John PROG read CL book any A

In what follows, we will not be concerned with the interrogative reading of wh-phrases. For this reason, I will gloss CL+NP+NAO simply as “ANY NP”.

NPIs in Vietnamese come in two morphological variants, simple and complex. Those we just discussed are the simple ones. Complex NPIs are built out of simple NPIs by prefixing the latter with the word *bất kỳ* (Trinh 2020), which I will gloss as BK.

- (9) John có đang đọc bất kỳ quyển sách nào không  
John POS PROG read BK ANY book NEG  
‘Is John reading any book at all?’

As indicated by the translation in (9), adding *bất kỳ* to the NPI in Vietnamese has a similar interpretive effect as adding *at all* to the NPI in English: it gives rise to the inference that the speaker is biased towards the negative answer, in the sense that she has more reasons to think that the negative answer is correct than to think that the positive answer is. In the case of (9), the inference would be that the speaker strongly suspects that John is not reading any book.<sup>6</sup> Simple NPIs, on the other hand, do not induce such negative bias. The question in (8b-i), for example, does not give rise to any inference about which answer the speaker strongly suspects to be correct.

Another difference between simple and complex NPIs pertains to their distribution across the two types of polar questions: whereas simple NPIs are acceptable in both yes/no and agreement questions, as shown by (10a), complex NPIs are acceptable in yes/no questions but give rise to deviance when they occur in agreement questions, as shown by (10b).

- (10) Intended reading: ‘Is John reading any book at all?’
  - a. John có đang đọc bất kỳ quyển sách nào không?  
John POS PROG read BK ANY book NEG
  - b. # John đang đọc bất kỳ quyển sách nào à?  
John PROG read BK ANY book A

<sup>6</sup>Note that I am describing the effect of *at all* in canonical, non-negated English yes/no question containing an NPI, as exemplified by the translation of (9). It was pointed out to me that *at all* can occur in a high negation question, e.g. *Isn’t John reading any book at all?*, which gives rise to a *positive* speaker’s bias (Dan Goodhue p.c.). I have nothing to say about this fact.

## 2 Analysis

We have seen that Vietnamese polar questions come in two variants, yes/no questions and agreement questions. Yes/no questions are prejacent-neutral while agreement questions are prejacent-biased. We have also seen that NPIs in Vietnamese come in two variants, simple and complex. Simple NPIs are acceptable in both yes/no and agreement questions. Complex NPIs are acceptable in yes/no questions but cause deviance in agreement questions. In yes/no questions, complex NPIs give rise to negative bias while simple NPIs do not.

The present section will be devoted to an analysis of these facts.

### 2.1 Introducing WHETHER

For the purpose of this paper I will assume a simplified version of the analysis proposed in Hamblin (1973), Karttunen (1977). Let us define two functions. The first is YES, the identity function, and the second is NO, the negation function.

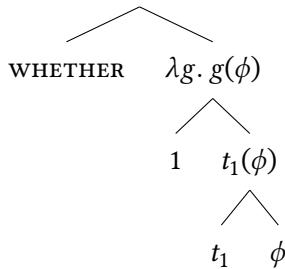
- (11) a. YES =<sub>def</sub>  $\lambda p \in D_{st}. p$   
       b. NO =<sub>def</sub>  $\lambda p \in D_{st}. \neg p$

We will say that a function  $f$  of type  $\langle st, st \rangle$  is a “polarity”, i.e. that  $polarity(f)$ , if  $f$  is either YES or NO. For polar questions, I assume the presence of a (overt or) covert WHETHER (Bennett 1977, Higginbotham 1993, Krifka 2001, Guerzoni & Sharvit 2014).

- (12)  $\llbracket \text{WHETHER} \rrbracket$   
 $= \lambda Q \in D_{\langle \langle st, st \rangle, t \rangle}. \lambda p \in D_{st}. \exists f \in D_{\langle st, st \rangle}. polarity(f) \wedge p = Q(f)$

The base position of WHETHER is above TP. When it moves, it leaves a trace of type  $\langle st, st \rangle$ . Predicate abstraction proceeds in the familiar way.

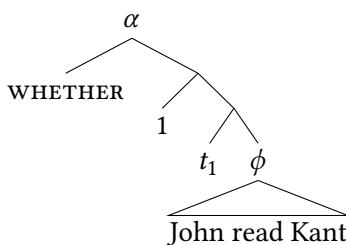
- (13)  $\lambda p. \exists f. polarity(f) \wedge p = f(\phi)$



I will assume that at the relevant level of analysis, a yes/no question in Vietnamese whose prejacent is  $\phi$  has the logical form [WHETHER  $\phi$ ]. Thus, the question in (1b), reproduced below in (14a), has the logical form in (14b), which denotes the set in (14c).

- (14) a. John có đọc Kant không?  
John POS read Kant NEG

b.



- c.  $\llbracket \alpha \rrbracket = \{\text{YES(John reads Kant)}, \text{no(John reads Kant)}\}$

## 2.2 Introducing EVID

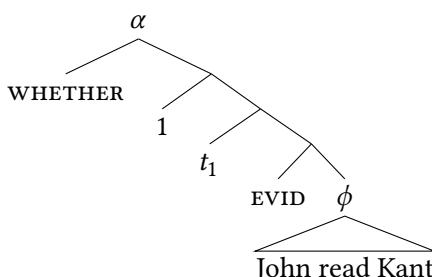
What about agreement questions? Recall that agreement questions are prejacent-biased, in the sense that they require the context to contain evidence for the prejacent. I will adopt the analysis proposed in Trinh (2014) and assume the existence of an evidential marker EVID, which is attached to TP and has the following interpretation.

- (15)  $\llbracket \text{EVID } \phi \rrbracket = \begin{cases} \llbracket \phi \rrbracket & \text{if there is contextual evidence that } \phi \\ \# & \text{otherwise} \end{cases}$

Thus, [EVID  $\phi$ ] presupposes that there is contextual evidence that  $\phi$ . I propose that at the relevant level of analysis, the agreement question (16a) has the LF in (16b), and the denotation in (16c).

- (16) a. John đọc Kant à?  
John read Kant A

b.



- c.  $\llbracket \alpha \rrbracket = \{\text{YES}(\text{EVID}(\text{John reads Kant})), \text{NO}(\text{EVID}(\text{John reads Kant}))\}$

Both answers contain  $[\text{EVID}(\text{John reads Kant})]$  as a subconstituent. Thus, both answers presuppose that there is contextual evidence that John reads Kant, which means the question presupposes that there is contextual evidence that John reads Kant.<sup>7</sup> We thus account for the fact that agreement questions are evidentially biased toward the prejacent.

How do we account for the fact that yes/no questions are prejacent-neutral, i.e. that a yes/no question with prejacent  $\phi$  is infelicitous in contexts where there is evidence that  $\phi$ ? I propose that this effect comes about as an anti-presupposition. I will assume the principle of Maximize Presupposition as a primitive of grammar (Heim 1991).<sup>8</sup>

- (17) Maximize Presupposition (MP)  
Presuppose as much as possible!

Given MP, a yes/no question will be understood as indicating that there is no contextual evidence for the prejacent, since if there were such evidence, the speaker would have used an agreement question instead (Sauerland 2008).

## 2.3 Introducing EVEN

Let us now address the fact that NPIs, both simple and complex, are acceptable in yes/no questions. A well-known fact about WHETHER is that it licenses NPIs. Various attempts have been made to derive this observation (cf. Ladusaw 1979, Krifka 1991, 1995, Van Rooy & Šafářová 2003, Guerzoni & Sharvit 2007, 2014, Niclae 2015, Roelofsen 2018, Jeong & Roelofsen 2023). For this paper, I will assume it as a primitive.

- (18) WHETHER licenses NPIs in its scope

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<sup>7</sup>I assume that if all answers to a question have a presupposition then the question itself inherits that presupposition. This follows from the fact that questions are quantificational structures (Heim 1983, 1992, Schlenker 2008).

<sup>8</sup>A reviewer raises the question whether MP should be considered a principle of rational communication of a Gricean sort which is external to the language faculty rather than one of grammar. I will not attempt to address this question adequately, as that would take us beyond the scope of this paper. What matters is that I use MP without deriving it, not how it is derived. Nevertheless, I would note that Heim (1991) did point out how it would be difficult to derive MP from principles of information exchange. Thus, given contextual, i.e. pragmatic, knowledge, *#a sun is shining* conveys the exact same amount of information as *the sun is shining*. It is not clear how to explain the contrast between these sentences in terms of their communicative function.

Given (18), we predict, correctly, that NPIs of both types are acceptable in yes/no questions. However, we also predict, incorrectly, that NPIs of both types are acceptable in agreement questions as well, given our analysis of agreement questions as containing WHETHER. Our task, therefore, is to specify a distinctive grammatical property of complex NPIs which explains the deviance caused by their occurrence in agreement questions.

Recall a complex NPI consists of a simple NPI plus the element BK. I propose that BK, by itself, has no independent semantics. Rather, it is just the morphological reflex of a c-commanding operator, EVEN.<sup>9</sup>

- (19) BK is the morphological reflex of a c-commanding EVEN in the structure

As its name suggests, EVEN has a meaning akin to that of English *even*. For the purpose of this discussion, we will give EVEN the interpretation in (20).

$$(20) \quad \llbracket \text{EVEN } \phi \rrbracket = \begin{cases} \llbracket \phi \rrbracket & \text{if } \forall \psi \in \text{ALT}(\phi). \llbracket \phi \rrbracket \leq_{\text{likely}} \llbracket \psi \rrbracket \\ \# & \text{otherwise} \end{cases}$$

Thus,  $\llbracket \text{EVEN } \phi \rrbracket$  asserts  $\phi$  and presupposes that  $\phi$  is the least likely among the alternatives of  $\phi$ . I will assume, following many works, that NPIs induce “subdomain” alternatives. Alternatives of sentences containing NPIs are generated by point-wise composition in the familiar way. In their basic meaning, NPIs are just existential quantifiers (Kadmon & Landman 1993, Krifka 1995, Chierchia 2013).<sup>10</sup>

- (21) a.  $\llbracket \text{any}_D \text{ book} \rrbracket = \lambda P. \exists x. x \in D \cap \llbracket \text{book} \rrbracket \wedge P(x) = \text{'a book in } D'$   
 b.  $\text{ALT}(\text{any}_D \text{ book}) = \{\text{any}_{D'} \text{ book} \mid D' \subseteq D\} = \{\text{a book in } D' \mid D' \subseteq D\}$   
 c.  $\text{ALT}(\text{John read any}_D \text{ book}) = \{\text{John reads any}_{D'} \text{ book} \mid D' \subseteq D\}$

Simple NPIs do not come with BK. I will take this to mean that they do not come with EVEN. In polar questions with EVEN, WHETHER can be base-generated either above or below EVEN. Consider the first possibility.

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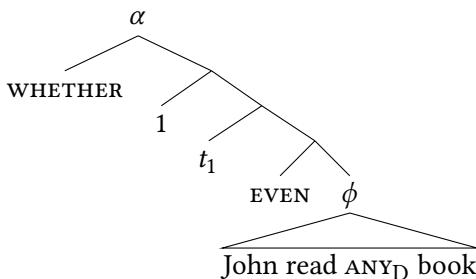
<sup>9</sup>For similar ideas see Heim (1984), Guerzoni (2004), Crnić (2014), Jeong & Roelofsen (2023).

<sup>10</sup>Note that as quantifiers, NPIs must QR to be interpretable. I make the standard assumptions that NPIs have narrowest scope, i.e. that they raise to the smallest clause containing them. This means that *John read any<sub>D</sub> book* has the following LF.

- (i)  $\text{any}_D \text{ book } \lambda_1 [\text{John read } t_1]$

I thank a reviewer for pointing out the need to make this clear.

(22)



$$\llbracket \alpha \rrbracket = \{\text{YES}(\text{EVEN}(\text{John read ANY}_D \text{ book})), \text{NO}(\text{EVEN}(\text{John read ANY}_D \text{ book}))\}$$

This configuration results in a yes/no question for which both answers, the positive as well as the negative, have the same unsatisfiable presupposition, induced by the subconstituent in (23).

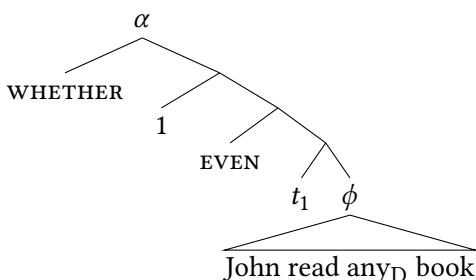
(23) # EVEN(John read ANY<sub>D</sub> book)

Presupposition: John reads a book in D  $\leq_{\text{likely}}$  John reads a book in D', for any  $D' \subseteq D$

Given that likelihood respects logical entailments, i.e. that  $\phi \leq_{\text{likely}} \psi$  if  $\phi \Rightarrow \psi$ , and given the logical truth that for any D and D' such that  $D' \subseteq D$ , if John reads a book in D' then John reads a book in D but not vice versa, both answers in (22) presuppose that a weaker sentence is less likely than a stronger sentence, which is necessarily false. I will take this fact to mean that such a parse as (22) will be ruled out as deviant by the grammar.

Having EVEN scoping above the trace of WHETHER, however, results in a polar question with *one* felicitous answer, namely the negative.

(24)



$$\llbracket \alpha \rrbracket = \{\text{EVEN}(\text{YES}(\text{John read any}_D \text{ book})), \text{EVEN}(\text{NO}(\text{John read any}_D \text{ book}))\}$$

The positive answer in this case is equivalent to the positive answer in (22), and is deviant for the same reason, namely because it has a necessarily false presupposition. The negative answer, however, does not have such a presupposition. Let us consider it.

- (25) EVEN(NO(John read any<sub>D</sub> book))

Presupposition:  $\neg\text{John reads a book in } D \leq_{\text{likely}} \neg\text{John reads a book in } D'$ ,  
for any  $D' \subseteq D$

Negation is scale-reversing, so for any  $D' \subseteq D$ , if it is not the case that John reads a book in  $D$  then it is also not the case that John reads a book in  $D'$ , but not vice versa. This means the negative answer in (24) has a trivially true presupposition.

We thus see that if EVEN is present in a polar question, it has to be parsed above the base position of WHETHER, and within this parse, only the negative answer is acceptable. This means that polar questions with EVEN have only the negative answer as the one felicitous answer. And because complex NPIs require a c-commanding EVEN, we predict that for polar questions with complex NPIs, only the negative answer is felicitous. Asking a polar question with a complex NPI, then, amounts to presenting the hearer with the negative answer as the only choice. I propose that this is what brings about the inference that the speaker of such a question is biased towards the negative answer (cf. Guerzoni 2004). For concreteness, I will take this inference to be a conversational implicature of the question.<sup>11</sup>

Let us now come (back) to the question why complex NPIs cause deviance in agreement questions, as evidenced by (10b), reproduced below in (26).

- (26) # John đang đọc bất kỳ quyển sách nào à?

John PROG read BK ANY book A

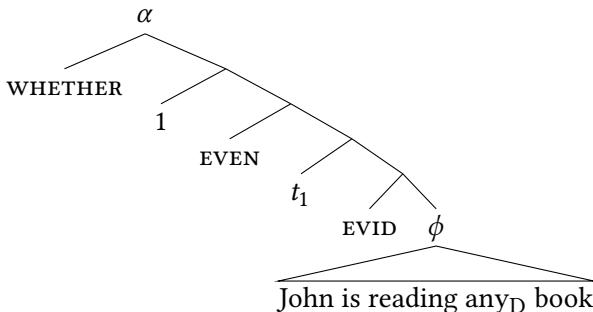
Intended reading: 'Is John reading any book at all?'

Given what we have said, this question will have the parse in (27a) and the denotation in (27b).

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<sup>11</sup>The issue arises, of course, as to how a 'yes' answer to such a negatively biased question is still possible. Note that this issue arises in the same way for Guerzoni (2004). One plausible response is to say that a 'yes' answer, in this case, requires the accommodation of a slightly different question, namely one without the negative bias. Thus, such an answer is also a move to deny the negative presupposition of the biased question.

(27) a.



- b.  $\llbracket \alpha \rrbracket = \{\text{EVEN}(\text{YES}(\text{EVID}(\text{John is reading any}_D \text{ book}))), \text{EVEN}(\text{NO}(\text{EVID}(\text{John is reading any}_D \text{ book})))\}$

Let us consider the inferences licensed by this question. Due to the presence of EVID, it has the presupposition in (28a). And due to the presence of EVEN, it has the implicature in (28b).

(28) Inferences licensed by (27)

- a. There is contextual evidence that John is reading a book in D
- b. The speaker strongly suspects that John is not reading a book in D

I submit that these two inferences are responsible for the question being perceived as deviant. The reason, I claim, is that a rational speaker cannot both strongly suspect  $\neg\phi$  while at the same time take some fact in the context to be evidence that  $\phi$ . Thus, if he really strongly suspects that John is not reading a book, the sight of John reading a book would have to be interpreted by him to be evidence that John is pretending to read a book.<sup>12</sup>

### 3 Interim summary

Polar questions contain a covert WHETHER, which accounts for the intuition that they ask the hearer to confirm a proposition or to confirm its negation. Polar questions in Vietnamese come in two variants, yes/no questions and agreement questions. Agreement questions contain EVID, the evidential marker which introduces the presupposition that its prejacent is supported by contextual evidence. Yes/no questions, in contrast, do not contain EVID. Given Maximize Presupposition, yes/no questions anti-presuppose that there is contextual evidence for the prejacent. This accounts for the fact that in prejacent-biased contexts, agreement

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<sup>12</sup>I admit that this point needs further explication. I hope to pursue this task in future research.

questions are felicitous while yes/no questions are not, while in prejacent-neutral contexts, the opposite is the case.

NPIs in Vietnamese also come in two variants, simple and complex. Complex NPIs come with a c-commanding EVEN in the structure, which introduces the presupposition that its prejacent is the least likely among the alternatives. Given that NPIs denote existential quantifiers and induce subdomain alternatives, the presence of EVEN brings it about that only the negative answer is felicitous. This accounts for the fact that polar questions containing complex NPIs give rise to the inference that the speaker strongly suspects that the negative answer is correct. Simple NPIs do not come with EVEN and hence do not give rise to such a bias.

An agreement question which contains a complex NPI would be parsed with both EVID and EVEN. Such a question would presuppose that there is contextual evidence for the prejacent, and at the same time, would license the inference that the speaker suspects that the prejacent is false. I hypothesize that such an expression represents an odd move in the language game, and hence, would be perceived as odd. This accounts for the fact that complex NPIs in agreement questions gives rise to deviance.

## 4 Comparison

I will conclude this note by discussing some similarities and differences between Vietnamese and English with respect to polar questions and NPIs. I believe that addressing the questions they raise will contribute to the cross-linguistic research on the semantics-syntax interface, or more specifically, on how Universal Grammar constrains the way basic building blocks of semantic representation are combined and mapped onto syntactic objects by different languages.

Let us start with the distinction within the class of polar questions in Vietnamese, i.e. the distinction between yes/no and agreement questions. The reader might have noticed that this distinction resembles the distinction in English between “inversion” and “declarative” questions. Inversion questions are polar questions which exhibit subject auxiliary inversion, such as (29a), and declarative questions those which exhibit declarative word order and are often pronounced with rising intonation, such as (29b).

- (29) a. Does John read Kant?  
b. John reads Kant?

It has been pointed out that declarative questions give rise to the inference that there is contextual evidence supporting the prejacent (Gunlogson 2003, Trinh

2014). In a context where the speaker has no reason to think that John reads Kant or to think that he does not, (29a) would sound appropriate and (29b) would sound odd. On the other hand, if the speaker sees John with a copy of *The critique of pure reason* in his hand, (29b) would be felicitous.

Can we say that inversion and declarative questions are the English counterparts of Vietnamese yes/no and agreement questions? It turns out that we cannot. The distinctions do align, but not perfectly. Recall, from (5) and (6), that Vietnamese yes/no questions and agreement questions are in complementary distribution: yes/no questions are felicitous only in prejacent-neutral contexts and agreement questions are felicitous only in prejacent-biased contexts. The situation with English inversion and declarative questions is different. It turns out that the contexts in which inversion questions are felicitous are a superset of the contexts where declarative questions are felicitous. Specifically, inversion questions are felicitous in prejacent-biased contexts as well.

- (30) Context: the speaker sees John with a copy of *The critique of pure reason* in his hand.
- Does John read Kant?
  - John reads Kant?

Table 1: Prejacent-neutral vs. prejacent-biased

|                   | yes/no | agreement | inversion | declarative |
|-------------------|--------|-----------|-----------|-------------|
| prejacent-neutral | ✓      | ✗         | ✓         | ✗           |
| prejacent-biased  | ✗      | ✓         | ✓         | ✓           |
| Vietnamese        |        |           | English   |             |

I turn now to a discussion of the distinction between simple and complex NPIs in Vietnamese. Again, the reader might have noticed that this distinction resembles the distinction between NPIs and so-called “minimizers” in English, i.e., expressions such as *lift a finger* or *have a red cent*. In fact, it is Guerzoni’s (2004) analysis of minimizers that informs the analysis of complex NPIs proposed here. Guerzoni observes that minimizers induce negative bias in polar questions whereas NPIs do not. Thus, (31a) can be read as not implying anything about how likely it is that John did something to help, while (31b) clearly implies that it is unlikely that John did something to help.

- (31) a. Did John do anything to help?  
b. Did John lift a finger to help?

Guerzoni accounts for the difference between NPIs and minimizers with respect to negative bias by postulating that minimizers, but not NPIs, come with a c-commanding EVEN in the structure which has to scope above the base position of WHETHER. My account of the same difference between simple and complex NPIs in Vietnamese is just an adoption of her analysis. Can we, then, say that simple NPIs in Vietnamese correspond to NPIs in English while complex NPIs in Vietnamese correspond to minimizers in English?

Again, it turns out that we cannot. Recall that simple NPIs in Vietnamese are acceptable in prejacent-biased polar questions. NPIs in English, however, are not. Suppose I am talking to John on the phone and hear chewing sounds, which I take to be evidence that he is eating while talking. In this context, it seems that I cannot ask him the questions in (32).

- (32) Contextual evidence: The hearer is eating.  
a. # Are you eating anything?  
b. # You're eating anything?

Thus, NPIs in English are blocked by prejacent bias. Note that it has been observed that NPIs are deviant in declarative questions (Hirst 1983, Huddleston 1994, Gunlogson 2002). This is expected, given that declarative questions are necessarily prejacent-biased.

Simple NPIs in Vietnamese, however, are not blocked by prejacent bias. Recall that only agreement questions can be prejacent-biased. In the same context, i.e., one where there is evidence that the hearer is eating while talking on the phone, the question in (33) is completely fine, where *gì* is the word whose interrogative reading is ‘what’ and whose NPI reading is ‘anything’.

- (33) Anh đang ăn *gì* à?  
you PROG eat anything A

How do complex NPIs in Vietnamese and minimizers in English compare with respect to prejacent-biased questions? It turns out they behave similarly in this case: both are unacceptable. The deviance of (10b) evidences this for Vietnamese. For English, we can observe that a question such as (31b) would be utterly inappropriate in contexts where there is evidence that John did do something to help.

Another way in which Vietnamese and English NPIs differ pertains to the so-called “free choice reading”, or FC reading for short. It has been observed that in English, NPIs embedded under existential modals such as *be allowed to* are, by default, read as wide-scope universal quantifiers (Carlson 1981, Dayal 1998, Menéndez-Benito 2010, Crnič 2019, Bar-Lev & Fox 2020). The FC reading, however, is impossible for minimizers.

- (34) a. John is allowed to do anything to help.

‘ $\forall x$ . John is allowed to do  $x$  to help’

- b. # John is allowed to lift a finger to help.

Intended reading: John is allowed to do anything to help

In Vietnamese, the situation is, in a sense, the reverse. It is the complex NPIs which can occur, and have the FC reading, under existential modals. Simple NPIs are excluded.

- (35) Intended reading: ‘John is allowed to read any book’

- a. # John được phép đọc quyển sách nào  
John is allowed to read ANY book

- b. John được phép đọc bất kỳ quyển sách nào  
John is allowed to read BK ANY book

‘John is allowed to read any book’

Table 2: Biased questions vs. FC reading

|                  | simple<br>NPIs | complex<br>NPIs | NPIs | minimizers |
|------------------|----------------|-----------------|------|------------|
| biased questions | ✓              | ✗               | ✗    | ✗          |
| FC reading       | ✗              | ✓               | ✓    | ✗          |
| Vietnamese       |                | English         |      |            |

I hope to account for the facts we just discussed in future research.

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# Chapter 9

## Psycholinguistic processing tasks and the study of question bias

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The study of biased questions is situated in a rich semantic tradition, based primarily on introspective cross-linguistic work. In this chapter we explore how psycholinguistic processing tasks can complement this existing work and help hone our understanding of the factors that influence question production, and the meanings these questions can carry, in this complex semantic-pragmatic domain.

### 1 Introduction

In recent years, a growing body of literature in formal semantics has sought to understand “non-canonical questions” (Dayal 2017), and particularly “biased questions” – interrogatives in which the questioner has some sort of expectation as to what the answer to the question might be.<sup>1</sup> The so-called “bias” may originate in an expectation based on, for example, epistemic or deontic information, such as when the questioner is knowledgeable about the state of affairs they are

<sup>1</sup>Questions with biases have also been of interest to researchers in the interactional linguistic tradition. This research focuses on how questions can reflect stances that users may choose to take in communicative interaction, in particular regarding the likelihood of the states of affairs that the questions refer to (e.g. Heritage & Raymond 2021, Raymond & Heritage 2021), and how responses to these questions may be organised (e.g. Heritage 2012, Lee 2015). Here we focus on what has been established in formal semantics, but acknowledge the links between the work conducted in both fields.



inquiring about or when they use the question as a form of directive. In this paper, we focus exclusively on epistemic biases. The main body of this work on non-canonical questions has relied on introspective judgments to delineate the pragmatic contexts in which these questions can be used, and to postulate how, semantically, the bias is incorporated into the question.

More recently, experimental work has begun in this domain, primarily focused on production tasks (Domaneschi et al. 2017). This work has begun to hone the wide array of epistemic and evidential biases that have been claimed to be relevant for biased question production, but a number of questions, including about how those interrogative forms are interpreted, remain.

In this paper, we illustrate how psycholinguistic processing experiments can complement the formal semantic research that has characterised biased question research to date. In Section 2, we give a brief overview of the trajectory of the methodologies used to study question bias, from introspective observations to more recent experimental work. In Section 3, we lay out some questions that can be addressed by approaching the topic of question bias through processing tasks, and what can be gained from these kinds of studies. With particular reference to the studies presented in Macuch Silva & Jamieson (2025) and Tian et al. (2021), we show how these questions have begun to be explored. Finally, we discuss some of the challenges of using processing methodologies to investigate a complex phenomenon like question bias, which spans the interfaces of semantics and pragmatics, as well as (morpho)syntax and prosody. We discuss how to design tasks to deal with these challenges, and thus to allow psycholinguistic research to contribute to this growing field.

## 2 Studying question bias: from introspection to production

### 2.1 Theoretical developments

Negation is a polyfunctional linguistic device which can be used pragmatically for purposes as varied as mitigating the meaning of an assessment (e.g. Fraenkel & Schul 2008, Giora et al. 2005, Krifka 2007) or modulating the acceptability of a request (e.g. Koike 1994). The rich formal semantic literature on question bias begins with an observation about the role of negation in polar questions, more specifically Ladd's (1981) observation that, in English, a question with a *negative* surface form can in fact indicate that the questioner has a belief of the *positive* proposition. This can be seen in (1–2), adapted from Ladd (1981), in which

S uses a negated form of the question to express their belief of the existence of a vegetarian restaurant.

- (1) S is visiting A, and believes there is a good vegetarian restaurant in town.  
 A: You guys must be starving. Shall we get something to eat?  
 S: Yeah, isn't there a vegetarian restaurant around here?
- (2) S is visiting A, and believes there is a good vegetarian restaurant in town.  
 A: We should get something to eat, although I don't know if there's anything you'll like around here.  
 S: Oh, isn't there a vegetarian restaurant around here?

Ladd proposes that there is an “ambiguity” in the usage of the negated question, whereby in situations like (1) it is used with the aim of confirming the questioner’s existing belief of  $p$ , while in situations like (2) it is used with the aim of confirming the evidence the questioner has just received for  $\neg p$  in the face of their existing belief.

Ladd’s initial observations about (American) English have spawned considerable further research reasoning about the pragmatic conditions that trigger the use of those particular type(s) of biased question, as well as if, and if so, how, the meaning of the question is semantically encoded into particular linguistic forms (Büring & Gunlogson 2000, Van Rooy & Šafářová 2003, Romero & Han 2004, Asher & Reese 2007, AnderBois 2011, Northrup 2014). There has also been interest in how English biased questions are represented in terms of different syntactic forms. Early research focused on questions with syntactically “high” negation –  $n't$ , like those in (1–2), which, despite any potential differences in meaning, have the same form. “Low” negation *not* (as in (3)) was not assumed to share these characteristics. Instead, low negation questions seemed to be used to genuinely question the truth of the negative proposition  $\neg p$  from current contextual evidence, with no involvement of any prior beliefs.<sup>2</sup>

- (3) Is there not a vegetarian restaurant around here?

The proposed distinction in the meanings of high and low negation questions has furthermore led to some syntactic proposals that these different negative

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<sup>2</sup>However, some later work incorporated “low negation” questions as having similar bias imports to “high negation” questions (Van Rooy & Šafářová 2003, Asher & Reese 2007). Domaneschi et al. (2017) propose that this may be the case in some contexts in German, but argue that it is not the case for English.

markers *-n’t* and *not* occupy different positions in the syntax (Cormack & Smith 2012, Krifka 2015).

While much of the work on biased questions has focused on English, further work has indicated that biasing an interrogative, and having different forms to represent this, is also possible in other languages, with accounts for German (Büring & Gunlogson 2000), Japanese (Sudo 2013) and Hungarian (Gyuris 2017) contributing to Gärtner & Gyuris’s (2017) attempt to delimit the possible bias profile space for questions cross-linguistically. This research has shown that biased questions may be marked syntactically, morphologically or prosodically, sometimes in addition to the use of a negation marker. For the remainder of this article, we use the term *question form* to refer to any linguistic form or realisation which is associated with a bias in the literature, regardless of whether the form itself consists of a morphosyntactic construction, a particle or morpheme, or an intonation pattern.

The rich introspective research on biased questions has led to various categorisations of the most important contextual phenomena that might license the use of these interrogatives, as well as the specific question forms associated with particular contexts. However, this has led to conflicting accounts regarding the role of the different factors, as well as the relationship between the semantic/pragmatic factors and the form of the interrogative (e.g. whether the negation is low or high in English, or whether particular particles are used in Japanese, Sudo 2013). The literature has generally agreed that *original speaker bias* and *contextual evidence* are relevant factors for the licensing of these questions, but the ways in which those two types of influence have been understood and grouped together has varied considerably (see Romero 2020 for an overview). More recently, scholars have started gathering empirical data through experimental methodologies in order to tease apart the various proposals on the ways these biases and the linguistic forms that may express them interact. In the next section, we review the results of some of these studies. Though we acknowledge the need to explore this topic cross-linguistically, throughout this paper, we focus on the results of research on English biased questions, as this is where the most work has been done into understanding the interaction between the question form and the pragmatic factors that may license it.

## 2.2 Experimental tasks

A prolific research tradition in phonetics has investigated the realisation of polar questions across different languages, particularly in Romance (e.g. Crocco 2006, Escandell-Vidal 2017, Giordano 2006, Grice & Savino 1997, 2003, 2004, Henriksen

et al. 2016). Plenty of the work in this tradition has not only been experimental in nature but it has also explicitly addressed question bias or speaker certainty and epistemic stance, both in the perception (Armstrong & Prieto 2015, Vanrell et al. 2017, Orrico et al. 2019, Prieto & Borràs-Comes 2018) and production (Armstrong 2017, Vanrell et al. 2014) of polar questions. However, the (morpho)syntactic question forms that have driven formal semantic research into question bias have not been subject to the same quantity of experimental investigation.

For morphosyntactic question forms, the first experimental work to be conducted consisted of a series of acceptability judgment tasks investigating which interrogative structures participants find acceptable, given particular combinations of original speaker bias and contextual evidence. For example, Sailor (2013) finds no evidence for the sort of ambiguity of meaning for high negation in American English claimed by Ladd (1981). However, Sailor's study was small and focused on the acceptability of negative polarity items such as *either* in a high negation or a low negation construction, rather than the licensing of the interrogative structure itself. While the acceptability of negative polarity items can be extrapolated to the “biased” meaning of the question, the study does not directly address the production (or interpretation) of the question forms in context.

Roelofsen et al. (2013) conduct an online acceptability judgment task investigating how natural different polar questions are when presented in various belief and bias contexts in English. Questions were shown as part of short cartoon contexts, with participants rating the items on a scale from 1 (natural) to 7 (unnatural). Roelofsen et al. (2013) found that high negation questions were acceptable in contexts with a preexisting speaker belief for *p*, and negative or no contextual evidence against *p* – as hypothesised. Perhaps surprisingly, they also found that low negation questions did not behave as differently as predicted to high negation questions, being preferred in contexts with prior speaker belief and negative or no contextual evidence.

While the study in Roelofsen et al. (2013) is broader in scope than Sailor (2013) and with a larger participant pool, there were some issues with the contextual evidence and speaker bias presented in their examples. In the negative cases, the evidence relied on a conversational implicature (for example, “Kate got a dog” does not entail that she did not also get a cat), which led to unexpected results (Roelofsen et al. 2013: 460). Secondly, as identified by Domaneschi et al. (2017: 6), the conditions with absence of speaker bias were *too* neutral. For example, Rose telling Jennifer that “Kate got a dog” out of the blue (without establishing, for example, that Kate prefers cats) renders any polar question somewhat unnatural.

Finally, we would point out that, for example, the belief that arises from a friend saying “I am *going to get* a dog” is different to “I *have got* a dog”. It is

therefore questionable how strong the beliefs were in the various contexts, and to what extent this may have affected participants' rating of items. Roelofsen et al. (2013: 466) find a "scale of speaker belief" in their results, and claim that "the neutral and negative [speaker bias] contexts in the experiment suggest the absence of positive speaker belief, but strictly speaking, they do not exclude it". While this will always, to some extent, be the case, the speaker beliefs – or lack thereof – could have been strengthened.

Roelofsen et al.'s (2013) study presents an interesting potential counterpoint to the theoretical literature positing a true semantic difference between high and low negation questions. However, their materials included possible confounds which may have impacted on their results.

We thus turn to Domaneschi et al. (2017), which builds on Roelofsen et al. (2013). Domaneschi et al. (2017) conduct lab-based production tasks in both English and German in order to "resolve" the conflicting claims in the literature as to which question forms (in these cases, low vs. high negation) are preferred in which contexts. Here, we discuss results from their English experiment only.

In their study, Domaneschi et al. (2017) asked participants to read through a short context that set up a prior belief for the participant, and then presented them with some contextual evidence that either supported, challenged, or was neutral in respect of that belief. Participants then chose one of a list of possible questions to ask, and produced this question into a microphone so that information about prosodic realisations could be recorded. The forms available to participants included positive polar questions (*Do you ...*), high and low negative polar questions (*Didn't you ... / Did you not ...*), as well as positive polar questions prefaced by a surprise marker (*Really? Did you ...*).

Domaneschi et al. (2017) find that participants have strong preferences as to which syntactic form of a question to produce given any one combination of prior belief and contextual evidence. Indeed, while low negation questions (LoNQ) are produced at a rate of 59% in contexts with a neutral bias and negative contextual evidence, high negation questions (HiNQ) are preferred in situations where there is a prior bias for the proposition expressed in the question, being produced at similar rates both in contexts with neutral evidence for the proposition (65%) and in contexts with evidence against the proposition (67%). The results for questions with negation are summarised in Table 1.

These results help us to understand what epistemic and evidential profile biased questions can have in English (and German). This study has since been replicated and extended upon by Maro et al. (2021), who find the same factors influencing production choice of biased questions in Italian. However, these studies only begin to examine the complexities of licensing (and understanding) question

Table 1: Attested pragmatic profile of polar questions with negation in English, from Domaneschi et al. (2017)

|                     |          | speaker bias |         |          |
|---------------------|----------|--------------|---------|----------|
| contextual evidence |          | $p$          | neutral | $\neg p$ |
| $p$                 | neutral  | HiNQ         |         |          |
|                     | $\neg p$ | HiNQ         | LoNQ    |          |

bias. For example, Maro et al. (2021) note possible additional roles for the tense of the verb in the auxiliary construction.

Moreover, although Domaneschi et al. (2017) show that there are clear preferences for particular forms to be produced in each context, as summarised in Table 1, the distribution of choices for the remaining forms is not uniform, with certain “non-preferred” forms being produced above chance – indicating that perhaps these distinctions are not so clear cut. For example, in situations constructed so that participants had a prior bias towards the positive proposition  $p$ , and so that the contextual evidence was either neutral or in favour of  $\neg p$ , high negation questions were preferred. However, with a prior bias for  $p$ , when the contextual evidence was neutral, the second most preferred form (around 20% of the data) was a positive polar question, while when the contextual evidence was in favour of  $\neg p$ , around 25% of the data was a low negation question. So, although there seem to be clear preferences when people are asked to choose between different polar question forms, it is likely that in freer production the data would be considerably noisier, if including (polar) questions as the next relevant discourse move.

Furthermore, research by Jamieson (2018) indicates that the likelihood of a high negation question being produced in a given context appears to be stronger in certain contexts than others, despite the same basic bias profiles. Participants in Jamieson’s study were presented with 20 short contexts in a conversation with a friend. These contexts were designed to include a prior speaker belief and either negative or neutral contextual evidence. There were also 30 filler examples. Participants then chose between either a high negation question or a tag question to produce in response to these contexts.<sup>3</sup> All participants saw the same contexts, but the order was randomised.

<sup>3</sup>Tag questions are argued to be licensed in the same sort of belief and bias contexts as biased matrix questions (Ladd 1981, Reese & Asher 2006, Malamud & Stephenson 2015, Krifka 2015).

Both of the contexts in (4) and (5) contain a prior belief, and the evidential context is neutral. We might, therefore, expect that high negation questions would be produced at around the same rate in both contexts. However, around 48% of participants chose to produce a high negation question in context (4), while only around 10% of the same participants did so in (5).

- (4) We are talking about a friend of ours who moved away. You are pretty sure she went to Berlin. You say:
  - Didn't she move to Berlin?
  - She moved to Berlin, didn't she?
- (5) A friend has said she is going to pick up her new pet. You are pretty sure it is a dog. You say:
  - Isn't she getting a dog?
  - She's getting a dog, isn't she?

This suggests that the choice to produce a high negation question may be more probabilistic than deterministic in any given context, even if the speaker has a prior belief of  $p$ . Any number of factors or normative expectations may be influencing the participant's choice of question at any one given time, including, potentially, other non-epistemic biases.

Finally, while data on language production and perception in both the phonetic and semantic traditions provide a strong indicator of overall usage distributions for particular question forms, given biases and contextual information – and thus can tap into intended meaning – language *comprehension* data may provide a very different picture. By looking at how participants process these questions with biases, we can gain a greater understanding of how the questions are interpreted, and thus speak to ongoing theoretical discussions of how these biases are expressed by the interrogative constructions at hand.

In the next section, we therefore explore how to design a processing study to investigate the real-time interpretation of biased questions. We firstly give an overview of related domains where (predictive) processing tasks have been used to explore issues of interpretation, and what sorts of issues surrounding the interpretation of question bias in particular can be addressed using these types of tasks. We then review two studies which have started to explore those issues: Tian et al. (2021) and Macuch Silva & Jamieson (2025). We do not present full results from these studies, but show how the methodologies can enhance the existing literature by investigating the question of whether the information structure of the question can allow participants to predict upcoming material, given a particular context.

Finally, we address the methodological choices that need to be made when designing a processing study to help understand *when* and *how* in interpretation biases are set for any given interrogative structure.

We continue to focus on English, and thus on how variation in (morpho-) syntactic question forms may allow participants to predict upcoming material, but note that the topics and methodologies discussed in Section 3 would extend to the other information structural cues seen in biased questions in other languages (see Section 2.1).

### 3 Using processing tasks to explore question bias

#### 3.1 What can processing studies bring to our general understanding of question bias?

Language production studies like those discussed in Section 2.2 are a vital part of linguistic research, allowing us to shed a light on how language users plan and realise different sorts of linguistic elements, from individual phonemes to entire utterances. However, despite being deeply interconnected in conversation, the processes of producing and comprehending language are usually studied separately from one another, mostly in order to maximise experimental control and precision of measurement. For instance, given that language users may want to achieve various communicative goals with the bits of language they produce, focusing on how they choose to structure their linguistic signals given goals and (linguistic) contexts which are manipulated experimentally can shed light on the processes and motivations behind specific realisations. Conversely, focusing on how language users parse different types of linguistic signals can shed light on the inferences they draw when processing utterances in real time. Existing models of how sentences or otherwise non-sentential utterances are built up and how meaning is imparted in production therefore only tells us so much about how understanding is achieved in comprehension. In psycholinguistics, comprehension research sets about addressing the question of how language is understood based on the signal that is parsed – possibly including information from non-linguistic sources as well as multiple signalling modalities.

A key tenet of modern psycholinguistic research is that language processing is incremental; that is, comprehenders process information as they parse it, one chunk at a time (Altmann & Steedman 1988). While this means that to some extent processing happens on the fly for any individual lexical item, parsing a new word or chunk can both update previous beliefs about what the possible meaning of the signal is (Levy et al. 2009), and, importantly, can help predict

the interpretation of upcoming input in the remainder of the signal (Levy 2008, Kuperberg & Jaeger 2015).

Insights from at least three existing areas of processing research can help us conceptualise how to investigate question bias in terms of incremental (predictive) processing: information structure, extralinguistic context and negation.

Firstly, information structural cues like word order (e.g. Kaiser & Trueswell 2004, Yano & Koizumi 2018) and intonation (e.g Kurumada et al. 2014, Roettger & Franke 2019) can allow the comprehender to make predictions about upcoming material in the signal, such as specific discourse referents or even non-referential lexical information, depending on context. The research on intonation is particularly relevant for researchers interested in question bias, as it complements the already extensive work in experimental phonetics referred to in Section 2, which nevertheless does not focus on real-time processing and its impact on incremental interpretation.

To date, there has been considerably less work focused on the processing of interrogative structures compared to affirmatives, particularly in terms of how information structural cues might allow comprehenders to predict upcoming material in a question. However, for biased questions, we might assume that if a particular question form (for example, syntactically high negation in English) has a specific conventionalised meaning, its use in a particular pragmatic context may then facilitate processing of specific elements in the question through prediction.

Aside from work explicitly focused on pragmatic language interpretation, processing studies have generally focused on the predictability of particular interpretations given the immediate sentential context – that is, the context within the particular sentence being investigated, generally a specific word given the words preceding it. However, particularly pertinent for the study of question bias is the possible importance of extra-sentential context on predictability. Lemke et al. (2021) highlight the importance of investigating predictability based on extra-sentential context when investigating interrogatives, where predictability likely comes from the preceding discourse material, including the extralinguistic context, rather than from the form of the interrogative itself. For example, if two people are sharing a pizza, asking the question in (6) would most likely predict the continuation of *another slice* rather than, for example, *to go out on Saturday* or *some Christmas pudding*. This prediction is made purely on the extralinguistic context and not on any preceding material in the sentence.

- (6) Anna and Ben are sharing a pizza. Anna's plate is empty, and Ben says:  
Would you like (another slice/to go out on Saturday/some Christmas pudding)?

Given what has been found in production data, therefore, it may be possible that based on a set of contextual beliefs and biases, comprehenders are able to predict either the form of the question itself (e.g. high or low negation in English), or further material in the main body of the question, based on the combination of context and question form.

While the example in (6) adapted from Lemke et al. (2021) demonstrates how extralinguistic context can influence the processing of positive polar interrogatives, the addition of negation makes the study of biased questions all the more complex.

The processing of negation has played a major role in the development of psycholinguistic research (Kaup & Dudschtig 2020). Early studies (e.g. Just & Carpenter 1971, Fischler et al. 1983) found that negative sentences are more troublesome for comprehenders than their positive counterparts, and are thus processed more slowly. Some more recent research (Nieuwland & Kuperberg 2008, Tian et al. 2010, Dale & Duran 2011) has indicated that the difficulty in processing of negation in these experiments may be purely circumstantial, due to a lack of contextual information provided to participants in the studies. Rather, if the negation is pragmatically licensed by a current question under discussion, processing proceeds unhindered as we would expect for affirmative sentences. However, even with high-level contextual support, evidence for the difficulties of processing negation still arises (Darley et al. 2020).

The role of negation in processing is thus another factor that must be taken into account when considering what processing studies can tell us about question bias, at least for languages where negation is part of the relevant question form, as in English and German. It may be that having a strong enough discourse context set up prior to the question itself resolves any issues that a negation marker may present; however, it may also be that the presence of negation – separate from the issue of the question form – could cause difficulty in processing.

Notably as negated biased questions relate to the affirmative proposition, it has been proposed that the negative marker in a high negation question is not a regular propositional negation, but an operator (Repp 2009, Romero 2015) or a sort of metalinguistic negation (Romero & Han 2004, Krifka 2015). Issues in the processing of low negation questions, but not in the processing of high negation questions, may be able to contribute to these debates, perhaps suggesting an operator based account.<sup>4</sup>

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<sup>4</sup>There is little research on the processing of metalinguistic negation; however, limited results indicate that metalinguistic negation is processed in the same way as propositional negation (Noh et al. 2013, Blochowiak & Grisot 2018).

Even removed from the study of negation, we might expect that if the interpretation of a biased question is tied to the conventionalised semantic meaning of a particular question form (such as an operator), then we might see different effects compared to if the interpretation is derived from pragmatic inferencing (as in e.g. Van Rooy & Šafářová 2003).

In summary, on the basis of existing research in psycholinguistics, we can ask some of the following questions with regard to how question bias is processed:

1. Do biases originating from or relating to a speaker's original belief, or the contextual evidence, facilitate processing of particular types of biased interrogative structure?
2. Do information structural cues of a biased interrogative structure, such as high or low negation, facilitate processing downstream in the sentence, dependent on the context?
3. Does processing negation in a (biased) interrogative structure cause particular processing difficulties given any one question form or context?

Answering these questions about what comprehenders might or might not predict on the basis of the context and the question form can then contribute to the ongoing debate surrounding how bias is encoded into questions.

In the next section, we demonstrate, referring to studies from Tian et al. (2021) and Macuch Silva & Jamieson (2025), how (predictive) processing models and incremental interpretation can start to address these questions.

### **3.2 Exploring whether the question form allows comprehenders to predict upcoming material**

Combining the insights from research on predictability based on information structural cues with those from the research on extra-sentential cues and negation suggests that processing studies can shed light on where, and how, biases are incorporated into an interrogative, and whether particular linguistic forms encode these biases.

We firstly turn to a study from Tian et al. (2021). Tian et al. report results from a set of visual world eye tracking experiments in English and French – here, we focus on their English experiments. Participants were presented with a visual display containing four images, two distractors and two target images. Each target image represented a positive or a negative version of the same critical proposition, which always consisted of a binary predicate – e.g. an ironed shirt

representing *The shirt is ironed* and a creased shirt representing *The shirt is not ironed*. Participants heard either a positive polar question (7), a question with high negation (8) or a question with low negation (9), along with a positive or negative answer to the critical question.

- (7) Has John ironed his father's shirt? Yes, he has / No, he hasn't
- (8) Hasn't John ironed his father's shirt? Yes, he has / No, he hasn't
- (9) Has John not ironed his father's shirt? Yes, he has / No, he hasn't

Participants' task differed between two versions of the same experiment. We focus on the results from the experiment which involved not only listening to the question-answer pair and looking at the screen but also selecting the picture that best matched the dialogue. Participants' gaze was measured throughout each trial as they listened to the dialogue, the measure of interest being the proportion of looks to both the  $p$  and  $\neg p$  targets during the question and the gap that ensued before the answer was played.

Tian et al. (2021) find that, across all question types, participants consider both  $p$  and  $\neg p$ , directing their gaze at both images. In the positive polar questions, participants show a bias for the  $p$  target starting at the noun (e.g. *shirt*) and continuing into the gap between the question and the answer. Though only reliable downstream in the sentence, descriptively, the bias seems to emerge as early as at the possessive (e.g. *his*), right after the main verb (e.g. *ironed*). In the high and low negation questions, on the other hand, participants show no reliable bias for either the  $p$  or  $\neg p$  targets, although, descriptively, the results for the high negation seem more akin to positive questions. Interestingly, the descriptive results in the high negation also suggest an early sensitivity to the  $p$  target at the main verb, although, here too, the differences are not reliable. All in all, the authors conclude that original speaker bias can account for the variation in gaze behaviour, with at least suggestive evidence for a bias towards  $p$  in high negation contexts, which would map onto the assumed bias that has been argued for in the literature. Regarding low negation questions, the authors tentatively conclude that low negation questions may also carry original speaker bias towards  $p$ , and that this may balance out any preference for the  $\neg p$  target, though the results are inconclusive.

While Tian et al. (2021) make a start at addressing the question of how questions with biases are processed, at this stage several open questions remain. First, their study was designed to investigate whether polar interrogatives denote the set of all possible answers (Hamblin 1973, Karttunen 1977, Groenendijk & Stokhof 1984) regardless of their surface syntactic form, or whether different

forms of interrogatives abstract from (Ginzburg & Sag 2001) or highlight (Roelofs & Farkas 2015) one of the possible answers (e.g.  $p$  or  $\neg p$ ). Although they subsequently extrapolate to discussions of original speaker bias and contextual evidence, their materials were not designed to take this into account. In particular, the target questions were not situated within any context which set up biases and beliefs for the participant (as they were in, for example, Domaneschi et al. 2017) and so it is hard to make conclusions about how the different question structures might be processed in relation to these specific biases that have been highlighted in the formal semantic literature, which have otherwise been shown to affect controlled question production in the laboratory. Then, on the face of it, Tian et al.'s initial results clash with the existing claims and evidence from the literature, such that positive polar questions and high negation questions seem to have a similar processing profile. Lastly, it is unclear from the setup of their study whether any particular words were accentuated prosodically, which might provide contradictory cues to the morphosyntactic information manipulated explicitly.

We now turn to the study from Macuch Silva & Jamieson (2025). In this study, we conducted a set of self-paced reading experiments in English and German to investigate whether there is facilitation of processing one syntactic form of a negative question over another, given variations in original speaker belief with negative contextual evidence. We focus on the results from the English experiments.

In the study, participants were presented with short contexts, which set up either a prior belief of a given proposition  $p$ , or contained no specific prior belief. The context also contained some current evidence that suggested the truth of  $\neg p$ . The study therefore investigated the distinction between high negation questions and low negation questions found in the production study in Domaneschi et al. (2017), seen in the bottom row of Table 1. Recall that Domaneschi et al. (2017) found that, when presented with different polar question forms, participants preferred to produce high negation questions in contexts with an original belief of  $p$  plus contextual evidence for  $\neg p$ , while low negation questions were preferred in contexts with no specific original belief and contextual evidence for  $\neg p$ . An example of a context from Macuch Silva & Jamieson (2025) with a prior belief and contextual evidence for  $\neg p$  is given in (10), with the associated high and low negation test items.

- (10) Our friend is getting a new pet. You heard from her sister that it would be a cat. However, I tell you she is planning to take the pet for a lot of walks.  
You say:

- Hold on. Isn't she getting a cat?
- Hold on. Is she not getting a cat?

120 self-reported monolingual speakers of English read these fictional scenarios. Each scenario was followed by the test item, in which the words were masked with underscores. Participants were instructed to press the space bar to reveal one word at a time, following a moving window self-paced reading task design (Just et al. 1982). The time participants spent reading each word was measured, with any facilitatory processing expected to lead to shorter word reading times, and surprisal or difficulty leading to increased reading times. Participants were instructed to read for comprehension, and were presented with comprehension questions after every 3 trials to ensure focus was kept on the task.

Macuch Silva & Jamieson (2025) find no reliable evidence for facilitation in reading either question form (so, *Isn't she...* or *Is she not...*) in either of the contexts tested, suggesting that although language users may have preferences as to which interrogative form to produce in context, these preferences may not translate into concrete expectations when it comes to the processing of the same question forms. Regarding the first of the questions set out in Section 3.1, then, it does not appear that contextual beliefs and biases as put forward in the literature constrain the processing of either particular interrogative form, contra what the production biases in Domaneschi et al. (2017) might suggest.

However, unlike offline production data, which can be mapped more straightforwardly onto existing biased question accounts, no semantic account currently on offer provides concrete processing predictions, such that it remains underspecified *when* exactly in incremental interpretation contextual facilitation may occur. Indeed, even when a question is set against the belief and contextual evidence said to license a particular question form, there are still numerous topics that the actual biased question *could* be about. For example, in the above example in (10), the discourse continuation of *Isn't she...* could be about the cat, but it could also be about, for example, the friend being too busy with work to go out for regular walks. It could therefore be that a particular question form *is* preferred in context, but that facilitation only occurs once semantically constraining information like the main verb enters the frame, that is, once interpretation is further constrained by additional linguistic material in the signal. Facilitatory processing might be expected to occur not at the question form itself or immediately following it but rather further downstream in the sentence once contentful information is processed and integrated into the unfolding discourse representation.

As at the question forms, Macuch Silva & Jamieson (2025) find no reliable evidence for facilitation in reading the main verb following the auxiliary verb

construction for either high or low negation questions in either belief and bias context. However, we do find reliable evidence for a facilitatory effect at the noun (e.g. “cat”) in high negation questions which follow a discourse which has been set up to include a prior belief. Interestingly, this result seems to map onto the descriptive results reported by Tian et al. (2021), who find suggestive evidence that comprehenders have a preference to direct their gaze to images representing *p* when hearing the noun in a high negation question.

All in all, these results indicate that comprehenders track epistemic information during the processing of negated polar questions, and that they might be sensitive to how that information interacts with the syntactic form of the question, such that they seem to expect specific lexical information downstream in the sentence when processing high negation questions. Ultimately, this might mean that there is no specific semantic meaning associated with the negation marker in a high negation question in English, but rather that the meaning of the auxiliary construction as a whole is inferred pragmatically in context.

However, this is only the tip of the iceberg regarding the study of processing biased questions. Firstly, Macuch Silva & Jamieson (2025) only investigate two cells from Table 1; how would low negation questions be processed in contexts with a prior belief but no contradictory evidence, for example?

Furthermore, it may be that word reading times are not a fine-grained enough measure of processing for this subtle interface phenomenon. Indeed, at the current level of analysis, the pragmatic expectations of interest are categorical in nature – we expect there to be a preference for a particular question form, but not *how much* of a preference – which realistically means these expectations may not map well onto real-time processing demands and their accompanying behavioural correlates, unless there are strong enough pressures in place such that the relevant biases actually translate into measurable expectations.

In summary, the studies from Tian et al. (2021) and Macuch Silva & Jamieson (2025) illustrate how we can use processing tasks to help address the major topics of concern in the study of question bias, but there is much more that can be done. In the final section, we therefore reflect on some of the design decisions of these studies and overview how to potentially design new studies to help understand *when* and *how* in processing biases are set for any given interrogative structure.

### 3.3 Designing a processing study to investigate question bias

#### 3.3.1 The task

In order to study “online” interpretation processes, it is important to use tasks which measure participants’ reactions and understanding on a moment-by-

moment basis, either in addition to or possibly without explicitly asking them to make “offline” decisions or judgments – in which various extralinguistic or metalinguistic pressures may affect the outcome of the task.

There are a variety of experimental tasks that can be used to investigate online processing, each with their own perks and pitfalls. The two studies we discussed in Section 3.2 have employed two very different types of tasks: a self-paced reading task and a visual world eye tracking task. Here, we outline how to weigh up design choices for these two methodologies in particular, though a myriad of other psycholinguistic methods such as mouse tracking or ERP studies could be used to investigate question bias.

### 3.3.1.1 Self-paced reading

Self-paced reading tasks (Just et al. 1982) allow for relatively cheap studies of psycholinguistic processing based on common computer equipment, making them particularly useful for gathering data both in the laboratory and online. In a standard “moving window” self-paced reading task, participants press a button to read a sentence one word or chunk at a time, the measurement of interest being the time spent between button presses. In general, self-paced reading tasks have been found to be comparable to other, more complex, cognitive measures of psycholinguistic processing (Marsden et al. 2018), which speaks to their usefulness as a method. A number of potential pitfalls arise, however, with using a self-paced reading task to understand a discourse phenomenon such as question bias.

Firstly, given that question bias is strongly situated in interactional contexts (e.g. Hennoste et al. 2017, Heritage & Raymond 2021), reading may not be particularly informative of how people actually process biased questions naturalistically. Of course, experimental psycholinguistics in general is not situated in rich interactive settings, and so this may not be a concern specific to this methodology, but the issue should nevertheless be taken into account. Constructing scenarios or (reported) dialogues which set up some form of a discourse context for the test sentence can go a certain way to solving this potential concern, at least under the assumption that one can extrapolate from reading processes to naturalistic comprehension in the first place.

A related concern when using self-paced reading, or any reading method for that matter, is that it is not possible to know how participants interpret the prosody of the read sentence. The licensing and interpretation of an interrogative can often be dependent on its prosodic structure (Pierrehumbert & Hirschberg 1990, Grice & Savino 1997, Vanrell et al. 2012, Hedberg et al. 2017), and in polar

questions prosody can be an important factor whether or not intonation itself is the linguistic form said to mark any bias, as discussed earlier in Section 2.2. Regarding negated biased questions where the bias is claimed to be marked primarily morphosyntactically, Domaneschi et al. (2017) find that while participants in their German production study consistently produce high negation questions with a final rise, participants in their English study produce high negation questions around 50% of the time with a final rise, and 50% of the time with a final fall.<sup>5</sup> Using a self-paced reading study, therefore, does not allow us to understand how prosody might impact the interpretation of a biased question, which could well be processed differently by different participants, depending on which contour they project on reading.

The obvious solution to the above issue is to present the stimuli auditorily to participants, thus making it possible to take account of effects of prosody on biased question interpretation. For that, one could retain the same general setup of a self-paced reading study but instead use a self-paced listening task (Ferreira, Henderson, et al. 1996), which follows the same format but with auditory rather than written stimuli. While self-paced listening is a rather underexplored psycholinguistic method, especially compared to self-paced reading, it has been shown to replicate the results of self-paced reading tasks (Ferreira, Anes, et al. 1996, Papadopoulou et al. 2013), and might thus be ideal for cases where written stimuli may not be so appropriate and where using other auditory delivery methods may not be feasible. One potential limitation of the method is that, compared to self-paced reading, self-paced listening might exacerbate even more the unnaturalness of the comprehension process, as it is very much unlike normal listening.

Secondly, recording the time it takes for a participant to press a button and read (or listen to) a particular segment in a test sentence may simply not be a fine-grained enough measure of online processing to allow us to determine how comprehenders process a complex semantic-pragmatic construction like a biased question, as discussed in the previous section. For instance, in Macuch Silva & Jamieson (2025), we find small differences in reading times at the noun when comparing high negation questions in both bias conditions. It is likely that the effect size of interest is indeed very small, and so the granularity of a method such as self-paced reading may not allow capturing such subtle effects, which might otherwise be measurable using more fine-grained methods. Next, we discuss some of the trade-offs of using one such higher-resolution method, namely eye tracking.

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<sup>5</sup>Domaneschi et al. (2017) propose that this intonational difference corresponds to the ambiguity in high negation described by Ladd (1981) and shown in examples (1–2).

### 3.3.1.2 Eye tracking

While self-paced reading still relies on the participant to actively engage in some element of the task beyond simply processing (i.e. pressing a button to move on to the next reading segment), eye tracking studies (Rayner 1978) allow for an even more natural reading process – given that eye movements are an essential part of processing (written) language. In eye tracking studies, eye movements and fixations are recorded as a participant reads through a sentence. Additionally, any “regressions” that the participant makes, such as re-reading a segment, can also be recorded. Where self-paced reading provides a singular measure for each word or chunk in a sentence, eye tracking can thus provide an extremely rich data set containing several measures for even one test item.

Eye tracking can rely on the same sort of measurement principles and assumptions as self-paced reading: namely, that when the eye is fixated on a particular target, that target is being considered, and that longer durations spent on any one target indicate that it is proving to be more difficult to process. However, unlike self-paced reading, eye tracking allows for more naturalistic reading processes, such as backtracking and re-reading. In the study of question bias, therefore, it may be possible using an eye tracking experiment to see, when a comprehender encounters the main contentful verb in the question, whether they then regress to the negation marker which they may have previously processed, indicating difficulty in integrating semantic information from verb. However, classical eye tracking studies involving the reading of sentences have the same issues as self-paced reading tasks in the study of biased questions: that questions are inherently interactional and thus not so often read, and a participant’s interpretation of the sentence prosody cannot be controlled.

Visual world paradigms (Huettig et al. 2011) allow researchers to track participants’ eye movements towards particular (referential) targets, as they process auditory stimuli. This method was used to explore processing of different types of question forms in Tian et al. (2021), discussed in Section 3. However, it does not trivially lend itself to investigating discourse situations which involve expectations that might not be referential in nature.<sup>6</sup> In order to fully understand how biased questions are processed, the visual world paradigm would need to be combined with an effective way to present contextual evidence for the question to the participant. This could perhaps be done through video or audio story telling prior to the presentation of the visual world, or it could involve designing scenar-

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<sup>6</sup>For research employing eye tracking while reading to investigate how spatial information can inform abstract language processing, see Guerra & Knoeferle (2014, 2017).

ios with epistemic expectations which can be encapsulated in concrete objects or actions as they are traditionally represented in visual world.

Both classic eye tracking and visual world paradigms can present researchers with an array of useful data that could help address major questions in the study of question bias, as outlined above. However, crafting useful designs where beliefs and biases can be straightforwardly operationalized might be a challenge for traditional setups. In the next section, we discuss some ways in which materials for such experiments can be designed.

### **3.3.2 Material design**

Designing materials for any study of question bias is in itself a complex task, regardless of whether you are conducting a processing study or not. In this section, we focus on particular decisions that are important for processing studies – again looking in particular at self-paced reading and eye tracking – only touching on general decisions that must be made in any experimental study of question bias.

#### **3.3.2.1 Setting up the contexts**

In order to capture potential interactions between speaker beliefs and contextual evidence in the processing of a biased question, the experimental stimulus must be combined with a discourse context which sets up beliefs and biases (as in e.g. Domaneschi et al. 2017 and Macuch Silva & Jamieson 2025). Ideally, these contexts should be as realistic and naturalistic as possible given the constraints of a controlled laboratory experiment, and importantly they must actually include the various biases that are being set up for the context, at an appropriate “strength” – for example, the biases should not be so strong that the very act of asking a question becomes irrelevant. In Macuch Silva & Jamieson (2025), we conducted an independent task prior to the main data collection in order to collect norms of the experimental discourse contexts, to understand the baseline likelihood of expecting certain epistemic beliefs in those contexts. Participants in the norming study were asked to read a short scenario corresponding to the background contexts that would be used to set up the questions. Participants then answered a question pertaining to the scenario, which paraphrase the relevant negated question that would appear in the main study. An example can be seen in (11).

- (11) Scenario: Our friend is getting a new pet. You heard from her sister that it would be a cat.

Q: Do you think the person in this scenario is getting a cat?  
Yes/No/Don't know

For contexts in which a prior speaker belief was to be established, we expected scenarios to show a bias for “yes” responses, while for scenarios which were to establish a belief, a bias against “yes” was expected.<sup>7</sup> By carrying out a norming study in advance, we can be more certain of ensuring that the beliefs and biases established in the scenarios map to the types of situations that have been detailed previously in the literature, and likewise that any expectations related to particular forms or contexts can be at least coarsely quantified. Yet, as discussed in Lemke et al. (2021), collecting study-specific norms (which are not necessarily generalisable to other data sets) might not be the best way of gauging variability or uncertainty in the expectations of interest; instead, relying on corpus estimates or norms which are open and freely available might be a more viable alternative.

### 3.3.2.2 Test stimuli

It is important that the test stimuli used in any processing study of biased questions meet the standard expectations of any well-conducted experimental paradigm: for example, in terms of appropriate numbers of stimuli, filler items and randomisation or counterbalancing procedures. However, there are other factors that must also be taken into account in a processing study.

For instance, in order to take valid measurements of the relevant moments in a processing task, each stimulus must follow the same basic frame so that the critical form is in a comparable position or time-window in every sentence. For example, in a straightforward declarative sentence, all items may follow the structure as in (12).

- (12) The boy walks to the shop.  
DET NOUN VERB PREP DET NOUN

If the verb in the example in (12) is the critical form in the stimulus, to which the relevant facilitation or processing difficulties might be attributed, measurements can then be taken directly at the verb as well as at the words immediately following it in the case of reading, or a reasonable time-window around the verb can be normalised across different sentences in the case of unconstrained listening.

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<sup>7</sup>Responses could be either in favour of *no* or *don't know* in the no belief conditions.

In conducting a processing task on question bias, we potentially run into problems given that biases can be associated with quite different question forms, as in the high and low negation forms in English. In this case, questions with low negation have one extra word compared to questions with high negation, which might directly impact both a reading and a listening experiment, given that the moment-by-moment unfolding of the signal cannot be matched as directly as when investigating biases which are mapped, for instance, onto different intonation contours over the same word or phrase. Furthermore, the position of the negation marker in the sentence is completely different (either first position in a high negation question, or after the subject in a low negation question). This makes direct comparison between the two types of structures difficult, and so while it may be intuitive to measure, for a given bias context, how each interrogative construction is processed, it is probably more convenient to instead compare, for each interrogative, how it is processed in each bias context.

A further potential problem arises in terms of the regions of interest in a sentence. In processing studies, it is important to avoid (as far as possible) having a critical region in the final region of the sentence. Participants' reading times often slow towards the end of a sentence (Conklin & Pellicer-Sánchez 2016), and the final region causes a general increase in processing times due to what Just et al. (1982) term the *sentence wrap up* effect, with comprehenders piecing together everything they've just processed.

Avoiding the final region may not be a major concern for the study of question bias in a language like English or German, but in a language like, for example, Japanese, where the negation or question particle comes at the end of the sentence, this would be an issue. Even in English and German, where fronted morphosyntactic constructions are the question forms of interest, cues at the end of a sentence might lead to qualitative shifts in interpretation, such as if the last word is accented in unexpected ways.

It is also important to avoid having critical regions at the very beginning of the stimulus. In English, this is potentially a problem for negated interrogatives, as the negation may be in the first region with a high negation question. Of course, many of these concerns are alleviated if one postulates that the question form itself serves as a cue to later information in the sentence, which is what the results from Macuch Silva & Jamieson (2025) and Tian et al. (2021) seem to suggest. Otherwise, issues with both the first and last regions may be accounted for by adding additional material on either side of the target sentence, which nonetheless introduces possibly unwanted sources of variation. In Macuch Silva & Jamieson (2025), we used short phrases like *hold on* or *wait a minute* before participants reached the question, which act as overt markers of surprise, perhaps making

both question types more akin to negations prefaced by *really* in Domaneschi et al. (2017). If studying a language in which the negation or question particles came at the end of the sentence, it would be important that any additional material added still allowed the structure to be interpreted as an information seeking or confirmational question (and not, for example, a rhetorical question that did not require a response).

As well as the overall structure of the sentence, it is important to take into account factors such as the length and overall frequency of the individual words, and the predictability of the words in relation to the context, as these can affect measures of expectancy such as word reading times (Conklin & Pellicer-Sánchez 2016). Other factors which may also have an effect on the ease of interpretation of biased questions include the modality or tense of the question (Maro et al. 2021). If the stimuli is presented auditorily, it is also important that prosody is controlled for, as discussed above.

## 4 Conclusions

In this chapter we have provided an overview of what psycholinguistic processing studies can add to the existing literature on question bias. While introspective theoretical work has identified potential pragmatic constraints on the usage of different question forms, and production studies have narrowed down speakers' preferences across those constraints, there are still major questions regarding if, and if so, how, a bias is semantically encoded into an interrogative form, as well as whether or not the choice of interrogative form is constrained by the combination of original speaker belief and contextual evidence. As we have shown, the empirical preferences for any particular form in different epistemic and evidential contexts seem to be much more gradient than originally discussed in the theoretical literature. Indeed, even in cases where one question form seems to be preferred over its potential alternatives, this preference is probabilistic in nature and dependent on a combination of factors that goes beyond the speaker bias/contextual evidence divide. Future work should address this variation, either explicitly attempting to capture it or at the very least providing an account as for what the source of the natural gradience in the data might be.

With reference to Macuch Silva & Jamieson (2025) and Tian et al. (2021) in particular, we have shown that processing studies can add to this debate by investigating at what stage of the interrogative the bias appears to take hold, and whether there are specific relationships between the bias and the question form. However, the results from these studies are only the beginning of what

psycholinguistic experimentation can add to the study of question bias, and so in Section 3.3, we laid out some possible design decisions for processing studies of question bias, as well as what the choice of a method can bring to the topic. While we have centred our focus on processing studies, there are many other ways that experimental tasks could be employed to explore both the production and comprehension of question bias, such as through map tasks (Anderson et al. 1991), or rating the probabilities of beliefs (Tonhauser 2016, Degen et al. 2019) given production of a question form. Ultimately, we believe that experimental psycholinguistic work should go hand in hand not only with theoretical work happening in formal semantics but also with other work, both empirical and theoretical, concerned with issues surrounding question bias, and we hope we have shown relevant ways to go about bridging these different approaches.

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*9 Psycholinguistic processing tasks and the study of question bias*

Yano, Masataka & Masatoshi Koizumi. 2018. Processing of non-canonical word orders in (in)felicitous contexts: Evidence from event-related brain potentials. *Language, Cognition and Neuroscience* 33(10). 1340–1354.



# Chapter 10

## Marking the type of speaker bias: Hungarian *nem-e* interrogatives

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This paper investigates the use conditions of a noncanonical polar interrogative form type in Hungarian, which contains the (surface) constituent *nem-e* (consisting of a negative and an interrogative particle), and compares them to those of the two canonical negative polar interrogatives. It is shown for the first time that *nem-e* in fact appears in three different construals, which are connected to at least two different dialects. Focusing on *nem-e* interrogatives used by speakers of the Standard Dialect, we point out that they lack non-epistemic speaker expectation bias, cannot be used to encode indirect reproaches, offers or requests, they do not realize initiating moves in discourse, they do not give rise to rhetorical question readings, and they cannot felicitously be responded to by isolated response particles. These properties are accounted for on the basis of the assumption that the focus-background structure of the form involves a focused proposition, which leads to certain restrictions regarding the structure of discourses it can appear in.

### 1 Introduction

The aim of this paper is to review the use conditions, particularly the “bias profiles” of different form types of negative polar interrogatives in Hungarian in general, and then focus on a non-canonical form type that contains the (surface) constituent *nem-e*, consisting of the negative particle *nem* and the interrogative particle *-e*, illustrated in (1). (Until we present our account of the interpretation of interrogatives with *nem-e* in Section 5, they will be translated into English in terms of negative polar interrogatives with “high negation”, as other negative



interrogative forms in Hungarian normally are, cf. Gyuris 2017, a.o.. In Section 5 we will argue for a more appropriate translation.)

- (1) A and B are wondering why their friends haven't arrived in time for a meeting.

A says: Nem-e történt valami az úton?

not-Q happened something the way.on

'Didn't something happen on the way?'<sup>1</sup>

We rely on a distinction made in the literature between two dimensions of bias in polar questions (cf. Sudo 2013). The first one, usually referred to as *evidential bias*, indicates sensitivity to evidence in the context for the positive or the negative answer ( $p$  vs.  $\neg p$ ) (Cf. Ladd 1981, Büring & Gunlogson 2000, Roelofsen et al. 2013). The second one, which is going to be referred to here as *(speaker) expectation bias* (following Silk 2020), indicates sensitivity to the speaker's previous expectations regarding the answer. These expectations can stem from the speaker's beliefs, wishes or some set of rules, and are thus referred to in the literature as *epistemic*, *bouleptic* or *deontic bias*, respectively.<sup>2</sup> (For relevant discussion, cf. Romero & Han 2004, Reese 2007, Reese & Asher 2009, Domaneschi et al. 2017, Silk 2020, a.o.)

Interrogatives containing the constituent *nem-e* complement the inventory of negative polar interrogative forms found in the Standard Dialect, to be introduced below. In traditional descriptive grammars and style guides they have been referred to as a "substandard" (cf. Szász 1905, Tompa 1961/1962, Grétsy & Kovalovszky 1980/1985), in modern descriptive grammars as a "non-standard" form type of negative interrogatives (cf. Kenesei et al. 1998: 2).<sup>3</sup> No semantic or pragmatic distinctions between interrogatives with *nem-e* and the other negative interrogative form types have been mentioned so far in the literature.

In this first systematic study of the interpretation of interrogatives with *nem-e*, we argue that they appear in at least two dialects in Hungarian, in different structural environments and with different use conditions. In the first dialect, they are used *in lieu* of a standard negative interrogative form.

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<sup>1</sup>Q stands for 'interrogative particle'.

<sup>2</sup>Note that Sudo (2013) and Gärtner & Gyuris (2017, 2023) refer to all types of (speaker) expectation bias as *epistemic bias* for brevity.

<sup>3</sup>In spite of the stigmatization of the form by descriptive linguists and language educators, a sociolinguistic survey reported on by Kassai (1994) has found that 36,7% of 832 participants considered an interrogative with *nem-e* acceptable, and 45,9% of 812 participants did not correct the form in a text where they were asked to correct what they consider "mistakes". These data indicate how widely the form is used and accepted among speakers.

In the second dialect, they appear in addition to the canonical negative polar interrogative forms, but are used for a special effect. In the latter dialect, *nem-e* turns out to be sensitive to the type of the (speaker) expectation bias (epistemic vs. deontic/bouletic). The central question to be addressed in this paper is how to account for the interpretational features of *nem-e* in the second dialect, with particular attention to its bias profile.

The paper is structured as follows. First, in Section 2, we review previous claims about the bias profiles of the (two) canonical positive and negative polar interrogative form types in Hungarian. Section 3 presents a set of examples with *nem-e*, and sorts them into two dialects. Section 4 focuses on *nem-e* interrogatives in one of these dialects, investigating the type of negation they encode, the type of the speaker expectation bias they introduce, and further conditions on the use of the form in context. Section 5 makes a proposal for an account of the interpretation of *nem-e* interrogatives in the latter dialect, which explains the properties discussed above. The paper ends with the conclusions in Section 6.

## 2 Polar interrogatives in Hungarian: Forms and biases

This section presents the interrogative forms that can appear in matrix clauses in Hungarian. (For more detailed overviews, cf. Gyuris 2017, 2018.)

(2) represents the form type referred to as *-e-interrogative*, marked by the *-e* interrogative particle, which cliticizes onto the finite verb. It is pronounced with an end-falling intonation contour. (3) is a so-called *rise-fall (/\)-interrogative*, which is marked by prosodic means, with a global rise-fall tune ( $L^*HL\%$ , cf. Ladd 1996), peaking on the penultimate syllable.<sup>4</sup>

- (2) János ki-utazott-e Berlinbe?  
 János VM-travelled-Q Berlin.into  
 ‘Did János go to Berlin?’<sup>5</sup>

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<sup>4</sup>For a detailed discussion of Hungarian intonation, including that of polar interrogatives, cf. Varga (2002).

<sup>5</sup>VM stands for ‘verb modifier’. The category of verb modifiers includes verbal prefixes (e.g. *ki*), bare nominal complements, oblique complements expressing a goal, and non-agentive subjects, cf. É. Kiss (2002: 57). In non-negative sentences, these constituents are situated immediately in front of the verb in the absence of a constituent in preverbal focus, but stay behind the verb in case the latter is preceded by the negative particle (*nem*) or a constituent in focus position (to be illustrated below). The verb–VM order will be referred to here as “inversion”. According to standard Hungarian orthography, a verb is written together as one word with the verbal prefix preceding it. To make the verbal prefix more visible, we will in most cases use a hyphen to connect it with the following verb.

- (3) János ki-utazott Berlinbe  $\wedge$ ?  
János VM-travelled Berlin.into (Q)  
'Did János go to Berlin?'

As a comparison between (3) and (4) illustrates,  $\wedge$ -interrogatives are string-identical to the corresponding declaratives, which are pronounced with an end-falling tune as a default:

- (4) János ki-utazott Berlinbe.  
János VM-travelled Berlin.into  
'János went to Berlin.'

In subordinate clauses, the only interrogative form available is the *-e* interrogative, as in (5).<sup>6</sup>

- (5) Mari tudja, hogy János ki-utazott-e Berlinbe.  
Mari knows that János VM-travelled-Q Berlin.into  
'Mari knows whether János went to Berlin.'

It is argued in Gyuris (2017) that whereas *-e*-interrogatives are equally infelicitous in the presence of *compelling contextual evidence* (cf. Büring & Gunlogson 2000) for the positive or the negative answer,  $\wedge$ -interrogatives can be compatible with the presence of compelling contextual evidence for the former.<sup>7</sup> (6) shows the use of the two forms in a context with compelling contextual evidence for the positive answer, and (7) illustrates their uses in a neutral context (i.e., one with no compelling evidence for any of the answers).

- (6) A enters the building in sunglasses and t-shirt. S, who has been sitting in a windowless office during the last couple of hours, wants to know what the weather is like outside. S asks A:  
a. # Jó idő van-e?  
good weather is-Q  
'Is the weather nice?'

---

<sup>6</sup>Note that (i) can only be analysed as containing an embedded declarative:

- (i) Mari tudja, hogy János ki-utazott Berlinbe.  
Mari knows that János VM-travelled Berlin.into  
'Mari knows that János went to Berlin.'

<sup>7</sup>In case the speaker believes that the contextual evidence is only compatible with the positive answer, the  $\wedge$ -interrogative form is blocked by a declarative pronounced with multiple rise-fall tunes (cf. Gyuris 2019, Varga 2010), the counterpart of English 'rising declaratives' (cf. Gunlogson 2003).

- b. Jó idő van  $\wedge$  ?  
 good weather is (Q)  
 'Is the weather nice?'
- (7) A and S talk long-distance on the phone. S wants to know what the weather is like at A's place. S asks A:
- a. Jó idő van-e?  
 good weather is-Q  
 'Is the weather nice?'
- b. Jó idő van  $\wedge$  ?  
 good weather is (Q)  
 'Is the weather nice?'

As noted in Gyuris (2017), and confirmed experimentally in Gyuris et al. (2020, 2021), speakers from different regions judge the appropriateness of *-e*-interrogatives for encoding informal information-seeking questions differently. As opposed to speakers from certain regions in Eastern Hungary and in Transylvania (Romania), speakers from Western Hungary and Budapest tend to accept them only in official, formal contexts (e.g., court or police interrogations), where they are intentionally used to indicate the impartiality of the questioner (cf. Varga 2021). Nevertheless, speakers of all dialects give for *-e*-interrogatives significantly higher acceptability ratings in neutral contexts than in contexts with evidence for the positive answer.

We turn now to the corresponding negative form types. The negative counterparts of (2) and (3) are illustrated in (8) and (9), respectively. The corresponding negative declarative, which is string-identical to (9), is shown in (10).

- (8) Nem utazott-e ki János Berlinbe?  
 not travelled-Q VM János Berlin.into  
 'Didn't János go to Berlin?'
- (9) Nem utazott ki János Berlinbe  $\wedge$ ?  
 not travelled VM János Berlin.into (Q)  
 'Didn't János go to Berlin?'
- (10) Nem utazott ki János Berlinbe.  
 not travelled VM János Berlin.into  
 'János didn't go to Berlin.'

All of (8–10) display inversion between the VM and the verb, due to the fact that the negative particle attracts the verb to NegP, cf. É. Kiss (2009). The syntactic structure of (10) is shown in (11) (Cf. Surányi 2009.):

- (11) [NegP Nem [ utazott<sub>i</sub> [IP ki t<sub>i</sub> János Berlinbe ]]]

In what follows, standard negative -e-interrogatives of the form illustrated in (8) will be referred to as *nem V-e* interrogatives, and negative  $\wedge$ -interrogatives as *nem  $\wedge$*  interrogatives.

The bias profiles of *nem V-e* and *nem  $\wedge$*  interrogatives are different, as discussed in Gyuris (2017). Both of them are compatible with *vala*-indefinites, which Szabolcsi (2002) considers positive polarity items (PPIs). This indicates, following Ladd (1981), that both give rise to an “outside negation” (ON, non-propositional negation) reading. *Nem  $\wedge$*  interrogatives are also compatible with negative polarity items (NPIs), including phrases with *sem* (that É. Kiss 2009 refers to as “negative polarity item, minimizer”), which indicates, following Ladd (1981), that they also give rise to a so-called “inside negation” (IN, propositional negation) reading.<sup>8</sup> The availability of the ON- vs. IN-readings is illustrated for the two negative interrogative forms in (12)–(13):

- (12) Nem utazott-e ki János Berlinbe (valamikor / \*semmikor)?  
not travelled-Q VM János Berlin.into at.some.time never  
'Didn't János go to Berlin (at some point/\*ever)?' ON, \*IN

- (13) Nem utazott ki János Berlinbe (valamikor / semmikor)  $\wedge$ ?  
not travelled VM János Berlin.into at.some.time never (Q)  
'Didn't János (at some point/ever) go to Berlin?' ON, IN

The examples in (14)–(15), where *nem V-e* and *nem  $\wedge$*  interrogatives are presented in contexts with no previous expectation regarding any of the possible answers vs. with expectation towards the positive answer *p*, respectively, show that both negative forms are incompatible with contexts where the speaker has no expectation bias, but that they are both compatible with contexts with bias towards *p* (independently of the ON/IN distinction).

- (14) *No expectation:*

You told me that you went to a party yesterday. I have no idea who else did (or was supposed to go). I ask:

<sup>8</sup>Further diagnostics of ON vs. IN readings include compatibility with *is ‘too’* vs. *sem ‘neither’*, respectively, to be illustrated in (14–15).

- a. # Nem volt-e ott (esetleg) János (is) a buliban?  
not was-Q there perhaps János too the party.in  
#‘Didn’t (perhaps) János go to the party (too)?’
- b. # Nem volt ott (esetleg) János (is/sem) a buliban  $\wedge$ ?  
not was there perhaps János too/neither the party.in (Q)  
‘Didn’t (perhaps) János go to the party (too/either)?’

(15) *Positive expectation:*

You have just told me about Mary’s birthday party you went to. I have no idea who else went (or was supposed to go). I know that John is a good friend of Mary’s. I ask:

- a. Nem volt-e ott (esetleg) János (is) a buliban?
- b. Nem volt ott (esetleg) János (is/sem) a buliban  $\wedge$  ?

Having looked at the canonical positive and negative interrogative form types in Hungarian, the next section zooms in on interrogatives with *nem-e*.

### 3 Interrogatives with *nem-e*: Data and dialects

In the following examples, the majority of which was taken from the Hungarian National Corpus (HNC)<sup>9</sup>, the particle *-e* appears cliticized onto the negative particle *nem*. (16)-(17)<sup>10</sup> encode information-seeking questions, in (18), (19), (20)<sup>11</sup>, and (21)<sup>12</sup> *nem-e* appears in “embedded root” environments:

- (16) Az üzletközpont útvesztőjéből óriási szatyrokkal betéved  
the shopping.centre labyrinth.its.from giant bags.with VM.come.3SG  
néhány civil: “nem-e itt árulják az akciós rozsdamentes  
some civilian not-Q here sell.3PL the sale stainless  
edénykészletet.” [HNC]  
cookware.ACC

‘From the labyrinth of the shopping centre some civilians come in with big shopping bags: “isn’t it here where the stainless steel cookware is sold?” ’

<sup>9</sup>[http://corpus.nytud.hu/mnsz/index\\_eng.html](http://corpus.nytud.hu/mnsz/index_eng.html), cf. Oravecz et al. (2014).

<sup>10</sup>Repeated with original spelling.

<sup>11</sup>[https://www.gyakorikerdesek.hu/sport-mozgas\\_egyeb-kerdesek\\_2716148-hogyan-nezzem-meg-hogy-nem-e-atvernek](https://www.gyakorikerdesek.hu/sport-mozgas_egyeb-kerdesek_2716148-hogyan-nezzem-meg-hogy-nem-e-atvernek) (Last accessed: 15 June 2025)

<sup>12</sup>This example is from the questionnaire reported on in Kassai (1994).

- (17) figyu, vince, nem-e vetted még észre, hogy a mti  
look.SUBJ.2SG Vince not-Q took.2SG still VM that the MTI  
híreit MINDENKI szószerint hozza le/ismélti, mert  
news.its.ACC everybody literally bring.3SG VM/repeat.3SG because  
valószínűleg ez kikötés? probably this requirement [HNC]  
'Look, Vince, haven't you noticed yet that the news of the MTI  
(Hungarian News Agency) are brought/repeated by everybody using the  
same words, because probably that's a requirement?'
- (18) ném-ë gyün el, kérdézzíték mëg (Hegedüs 2001)  
not-Q come.3SG VM ask.SUBJ.2PL VM  
'Isn't he coming? Ask him!'
- (19) Kérdés, hogy nem-e a második emeleti folyosó végén lévő hátsó  
question that not-Q the second floor.of corridor end.its.on being back  
ajtónál fognak csöngetni? (Nádasdy 2024)  
door.at will.3PL ring.INF  
'It is a question whether they won't ring the bell at the back door at the  
end of the corridor on the second floor.'
- (20) Hogyan nézzem meg hogy nem-e átvernek?  
how look.SUBJ.1SG VM that not-Q VM.deceive.3PL  
'How should I find out whether they don't deceive me?'
- (21) Jó lenne tudni, nem-e lesz vihar.  
good be.SUBJ.3SG know.INF not-Q be.FUT.3SG storm  
'It would be good to know whether there won't be a storm.'
- (22) realizes a rhetorical question (cf. the particle *hiszen* 'indeed'):
- (22) Ráadásul egy ilyen hadüzenetnek megvolnának a  
in.addition a such declaration.of.war.DAT VM.be.COND.3PL the  
történelmi gyökerei is. Hiszen nem-e a magyar kalandozó hadak  
historical roots.its too indeed not-Q the Hungarian adventuring troops  
portyáinak igáját nyögte Szent Gallen büszke kolostora?  
raids.their.DAT yoke.its.ACC suffered.3SG Saint Gallen proud cloister.its  
[HNC]  
'In addition, such a declaration of war would have its roots in history.  
Wasn't it the yoke of the raids of Hungarian "adventuring" troops that  
the proud cloister of Saint Gallen suffered from?'

The question realized by the next example is to be interpreted as a suggestion for an explanation:

- (23) Nem-e az az oka ennek, hogy annyi embernek van  
 not-Q that the reason.its this.DAT that so.many person.DAT is  
 megnyilatkozási lehetősége ( mindenki szerkeszthet magának  
 expression opportunity.its everybody create.POSS.3SG himself.DAT  
 honlapot pl.), hogy egyszerűen nem tudjuk átlátni a  
 homepage.ACC e.g. that simply not know.1PL VM.see.INF the  
 helyzetet. [HNC]  
 situation.ACC

'Isn't the reason for this that so many people have an opportunity to express themselves (everybody can create a homepage for themselves, for example) that we simply cannot understand the situation?'

In (24)<sup>13</sup> the interrogative encodes an indirect offer:

- (24) – Másvalamit nem-e tetszik kérni? – folytatta a leány.  
 other.something.ACC not-Q like.3SG ask.INF continued.3SG the girl  
 ' – Don't you wish something else? – the girl continued.'

The interrogative in (25) is used to encode a threat. (Note the remark by one of the interlocutors in this dialogue about the education of the original speaker whose utterance is reported on here, to be discussed below.)

- (25) Azt kérdezte egy férfihang, hogy asszonyom, nem-e fél ...  
 that.ACC asked.3SG a man's.voice that madam not-Q afraid  
 – Így kérdezte, hogy "nem-e fél"? Nem lehetett egy  
 so asked.3SG that not-Q afraid not be.POSS.PAST.3SG an  
 akadémikus. Szóval, mit kérdezett? – Nem-e fél a kedves  
 academic so what.ACC asked.3SG not-Q afraid the kind  
 férje, hogy lóba varrjuk? [HNC]  
 husband.your that horse.into sew.1PL  
 'A man's voice asked, madam, isn't he afraid ... – Did he ask this way,  
 "isn't he afraid"? He surely wasn't an academic. So, what did he ask?  
 – Isn't your dear husband afraid that we sew him into a horse?'

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<sup>13</sup>Kondor, Vilmos 2018. A haldokló részvényes. ('The shareholder on his deathbed.') Libri Kiadó, Budapest. (Courtesy of László Simon.)

The two examples in (26) and (27) illustrate the use of the *nem-e* form to make requests. Note the repetition of *-e* in the latter, which will be discussed below:

- (26) Valaki esetleg nem-e tud segíteni a leszerelésben? [HNC]  
somebody possibly not-Q can.3SG help.INF the dismantling.in  
'Can't perhaps somebody help in dismantling it?'
- (27) Te, medve, nem-e lehetne-e engem arról a listáról kihúzni?  
you bear not-Q be.POSS.COND-Q I.ACC that.from the list.from  
VM.delete.INF  
'You, bear, couldn't my name be deleted from that list?'

The examples provided above might give the impression that interrogatives containing *nem-e* constitute a formal variant of *nem V-e* interrogatives, illustrated in (8), a position also taken in Kenesei et al. (1998). I am going to point out, however, that *nem-e* appears in two kinds of syntactic structures, and then argue that these are associated with different use conditions. I will also suggest that the two structures are in fact used in two different dialects.

The first type of interrogatives with *nem-e*, illustrated in (17)–(18) and (26) above, contains verb–VM inversion, as *nem V-e* interrogatives do, cf. (8), but differ from the latter in that *-e* cliticizes onto the negative particle.<sup>14</sup> I suggest that this configuration is a result of a phonological process, and thus the syntactic structure of the *nem-e* clause of (18) is as shown in (28a). The latter is either pronounced as in (28b), with *-e* cliticized onto the negative particle, or as in (28c), with *-e* pronounced twice, cf. (27).<sup>15</sup>

- (28) a. [... [NegP nem gyün-e<sub>i</sub> [IP el t<sub>i</sub>]] ... ]  
b. nem-e gyün-€ el  
c. nem-e gyün-e el

Interrogatives containing *nem-e* and verb–VM inversion will be referred to as *nem-e V VM* interrogatives (*nem-e* interrogatives with inversion). *Nem-e V VM* interrogatives were characteristic of Western Hungarian dialects until the 19th

<sup>14</sup>In the case of (26), the infinitive *segíteni* 'help.INF' is the VM.

<sup>15</sup>I follow Gärtnér & Gyuris (2022) in taking *-e* to be base-generated in I°. By contrast, Kenesei (1994: 342) considers counterparts of (28b) to speak in favor of lowering *-e* from C°. Discussion of the two approaches – in particular with respect to their predictions regarding locality – is beyond the scope of the current paper.

century. However, since in the Northeastern dialect that formed the basis of the standard (literary) dialect of Hungarian *-e* cliticizes onto the verb, as in (8), *nem-e* forms with inversion from other dialects started to be judged as substandard, and got stigmatized (cf. example (25) above). Informal evidence indicates that speakers who use *nem-e* V VM interrogatives use them in the same contexts speakers of the Standard Dialect use *nem V-e* interrogatives (with obligatory inversion). This is the reason we refer to the dialect where *nem-e* V VM interrogatives are used as the Stigmatized Dialect (Dialect S).<sup>16</sup> In Dialect S, cases of *-e* doubling, as in (28c), normally mark the speaker's uncertainty, and are often used in indirect requests intended to be very polite.<sup>17</sup> In the latter uses *nem-e* can also be analysed as a particle, adjoined to a clausal constituent, like adverbs and other particles are (cf. Gärtner & Gyuris 2012).

The second type of interrogative with *nem-e* lacks inversion between the verb and the VM, illustrated in (20). This latter type will be referred to as the *nem-e* VM-V interrogative. It is mostly used by speakers who in other respects speak the Standard Dialect (using *nem V-e* interrogatives as well), but in a much more restricted range of situations than *nem V-e* interrogatives, to encode a particular type of noncanonical question. The dialect where *nem-e* VM-V interrogatives appear will be referred to as Dialect E (from "Educated" Dialect).<sup>18,19</sup>

Note, importantly, that the two types of *nem-e* interrogatives can only be distinguished in case there is a VM in the sentence, and there is no constituent in the immediately preverbal focus position, which automatically forces inversion. (Cf. É. Kiss 2002 for the syntax of the focus position.) (1) and (25), with no VM, and (16), (19), (22), (23) and (25), with a preverbal focus constituent, can be analysed as representing both categories out of context. Table 1 presents the inventory of negative interrogative forms in the three dialects distinguished in this work.

The rest of the paper will concentrate on the formal and interpretational features of *nem-e* VM-V interrogatives in Dialect E. The next section is devoted to a review of its relevant syntactic and semantic properties.

<sup>16</sup>Stigmatization applies in most cases to any form containing *nem-e*, irrespective of inversion, which makes it very difficult to obtain reliable data about *nem-e*.

<sup>17</sup>Constructions with *-e* doubling are very often used for a stylistic effect, to mock speakers of non-standard dialects.

<sup>18</sup>Cf. Nádasdy (2024: 224–227). I thank Ádám Nádasdy for discussion on the use of *nem-e* VM-V interrogatives in the dialect I refer to as Dialect E.

<sup>19</sup>There are also examples for *nem-e* VM-V interrogatives being used in situations where *nem V-e* interrogatives are used in the Standard Dialect, as in (i). We will ignore them in what follows.

(i) ...még a rúzsát is meg-nézte, hogy "nem-e elkenődött" [HNC]  
even the lipstick.ACC also VM-looked that not-Q VM.smeared  
'...she even looked at her lipstick, "whether it did not smear" '

Table 1: Inventory of negative interrogative forms

|                  |                                                            |
|------------------|------------------------------------------------------------|
| Standard Dialect | <i>nem</i> $\wedge$<br><i>nem V-e</i>                      |
| Dialect S        | <i>nem</i> $\wedge$<br><i>nem-e V VM</i>                   |
| Dialect E        | <i>nem</i> $\wedge$<br><i>nem V-e</i><br><i>nem-e VM-V</i> |

## 4 Properties of *nem-e VM-V* interrogatives in Dialect E

### 4.1 Type of negation

(29) is a *nem-e VM-V* interrogative from Dialect E:

- (29) Nem-e ki-utazott János Berlinbe?  
 not-Q VM-travelled.3SG János Berlin.into  
 ‘Didn’t János go to Berlin?’

(30) illustrates the compatibility of (29) with a PPI (*valamikor* ‘at some point’) and its incompatibility with an NPI (*semmikor* ‘never’):

- (30) Nem-e ki-utazott János Berlinbe valamikor / \*semmikor?  
 not-Q VM-travelled.3SG János Berlin.into at.some.point never  
 ‘Didn’t János go to Berlin at some point/\*ever?’

(30) thus indicates that *nem-e VM-V* interrogatives have an ON, but no IN reading. This might suggest that they can be used felicitously in the same contexts as *nem V-e* interrogatives. The following subsections will, however, argue against this assumption.

### 4.2 Expectation bias

#### 4.2.1 The data

It has been assumed in the literature (cf. Reese 2007, Sudo 2013, a.o.) that whenever a polar interrogative form introduces an expectation bias for the positive or the negative answer, the source of this bias can in principle be the speaker’s

knowledge or beliefs (epistemic bias), her wishes (bouletic bias) or some set of rules (deontic bias). (31) illustrates the use of *nem-e VM-V*, *nem V-e* and *nem*  $\wedge$  interrogatives in a context where the expectation bias for the positive answer ('John went to Berlin') is based on the speaker's beliefs:

(31) *Suggestion scenario*

A, B and János are colleagues. A and B talk after a meeting.

A: Why wasn't János present at the meeting?

B replies:

- a. Nem-e ki-utazott Berlinbe?  
not-Q VM-travelled Berlin.into  
'Didn't he go to Berlin?'
- b. Nem utazott-e ki Berlinbe?  
'Didn't he go to Berlin?'
- c. Nem utazott ki Berlinbe  $\wedge$ ?  
'Didn't he go to Berlin?'

In the *Suggestion scenario*, all three negative interrogative forms are felicitous. The following example shows, however, that they do not always pattern together:

(32) *Reproach scenario*

Mother sees her child kick another child in the sandpit. Mother says to her child:

- a. # Nem-e szégyelked magad?  
not-Q be.ashamed.2SG yourself  
'Aren't you ashamed?'
- b. Nem szégyelked-e magad?  
'Aren't you ashamed?'
- c. Nem szégyelked magad  $\wedge$ ?  
'Aren't you ashamed?'

The intended interpretation of the negative interrogatives in (32) is the following. Mother, the authority, thinks that Child should be ashamed of his actions (based on assumed rules of conduct). By asking an information-seeking question, Mother thus indirectly calls Child's attention to the fact that his conduct was inappropriate. This interpretation presupposes that Mother, the speaker, has a deontic bias for the proposition 'Child is ashamed' (*p*). Note that (32a) would be felicitous in a situation where the purpose of Mother's question were to make a

guess about how Child is feeling, since this would be compatible with her having a previous epistemic bias for *p*.<sup>20</sup>

(33) provides another illustration for the scenario above. As opposed to (32a)–(32c), (33a)–(33c) contain a VM, the bare noun *bocsánatot* ‘apology.ACC’, which makes the absence of the VM–verb inversion visible. The felicity judgments for the three form types pattern with those pertaining to (32).

(33) Mother sees her Child kick another child in the sandpit. Mother to Child:

- a. # Nem-e bocsánatot kérsz?  
not-Q apology.ACC ask.2SG  
‘Don’t you apologize?’
- b. Nem kérsz-e bocsánatot?  
‘Don’t you apologize?’
- c. Nem kérsz bocsánatot  $\wedge$ ?  
‘Don’t you apologize?’

The next example shows the three negative interrogative forms in a context where they are used to encode offers.

(34) *Offer scenario*

B, a colleague, enters A’s office. A wants to offer him some coffee and thus says to him:

- a. # Nem-e meg-innál egy kávét?  
nem-Q VM-drink.COND.2SG one coffee.ACC  
‘Wouldn’t you drink a coffee?’
- b. Nem innál-e meg egy kávét?  
‘Wouldn’t you drink a coffee?’
- c. Nem innál meg egy kávét  $\wedge$ ?  
‘Wouldn’t you drink a coffee?’

In the *Offer scenario*, the *nem-e* VM-V interrogative form is infelicitous again, as opposed to the other two. The context justifies the assumption that the questioner has (or acts as if having) a bouleptic bias towards the proposition ‘Addressee would drink a coffee’. (A person making a sincere offer has a preference for the addressee accepting it.) Note that in case the speaker’s aim were to make a guess about what the addressee wishes to drink (or do something) in general, (34a) would be just as felicitous as (34b)–(34c).<sup>21</sup>

<sup>20</sup>(32a) is felicitous in Dialect S in the context provided.

<sup>21</sup>(34a) is felicitous in Dialect S in the context provided.

The next example illustrates the use of the negative interrogative forms to make a request:

(35) *Request scenario*

In front of the coffee machine, A addresses her colleague B:

- a. # Nem-e kölcsön-adnál      egy százast?  
not-Q VM-give.COND.2SG a      hundred.ACC  
'Wouldn't you lend me a hundred forints?'
- b. Nem adnál-e kölcsön egy százast?  
'Wouldn't you lend me a hundred forints?'
- c. Nem adnál kölcsön egy százast  $\wedge$  ?  
'Wouldn't you lend me a hundred forints?'

Here again, the *nem-e VM-V* interrogative in (35a) is infelicitous, as opposed to the other two forms. The context in which the interrogatives are used to make an indirect request indicates bouletic bias of the speaker towards the answer. If the speaker were making a guess about the intentions of the addressee, (35a) would be felicitous.<sup>22</sup>

Thus, we have shown that *nem-e VM-V* interrogatives in Dialect E (having only an ON reading) differ from *nem V-e* interrogatives (which also only have an ON reading) and from *nem  $\wedge$*  interrogatives (which are ambiguous between ON and IN readings): the first form is unavailable to make an indirect reproach, an offer or a request. Since the felicity of the latter three speech acts depends on the speaker having deontic or bouletic (that is, non-epistemic) biases towards the positive answer, one reasonable explanation for the infelicity of (32–35) in Dialect E would be that *nem-e VM-V* interrogatives are incompatible with non-epistemic (i.e., deontic or bouletic) biases for the positive answer. In the next section we look at previous approaches in the literature that were concerned with types of speaker expectation bias, to see whether they can offer a solution for the puzzle.

#### 4.2.2 Previous accounts on (speaker) expectation bias

Reese (2007), the only theoretically-based proposal on the relation between bias types and IN/ON readings, argues that negative interrogatives with IN readings can have an epistemic, deontic or bouletic expectation bias for the positive answer, while those with ON readings can only be epistemically biased. According to Reese (2007: 91), the difference follows from the assumption that the biases

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<sup>22</sup>(35a) is felicitous in Dialect S in the context provided.

associated with the two readings are “distinct kinds of meaning”: the biases of IN readings constitute “some type of implicature”, whereas those of ON readings are “entailments, reflecting a speaker commitment which functions as a weak assertion”. Interrogatives with ON readings, which “share the distributional properties of questions and assertions” are accounted for by the author by assigning to them “a conventionalized complex speech act type ASSERTION • QUESTION”, cf. Asher & Lascarides (2001, 2003).

The claim that deontic and bouletic biases can only arise for IN readings does indeed explain the infelicity of *nem-e VM-V* interrogatives, which can only have ON readings, in contexts (32–35). However, in these contexts *nem V-e* interrogatives, which also only give rise to ON readings, are all felicitous. This suggests that Reese’s general proposal for the types of expectation biases available on the basis of the availability of IN/ON readings cannot be extended to the relevant Hungarian data.

Contrary to Reese, Sudo (2013: 284) assumes that there are negative interrogatives in English with ON readings that “imply a positive expectation stemming from the norm/rules (deontic) or what the speaker desires (bouletic), rather than what the speaker believes to be true”, as in *Aren’t you ashamed of yourselves?*, or *Don’t you like it?*, respectively,<sup>23</sup> although without further theoretical justification.

Having illustrated that *nem-e* interrogatives in Hungarian introduce a distinction between types of expectation biases that has not yet been observed in the literature, we turn to some other properties that determine their use in discourse.

### 4.3 Further discourse properties of *nem-e VM-V* interrogatives

#### 4.3.1 Unresolved question in the discourse

(31), repeated in (36) below, shows that all the three negative interrogative forms under consideration are felicitous in situations where the aim of the speaker’s utterance is to put forward a suggestion for a congruent answer (cf. von Stechow 1991) to an unresolved question in the discourse.

(36) *Suggestion scenario*

A, B and János are colleagues. A and B talk after a meeting.

A: Why wasn’t János present at the meeting?

B replies:

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<sup>23</sup>The examples are used by Asher & Reese (2007), originally due to Huddleston & Pullum (2002).

- a. Nem-e ki-utazott Berlinbe?  
not-Q VM-travelled Berlin.into  
'Didn't he go to Berlin?'
- b. Nem utazott-e ki Berlinbe?  
'Didn't he go to Berlin?'
- c. Nem utazott ki Berlinbe  $\wedge$ ?  
'Didn't he go to Berlin?'

The unresolved question under consideration in the dialogue above is the one uttered by A, which activates a set of alternative (full) answers of the type 'János wasn't at the meeting because  $q$ ', where  $q$  stands for a proposition.  $q$  itself thus corresponds to a *term answer* to the unresolved question above.<sup>24</sup> The proposition 'He went to Berlin' is offered by B in the dialogue as the value of  $q$ .

(37) presents the three negative interrogatives in a context with no unresolved question in the context:

(37) *I have to ask something scenario*

- A to B: I have to ask you something.
- a. # Nem-e át-ment János a vizsgán?  
not-Q VM-went.3SG János the exam.on  
'Didn't János pass the exam?'
  - b. Nem ment-e át János a vizsgán?  
'Didn't János pass the exam?'
  - c. Nem ment át János a vizsgán  $\wedge$ ?  
'Didn't János pass the exam?'

The felicity of (37b–37c) and the infelicity of (37a) confirms the suggestion according to which *nem-e VM-V* interrogatives require the presence of an unresolved question in the context.

#### 4.3.2 No coordination

Here we want to point out that the coordination of two *nem-e VM-V* interrogatives is infelicitous, as opposed to the coordination of two exemplars of the other two negative interrogative form types, as illustrated in (38) below:

- (38) A, B and János are colleagues. A and B talk after a meeting.  
A: Why wasn't János present at the meeting?  
B replies:

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<sup>24</sup>Cf. Krifka (2011) for the definitions of *full* vs. *term* answers.

- a. # Nem-e el-felejtette az időpontot és nem-e ki-utazott  
not-Q VM-forgot the date.ACC and not-Q VM-travelled  
Berlinbe?  
Berlin.into  
'Didn't he forget the date and didn't he go to Berlin?'
- b. Nem felejtette-e el az időpontot és nem utazott-e ki Berlinbe?  
'Didn't he forget the date and didn't he go to Berlin?'
- c. Nem felejtette el az időpontot és nem utazott ki Berlinbe  $\wedge$ ?  
'Didn't he forget the date and didn't he go to Berlin?'

Based on the discussion in Section 4.3.1, the contrast between (38a) and (38b–38c) can be interpreted as indicating that *nem-e* VM-V interrogatives can only be used to suggest a complete congruent answer to the unresolved question (thus making the conjunction of two such forms infelicitous), whereas the other two forms can also be used to suggest a partial answer.

#### 4.3.3 Possible replies to questions with *nem-e*

We look next at how to react to questions encoded by *nem-e* VM-V interrogatives. (39b)–(39h) present potential replies to the question in (39a) in the context illustrated:

- (39) A and B see their colleague János from a distance, and note that he has a suntan.
- a. A: Nem-e nyaralni volt?  
not-Q be.on.holiday.INF was  
'Wasn't he on holiday?'
  - b. B: Lehet.  
maybe  
'Maybe.'
  - c. B: #Igen (, nyaralni volt).  
yes be.on.holiday.INF was  
#‘Yes (, he was on holiday).’
  - d. B: %De (igen) (, nyaralni volt).  
but yes be.on.holiday.INF was  
%‘Yes (, he was on holiday).’

- e. B: Nem, #(nem volt nyaralni).  
no not was be.on.holiday.INF  
'No, #(he was not on holiday).'
- f. B: Nem, a kertben dolgozott.  
no the garden.in worked  
'No, he was working in the garden.'
- g. B: Volt nyaralni, de nem azért barna.  
was be.on.holiday.INF but not because.of.that brown  
'He was on holiday, but he does not have a tan because of that.'
- h. B: (Nem,) (volt nyaralni, de) azért barna, mert  
not was be.on.holiday.INF but because.of.that brown because  
a kertben dolgozott.  
the garden.in worked  
'(No,) (he was on holiday, but) he has a tan because he worked in  
the garden.'

I suggest that these data indicate that, in spite of appearances, the set of congruent answers to questions realized by *nem-e* VM-V interrogatives does not consist of the denotation of the surface constituent following *nem-e* and its negation. For (39a), this set would include the propositions 'He was on holiday' and 'He was not on holiday'. (39b) illustrates the most natural reply to (39a) in the context. Since the response particle *igen* 'yes' is infelicitous in answers to canonical forms of negative interrogatives in Hungarian (cf. Farkas 2009 for an account), it comes as no surprise that, as evidenced by (39c), it is also excluded as answer to a question realized by a *nem-e* VM-V interrogative. It is more unexpected that the response particle *de* 'but'<sup>25</sup> (with or without the assumed positive answer) is not considered acceptable by all speakers of this dialect in the context under consideration, (39d)<sup>26</sup> and that the response particle *nem* 'not' in (39e) does not constitute a felicitous reply in isolation, either, only if followed by the utterance of a declarative disambiguating the answer.

(39f), where *nem* is followed by the utterance of an alternative answer to the superordinate question (*How did he get a suntan?*), is fine, as is (39g), which gives a polarity-reversing answer to the *nem-e* question, but explicitly denies that it also answers the superordinate question. Finally, (39h) answers the *nem-*

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<sup>25</sup> *De* is analogous to German *doch* 'but', encoding a reverse polarity reply to a negative polar question.

<sup>26</sup> I thank Lilla Kamilla Sándor and Viktória Virovec for discussions on the data.

*e* question, but rejects that the latter is identical to the complete answer to the superordinate question, by also explicitly giving an answer to the latter.

#### 4.3.4 No rhetorical question reading

The final property of *nem-e* VM-V interrogatives we wish to mention here is that they cannot be used by a speaker in a situation where the denotation of the surface constituent following *nem-e* or its negation is part of the common ground, in other words, where they encode a rhetorical question (cf. Caponigro & Sprouse 2007). Consider the relevant three forms (containing a covert copula) in a context where they are supposed to realize a rhetorical question:

(40) *Rhetorical question scenario*

A and B are talking. They both know that Péter is A's oldest friend.

A: Why is Péter always so helpful?

B replies:

- a. # Nem-e ō a legrégebbi barátod?  
not-Q he the oldest friend.your  
'Isn't he your oldest friend?'  
(Intended: 'He is your oldest friend.')
- b. Nem ō-e a legrégebbi barátod?  
'Isn't he your oldest friend?'  
(Intended: 'He is your oldest friend.')
- c. Nem ō a legrégebbi barátod  $\wedge$  ?  
'Isn't he your oldest friend?'  
(Intended: 'He is your oldest friend.')

(40b–40c) are available to commit the speaker to the proposition 'Péter is your oldest friend', and to indicate, based on the Maxim of Relevance, that this is B's answer to A's question. (40a), however, is not available for this purpose in Dialect E (although it would be available in Dialect S). The latter can only be interpreted as a suggestion for an answer to A's question by the speaker, without assuming that the answer is in the common ground, thus, not as a rhetorical question. The next subsection presents the proposal explaining these data.

## 5 *Nem-e VM-V* interrogatives: The account

### 5.1 Structural assumptions

As it was shown in the previous sections, *nem-e VM-V* interrogatives have a more restricted use in Dialect E than the canonical *nem V-e* interrogatives. Thus, the former represent a special form type having a specific interpretation. One possible approach towards explaining their distribution would be to consider *nem-e* a discourse/pragmatic particle, which indicates that the rest of the sentence denotes a proposition that the speaker puts forward as a suggested answer to an unresolved question. This proposal, however, fails to account for why clauses containing *nem-e* count as interrogatives, and thus can be embedded under matrix predicates that embed interrogatives, as in (41).<sup>27</sup>

- (41) Ilike töpreng rajta, hogy nem-e ö bántotta meg valamivel.  
 Ilike contemplates on.it that not-Q she offended VM something.with  
 'Ilike contemplates whether it was her who offended him with  
 something.' [HNC]

As an alternative, we propose that *nem-e* is the visible subpart of a matrix copular negative interrogative clause, and the rest of the *nem-e* interrogative originates from an embedded declarative, whose polarity (other things being equal) is positive. The essentials of the full structure of the *nem-e* interrogative in (42), including covert parts, are shown in (43):

- (42) Nem-e ki-utazott Berlinbe?  
 not-Q VM-travelled Berlin.into  
 'Isn't it that he went to Berlin?'

- (43) [CP<sub>1</sub> ... [NegP Nem [FocP az van-e [IP<sub>1</sub> ...  
 not that be.3SG-Q  
 [CP<sub>2</sub> hogy [IP<sub>2</sub> ki-utazott Berlinbe ]]]] ...]  
 that VM-travelled Berlin.into  
 'Isn't it that he went to Berlin?'

Let us consider the properties of the structure in (43). First, the covert expletive *az* is the “correlate” of the subordinate declarative clause. It is situated in the pre-verbal focus position.<sup>28</sup> Second, *az* is followed by the covert copula *van* ‘be.3SG’.

<sup>27</sup>Note that the embedded (root) interrogative in (41) would license the “reflectivity” particle *vajon* ‘I wonder’, a diagnostic of interrogative clauses, cf. Kenesei (1994) and Kálmán (2001).

<sup>28</sup>Cf. Kenesei (1994) for a comprehensive account of the syntax of subordinate clauses in Hungarian.

Third, the clitic *-e* ends up attached to the negative particle *nem* because both the copula and the correlate are covert. Finally, the complementizer *hogy*, introducing the subordinate clause, also remains covert.<sup>29</sup> It is well known that the preverbal focus position within the Hungarian sentence (which, other things being equal, hosts the constituent serving as the term answer to the Immediate Question Under Discussion, discussed below, cf. Gyuris 2012), is associated with an exhaustive/identificational reading (cf. É. Kiss 2002, Szabolcsi 1994 for general discussion, a.o.). Since the expletive *az* in the focus position of the main clause functions as a “placeholder” for the subordinate declarative clause, we assume that the *nem-e* construction makes the denotation of the declarative a propositional focus with an exhaustive/identificational reading. These interpretational features are emphasized in the English translation given in (43), which contains a cleft construction, and is thus preferable to the English translations given previously for *nem-e* interrogatives, in terms of plain negative polar interrogatives. In what follows, we will therefore use the cleft construction in the translations.

The structural assumptions listed above can account for the lack of inversion between the verb and the verb modifier, which is the default word order in positive declaratives, cf. (4) above.

Additional support for the biclausal analysis is provided by the possibility of *nem-e* preceding another *nem* ‘not’, illustrated in (44). Here the second negative particle is a constituent of the “embedded declarative”.

(44) A and B are talking.

A: I thought John went to a conference but his car is in the car park  
opposite the building.

B replies: Nem-e nem utazott el?

not-Q not travelled VM

‘Isn’t it that he did not go away (perhaps)?’

In the next section we present the preliminaries for an account of the interpretation of *nem-e VM-V* interrogatives listed in Section 4 on the basis of the structure postulated above.

## 5.2 Interpreting *nem-e VM-V* interrogatives: Basic assumptions

In Section 4 above *nem-e VM-V* interrogatives were associated with the interpretational properties listed in (45). Here, *p* stands for the denotation of the embedded declarative (cf. CP<sub>2</sub> in (43)) following *nem-e*:

<sup>29</sup>Obligatory covertness is the result of a certain degree of grammaticalization having affected *nem-e*. For discussion of the trade-off between compositional and construction-specific properties see Reis (1999) and Jacobs (2016).

- (45) Semantic and discourse properties of *nem-e VM-V* interrogatives in Dialect E
- a. They give rise to ON readings but not to IN readings. (Section 4.1.)
  - b. They are infelicitous as indirect reproaches, offers and requests. (Section 4.2.1.)
  - c. They are only felicitous in contexts where there is an unresolved question Q in the context such that *p* counts as a term answer to Q. (Section 4.3.1.)
  - d. The conjunction of two *nem-e VM-V* interrogatives is infelicitous. (Section 4.3.2.)
  - e. Replies consisting of the isolated response particles *igen* ‘yes’, *de* ‘but’ or *nem* ‘no’ are dispreferred or infelicitous. (Section 4.3.3.)
  - f. They do not give rise to rhetorical question readings. (Section 4.3.4.)

The fact that *nem-e* interrogatives are compatible with PPIs, which was used as a diagnostic for ON-readings (property (45a)), follows from analysing the constituent following *nem-e* as an embedded positive declarative (which is compatible with PPIs as a default). The incompatibility with NPIs, which indicates the absence of IN-readings, follows from the general incompatibility of the interrogative particle *-e* in the matrix clause with NPIs, as shown in Section 2.<sup>30</sup> Note that NPIs are still felicitous in *nem-e* interrogatives in case the “embedded” declarative contains another negation, which licenses NPIs, as in (44).

The remaining properties (45b–45f) are going to be accounted for by referring to the covert structure shown in (43) above, in which the embedded declarative (CP<sub>2</sub>) is interpreted as exhaustively focused, a result of the correlate (placeholder expletive) *az* being situated in the preverbal focus position of the matrix clause (CP<sub>1</sub>).

For describing the felicity conditions of *nem-e VM-V* interrogatives in the discourse we rely on insights from the Question Under Discussion (QUD) framework. (For general discussion, cf. Roberts 2012 and Büring 2003, a.o..) Here the (explicit or implicit) question that an utterance (of a declarative or interrogative) is assumed to react to is referred to as the *I(mmediate)* QUD, modelled as a set of propositions. For utterances of declaratives, the IQUD is constituted by a (contextually determined) subset of the set of focus alternatives to the declarative. (Cf. Rooth 1992, Beaver & Clark 2008, a.o..) As far as the IQUD of utterances of polar

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<sup>30</sup>Cf. Gärtner & Gyuris (2022) for an analysis of the ban on IN readings of *-e*-interrogatives as a syntactic intervention effect.

interrogatives with (exhaustive) focus is concerned, we follow Kamali & Krifka (2020: 26–27), who take it to be a contextually determined subset of the set of focus alternatives introduced by the declarative encoding the positive answer. As an illustration, consider (46a), a polar interrogative with a constituent in the pre-verbal focus position (followed by VM-V inversion). The set of focus alternatives to the positive answer is shown in (46b). Assuming that the set of contextually relevant individuals contains Anna and Béla, the denotation of (46c) is a subset of the set of alternatives in (46b), and thus (46c) denotes an appropriate IQUD for (46a).

- (46) a.  $\text{Anna}_F \text{ ment el } \text{moziba}$ ?  
 Anna went VM movies.into  
 ‘Was it Anna who went to the movies?’
- b. {‘It was Anna who went to the movies’, ‘It was Béla who went to the movies’, ‘It was Cili who went to the movies’, ‘It was Anna and Béla who went to the movies’, ‘It was Anna and Cili who went to the movies’, ‘It was Anna, Béla and Cili who went to the movies’, ... }
- c. (Anna és Béla közül) ki ment el a moziba?  
 Anna and Béla among who went VM the movies.into  
 ‘Who (of Anna and Béla) went to the movies?’

The fact that the focus in the polar interrogative in (46a) has an exhaustive/identificational reading entails that the focus alternatives in (46b) exclude each other, and thus that the positive answer to (46a) provides a complete answer to the IQUD in (46c).

Now the assumptions above will be applied to *nem-e* VM-V interrogatives. For simplicity, here we only consider *nem-e* VM-V interrogatives without a preverbal focus constituent in the “embedded” CP<sub>2</sub>, as in (43). We suggest that the focussing of the whole CP<sub>2</sub> indicates that its proposition denotation constitutes a *term answer* to the IQUD. The fact that CP<sub>2</sub> is exhaustively focused means that the propositions in the set constituting the alternatives to its denotation mutually exclude each other as term answers to the IQUD (and thus that all constitute maximally informative answers to the latter, cf. Dayal 1996). Thus, the IQUD for any *nem-e* VM-V interrogative is to be schematically represented as the set of propositions shown in (47), where  $p$ ,  $p'$ , and  $p''$  stand for the denotation of CP<sub>2</sub> and its alternatives,  $P$  denotes a property of propositions determined by the specific IQUD (to be discussed below), and exactly one of the propositions in the set can be true at the same time. This means, informally, that a *nem-e* VM-V

interrogative is used for the purpose of asking whether the denotation of  $CP_2$  is equivalent to the only proposition that has the contextually given property  $\mathcal{P}$ .

- (47) {‘It is  $p$  that has property  $\mathcal{P}$ ’, ‘It is  $p'$  that has property  $\mathcal{P}$ ’, ‘It is  $p''$  that has property  $\mathcal{P}$ ', ...}

Regarding how IQUDs of the form illustrated in (47), with mutually exclusive possible answers, are realized in natural language, empirical observations suggest that there are at least two *wh*-interrogative forms available for this purpose. The first one is *why*-interrogatives asking for reasons, which, according to Oshima (2007: 152) are presupposed to have “only one true resolution” in a particular context.<sup>31</sup> This means that all possible answers to *why*-questions are also complete. (36), repeated in (48), provides an illustration:

- (48) *Suggestion scenario*

A, B and János are colleagues. A and B talk after a meeting.

- a. A: Miért nem volt János az értekezleten?  
why not was János the meeting.on  
'Why wasn't János at the meeting?'
- b. B: Nem-e ki-utazott Berlinbe?  
not-Q VM-travelled Berlin.into  
'Isn't it that he went to Berlin?'

The property of having mutually exclusive possible answers does not apply to the question realized by the *wh*-interrogative in (49a), which, however, can denote the IQUD for the two polar negative interrogative form types in (49c–49d), but not for the one in (49b).

- (49) A, B and János are colleagues. A and B talk after a meeting.

- a. A: Mit mondott János Mariról?  
what.ACC said János Mari.from  
'What did János say about Mari?'
- b. B: #Nem-e ki-utazott Berlinbe?  
not-Q VM-travelled Berlin.into  
'Isn't it that she went to Berlin?'

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<sup>31</sup>It depends on contextual factors “what counts as a reason” (Oshima 2007: 155). Cf. also Unger (1977).

- c. B: Nem azt-e, hogy ki-utazott Berlinbe?  
not that.ACC-Q that VM-travelled Berlin.into  
'Wasn't it that she went to Berlin?'
- d. B: Nem azt, hogy ki-utazott Berlinbe ∨?  
not that.ACC that VM-travelled Berlin.into (Q)  
'Wasn't it that she went to Berlin?'

*How*-questions on their method reading, which have been suggested to have “determinate complete answers” (Sæbø 2016: 3175)<sup>32</sup> also illustrate a form type denoting appropriate IQUDs for questions realized by *nem-e VM-V* interrogatives, as shown in (50) (inspired by (7) in Sæbø 2016):

- (50) a. A: Hogy került ez ide?  
how got this here  
'How did this guy get here?'
- b. B: Nem-e ide-evezett a sziget másik oldaláról?  
nem-Q VM-rowed the island other side.from  
'Isn't it that he rowed here from the other side of the island?'

Before turning to the formal details of our analysis, we take a brief look at two types of constructions discussed in the literature that resemble *nem-e VM-V* interrogatives in terms of formal features, including focus-marking, and the structure of discourses they appear in.

### 5.3 Cross-linguistic analogues of *nem-e VM-V* interrogatives

Sheil (2016) studies the Scottish Gaelic *propositional cleft* (PC), which signals that the clause is not divided into a background and a focus part, because the whole is marked as a “broad-sized identificational focus”. She argues that declaratives realizing the PC construction are only felicitous in a context where there is an explicitly given “super-question of the Immediate QUD” (Sheil 2016: 35), the latter being a polar question. The contribution of the PC is then to signal “a revision to the line of inquiry (an alternative strategy to answering a super-question)” (2016: 26). Sheil (2016: 4) also shows, however, that the PC is ungrammatical in interrogatives and cannot be negated, which makes a detailed comparison with *nem-e* interrogatives difficult. The author argues, in addition, that in spite of superficial

<sup>32</sup>For a discussion of manner readings of *how*-questions, which are more difficult to associate with unique maximal answers, cf. Oshima (2007), Abrusán (2011), Sæbø (2016), Schwarz & Simonenko (2018), a.o..

similarities, the PC cannot be reduced to the English *it is that* construction (to be discussed below), since it does not share the explanatory or interpretive function of the latter. For example, in the context illustrated in (51), where no explanation is asked for, only the PC but not the *it is that* construction is felicitous:

- (51) (Roddy wants to marry a girl, and she insists on him buying her a ring.  
 He gets one from a gypsy tinker, and he and the girl agree to marry after  
 the fisheries.)  
 'S a cheud oidhche bha dannsa aca ann an taighean Gordon,  
 'And the first night they had a dance in Gordon's houses,'  
 's ann a thuit na clachan as an fhàinne.  
 COP in.3MSG C.REL fall.PAST the.PL stone.PL out.of the ring  
 '# it's that) the stones fell out of the ring.' (Sheil 2016: 5, (1.6))

In addition, the PC is also shown by Sheil not to be reducible to the verum focus construction (the sizes of the focused elements being different), or to sentence focus (which is an information focus, rather than an identificational one).

The second construction that resembles *nem-e* interrogatives as far as structure and discourse function is concerned is the *it is that* construction in English, illustrated in (52):

- (52) Not that Uther was ever unkind to me; it was simply that he had no particular interest in a girl child. (Delahunty 1990: 11)

Delahunty (1990: 20) considers the *it is that* construction an "inferential": "the form can be viewed as a pragmatic instruction to its audience to infer a relationship between the construction and its context that goes beyond the mere addition of the information conventionally denoted by the clause."<sup>33</sup> In various works, Delahunty suggests that the proposition denoted by the finite clause within the inferential may be interpreted as an implicated premise (explanation, reason, cause) or conclusion (result, consequence, conclusion), or "taken as a (re)interpretation or reformulation of the target utterance" (Delahunty & Gatzkiewicz 2000: 301), the exact choice depending only on the context.

Declerck (1992: 205) argues, however, that "the typical aspects of meaning associated with the inferential *it is that* construction are not of a pragmatic nature but follow from the fact that the construction belongs to the class of copular sentences that are 'specificational' ".<sup>34</sup> This accounts for the fact that the inferential

<sup>33</sup>More precisely, the relevant connection holds rather between the propositional content of the inferential construction and contextually given material, cf. Remberger (2020: 48).

<sup>34</sup>Declerck (1992) uses the term 'specificational' in the sense of specifying a value for a variable, cf. Higgins (1976), Akmajian (1979), and Declerck (1979).

construction is not interpretable in isolation (and unlikely to occur discourse-initially), and that it gives rise to an “exhaustiveness implicature” (Declerck 1992: 213).<sup>35</sup> Declerck claims that the construction involves two kinds of inferences.

“First, the *that*-clause expresses what the speaker infers to be the correct explanation or interpretation of a situation or speech act. [...] Second, in order to understand the sentence the hearer has to infer the variable for which the *that*-clause is presented as value” (Declerck 1992:212).

Importantly, it follows that a negative *it is that*-sentence, as in (53), does not reject the truth of the *that*-clause but denies that “this inference is the one that satisfies the variable” (p. 216):

- (53) It is not that one fears treachery, though of course one does.

(Declerck 1992: 216, (22a))

Declerck (1992) accounts for the distribution of the inferential *it is that* construction by suggesting that

“the only variables that can take a *that*-clause as value are those that lexicalize as nouns that can appear in the copular structure ‘NP is that’. Nouns like *reason*, *cause*, *explanation*, *interpretation* are of this type: they express a notion whose contents can be specified by a *that*-clause.” (Declerck 1992: 220).

He emphasizes that “[o]ther nouns that have to do with some aspect of a situation (e.g. time, place) do not share this characteristic”, adding that “since the value that is specified by an inferential has the form of a *that*-clause, the variable that is inferred is automatically taken from the group ‘reason / cause / explanation / interpretation’ ” (Declerck 1992: 220).

This short review thus shows that the Scottish Gaelic PC and the inferential construction share with *nem-e* VM-V interrogatives the property of marking a proposition as exhaustively focused, constituting a term answer to a superordinate question.<sup>36</sup> In the next section we turn to issues of how to formally model these interpretational features.

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<sup>35</sup>“When a value, or set of values, is specified for a variable, the hearer has a right to conclude that the listing of values is exhaustive.” (Declerck 1992: 213)

<sup>36</sup>Cf. Remberger (2020) for discussion of the focus-background structure of the latter.

## 5.4 Interpreting *nem-e VM-V* interrogatives: Formalization

In this section we are going to propose an account of the use conditions of *nem-e VM-V* interrogatives, which relies on the compositional semantic interpretation of the (partly covert) structure associated with *nem-e VM-V* interrogatives, shown in (43) above, and repeated here as (54).

- (54) [CP<sub>1</sub> ... [NegP Nem [FocP az van-e [IP<sub>1</sub> ...  
                  not           that be.3SG-Q  
                  [CP<sub>2</sub> hőgy [IP<sub>2</sub> ki-utazott Berlinbe ]]]] ...]  
                  that       VM-travelled Berlin.into  
                  ‘Isn’t it that he went to Berlin?’

The formal derivation of the meaning of (54), the outlines of which are presented in (55), relies on the following assumptions. First, the semantic value of polar interrogatives consists of the proposition corresponding to the positive answer and the latter’s negation (cf. Hamblin 1973). Second, (54) is a construction with exhaustive focus: the proposition denoted by the “embedded declarative” CP<sub>2</sub> is the only one among its alternatives that possesses a particular property, referred to as *P*. We assume that *P* is introduced by the covert copula *van*, and that it is a property of propositions, which is contributed by the context, more precisely, by the IQUD. We also assume that *-e* is responsible for marking the interrogative sentence type, and thus it is interpreted on the periphery (TypeP or ForceP). We assign it a denotation analogous to the polar-question operator in Hamblin (1973: 50), along the lines suggested in Uegaki (2018: 14).

- (55) a.  $\llbracket \text{CP}_2 \rrbracket = \lambda w'. \text{went}(j, b, w')$   
     b.  $\llbracket \text{van} \rrbracket = \lambda r. \lambda w. P(r)(w)$   
     c.  $\llbracket \text{FocP} \rrbracket = \lambda w. P(\lambda w'. \text{went}(j, b, w'))(w)$   
         $\wedge \forall q [q \neq \lambda w'. \text{went}(j, b, w') \rightarrow \neg P(q)(w)]$   
     d.  $\llbracket \text{-e} \rrbracket = \lambda p. \{p, \neg p\}$   
     e.  $\llbracket (54) \rrbracket = \{ \lambda w. P(\lambda w'. \text{went}(j, b, w'))(w)$   
         $\wedge \forall q [q \neq \lambda w'. \text{went}(j, b, w') \rightarrow \neg P(q)(w)],$   
         $\lambda w. \neg P(\lambda w'. \text{went}(j, b, w'))(w)$   
         $\wedge \forall q [q \neq \lambda w'. \text{went}(j, b, w') \rightarrow \neg P(q)(w)] \}$

The denotation of CP<sub>2</sub> in (55a) is a proposition, identical to the one denoted by the declarative in (56):

- (56) [CP ... [IP Ki-utazott Berlinbe] ...]  
VM-travelled Berlin.into  
'He went to Berlin.'

(55b) shows the denotation of the covert copula *van*, which takes a proposition as argument and associates with it has a contextually given property  $\mathcal{P}$ . (55c) presents the denotation of FocP as a proposition that is true in those possible worlds where 'John went to Berlin' has property  $\mathcal{P}$  but no other proposition does. It relies on standard assumptions about the preverbal focus constituent in Hungarian (cf. Szabolcsi 1994), according to which it is associated with an exhaustive reading. (55d) assigns *-e* the contribution of turning the proposition-denotation of its sister node into a set of propositions consisting of the latter proposition and its negation, discussed above. Additionally, we assume that *nem* contributes non-propositional (outside) negation, which makes a vacuous contribution to the truth conditions. The denotation of the whole structure in (54) is shown in (55e). (55e) makes it clear that the positive answer to a question encoded by a *nem-e VM-V* interrogative is not equivalent to the denotation  $p$  of CP<sub>2</sub>, but to a proposition that identifies  $p$  with the unique proposition that has property  $\mathcal{P}$ .

Now we turn to how these proposals can account for the remaining properties in (45). Property (45c), according to which *nem-e VM-V* interrogatives are only felicitous in contexts where there is an unresolved question Q such that the denotation of CP<sub>2</sub> counts as a term answer to Q, directly follows, given the assumptions of the QUD approach, from the claim that in the structure under consideration, CP<sub>2</sub> is (exhaustively) focused, and thus gives rise to the IQUD shown in (47), repeated in (57) below:

- (57) {'It is  $p$  that has property  $\mathcal{P}$ ', 'It is  $p'$  that has property  $\mathcal{P}$ ', 'It is  $p''$  that has property  $\mathcal{P}$ ', ...}

The unresolved question Q referred to in (45c) thus corresponds to the appropriate IQUD.

Next, we turn to property (45b): as opposed to the two other negative polar interrogative form types in Hungarian, *nem-e VM-V* interrogatives are infelicitous as indirect reproaches, offers or requests. This was shown in Section 4.2.1. For the sake of succinctness, I will sketch an account for the first case, repeated in (58), which is then taken to apply to the other cases *mutatis mutandis*. (The original English translation given in (32a) has been replaced by a cleft construction, for reasons discussed in Section 5.1.)

- (58) *Reproach scenario* (repeated with new translation)

Mother sees her Child kick another child in the sandpit. Mother says to Child:

- a. # Nem-e szégyelked magad?  
not-Q be.ashamed.2SG yourself  
'Isn't it that you are ashamed?'
- b. Nem szégyelked-e magad?  
'Aren't you ashamed?'
- c. Nem szégyelked magad  $\wedge$  ?  
'Aren't you ashamed?'

A very simple line of explanation can be based on the fact that the reproach in (32)/(58) is an initiating speech act. This is incompatible with uses of *nem-e VM-V* interrogatives, which, as we have seen above, must be reactive to an IQUD.

A more specific -- and stronger -- account emerges if we try to spell out such an IQUD for (32a)/(58a). Among *why*-questions, which we limit our discussion to here, the one fitting the context of (58) most naturally would be (59).

(59) Why are you kicking your friend?

And, if we now take inspiration from Delahunty (1990)/Declerck (1992) and allow ourselves the paraphrase of (32a)/(58a) in (60), we derive a double infelicity.

(60) Isn't the reason for your kicking your friend that you are ashamed?

(60) – and thus (32a)/(58a) – fails on the basic content-level, given that being ashamed would be a fairly odd reason for the child to kick his friend. And, what's more, if being ashamed is suggested by the mother as a reason for bad behaviour, this cannot be construed as her “endorsing” (cf. Silk 2020) such a feeling to the child, i.e., her epistemic bias cannot be reinterpreted (e.g., via relevance implicature) as deontic bias (“you should be ashamed”).

Note that things are different with the *Suggestion scenario*, (31), and the reinterpretations of *nem-e VM-V* interrogatives in (32)–(35) as guesses (Section 4.2.1). All of these are limited to epistemic speaker expectation bias, with the first one already containing – and the others in need of accommodating – an appropriate “*why*”-based IQUD.<sup>37,38</sup>

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<sup>37</sup>An additional possibility that we leave unexplored is that *nem-e VM-V* interrogatives license “higher-order” deontic expectation bias, schematically expressed by *The reason for ... should be that ...*

<sup>38</sup>I thank Hans-Martin Gärtner for discussions on the reasons for the absence of non-epistemic expectation biases for *nem-e VM-V* interrogatives.

Next, according to property (45d), the conjunction of two *nem-e VM-V* interrogatives is infelicitous. This follows from the fact that the answers to two conjoined *nem-e VM-V* interrogatives, given that they share the same IQUD, cannot be independent of each other. As (55) shows, the truth of a positive answer to one *nem-e VM-V* interrogative entails that no other interrogative having the same IQUD but a different CP<sub>2</sub> can be answered positively.

Now, consider (45f): *nem-e VM-V* interrogatives, as opposed to other negative interrogatives in Hungarian, cannot be used to signal that the proposition *p* denoted by CP<sub>2</sub> is in the common ground according to the speaker. This property was referred to as the “absence of a rhetorical question reading” above. One of the central claims of the account proposed here is that the set of possible answers to questions encoded by *nem-e VM-V* interrogatives is not identical to the denotation of the constituent (CP<sub>2</sub>) following *nem-e* and its negation ( $\{p, \neg p\}$ ). Rather, due to the focusing of CP<sub>2</sub> in the covert structure the denotation of the polar interrogative under consideration is equivalent to the set of propositions {‘It is *p* that has property  $\mathcal{P}$ ’, ‘It is not *p* that has property  $\mathcal{P}$ ’}. This means that even if *p* is in the common ground, a *nem-e VM-V* interrogative where CP<sub>2</sub> denotes *p* is not an appropriate means of pointing this out, since *p* is not a congruent answer to the latter.

Finally, we turn to property (45e): the isolated response particles *igen* ‘yes’, *de* ‘but’ or *nem* ‘no’ are dispreferred or even infelicitous as replies to questions realized by *nem-e VM-V* interrogatives. I suggest that the reason, again, has to do with the non-identity between the set of agreeing and disagreeing answers to *nem-e VM-V* interrogatives and the set  $\{p, \neg p\}$ , where *p* equals the denotation of CP<sub>2</sub>. This non-identity makes it difficult (or even impossible) to reconstruct the propositional content of the actual answer on the basis of a response particle alone.

## 6 Conclusion

This paper investigated the use conditions and the bias profile of the negative interrogative form type in Hungarian that contains the surface constituent *nem-e*, composed of a negative and an interrogative particle. It was pointed out for the first time that different occurrences of *nem-e* may represent different uses and belong to different dialects. We have provided different analyses to three different uses of *nem-e*, attributing the latter constituent a biclausal structure on the first one, considering it a result of movement according to the second one, and analyzing it as a particle on the third one, respectively. Concentrating on

*nem-e* interrogatives used by speakers of the Standard Dialect, we have pointed out that they only have ON but no IN readings, they are incompatible with (standard) non-epistemic speaker expectation biases, they cannot be interpreted as indirect reproaches, offers or requests, they are only felicitous in contexts with an unresolved superordinate question under discussion, cannot be coordinated, do not have rhetorical question readings, and cannot felicitously be responded to by isolated response particles. It was argued that these properties follow from the focus-background structure of the interrogative, which involves an (exhaustively) focused declarative clause subordinated to a covert matrix clause.

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# Chapter 11

## Children’s acquisition of English “high” negation: A window into the logic and composition of bias in questions

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In our investigation of biased “high” negation questions (NegQs) and negative tag structures, we present production data from early child acquisition of English and judgements from adult English. We use this data to demonstrate that the structures of negative tags and NegQs are distinct despite similarities in their interpretation, spelling out how distinct structures lead to differences in use and acquisition. We also highlight the remarkable ability of very young children to manipulate a discourse context shared with another person using increasingly fine-grained syntactic structures.

### 1 Introduction

In this chapter we argue that data from non-canonical biased questions in early language acquisition can greatly enhance and refine our formal understanding of such questions and how we conceptualise the integration of propositional and contextual information in the minds of language users. Children’s production has not, to our knowledge, been considered in theoretical accounts of biased structures and their meanings; nor have biased structures received much attention in existing acquisition literature, except from the point of view of non-target structures in child syntax (e.g. Guasti et al. 1995). We therefore make an empirical



contribution by focusing on English-acquiring children's production of "high" negation structures in naturalistic speech settings. We also make a theoretical contribution by revealing structural differences between NegQs and negative non-matching<sup>1</sup> tag questions on the basis of this data, as well as claiming a structural distinction between rising and falling negative tag questions.

Let us first present the core data for this chapter. (1) illustrates negative polar questions (NegQs).<sup>2</sup> All examples in (1) are taken from the CHILDES database (MacWhinney 2000); corpus names are given in parentheses.

- |     |                                      |                        |
|-----|--------------------------------------|------------------------|
| (1) | a. Isn't that funny?                 | Child 2 (Valian), 1;9  |
|     | b. There, don't you see it?          | Ross (MacWhinney), 2;4 |
|     | c. Doesn't it feel good, ma?         | Victor (Gleason), 2;4  |
|     | d. Isn't this mine? Isn't this mine? | Barbara (Belfast), 2;7 |

In NegQs, the clitic negation *n't* is, we claim, not propositional but metalinguistic (see Goodhue 2022a,b for a similar claim, building on intuitions by Ladd 1981). This metalinguistic negation is structurally and semantically distinct from the negation we see in superficially similar negative tag structures like (2). In (1), metalinguistic negation scopes above the propositional content of the utterance, negating the typical interpretation of an interrogative-typed clause, namely, that the speaker is ignorant as to the truth of the proposition and expects their addressee to be knowledgeable.<sup>3</sup> In (2), *n't* is interpreted as propositional negation that scopes under an interrogative clause-type operator, negating some proposition *p* within that clause.

- |     |                                       |                         |
|-----|---------------------------------------|-------------------------|
| (2) | a. Close to Rachel's feet, wasn't it? | Anne (Manchester), 1;11 |
|     | b. Now it needs ironing, doesn't it?  | Gail (Manchester), 2;3  |
|     | c. We saw some at the zoo, didn't we? | Joel (Manchester), 2;6  |

The structures in (2) consist of positive anchors – affirmative declarative clauses that first introduce the proposition at issue – and negative tags, the structure

<sup>1</sup>This means that the polarity of the tag and its associated declarative clause (its anchor) do not match. In the context of our chapter, all anchors have positive polarity.

<sup>2</sup>As some NegQs, like (1a), are string-equivalent to negative polar exclamatives, we hand-checked all potentially ambiguous strings in context to determine whether the string was used as a NegQ. See Section 2.1 for more details.

<sup>3</sup>Details to follow in Section 3.2 and Section 3.3.3.

of which is a key proposal in this chapter.<sup>4</sup> We do not have prosodic information for these structures, as the original audio is no longer available, but following Dehé & Braun's (2013) work on the British component of the International Corpus of English, we assume that they, like most reverse-polarity tags in adult English, are likely composed of two intonational contours; one for the anchor and one for the tag. Such tags are often referred to in the literature as nuclear negative tag structures (following Ladd 1981). The negation that they contain is, we argue, typical propositional negation.

We will propose structures for NegQs and negative tag questions assuming a speech act syntactic framework as in (3), which we assume is present in the left periphery of all root utterances.

- (3) [SpeechActP [PerspectiveP [CP [TP....]]]] cf. Woods (2021)

This structure contains two discourse-related syntactic projections, SpeechActP and PerspectiveP. SpeechActP, the highest syntactic node in (3) (and therefore in (1–2)), contains a discourse commitment operator. All root utterances contain one of these operators, which mark to what and to whom the speaker<sup>5</sup> is committed. This is very like the concept of the Common Ground as articulated by Stalnaker (1978, 2002), Gunlogson (2003, 2008) and others, but the commitment-based approach we use here (for further elaboration see e.g. Krifka 2015, Geurts 2019) differs from intentionalist, belief-oriented approaches to speech acts, so we will briefly explain what discourse commitment operators express. In this chapter we focus on operators that express one of two types of commitment between the speaker, the addressee, the propositional content and the discourse context. One type is found in utterances, in the making of which a speaker commits in the discourse context to acting as though some proposition is true (essentially, assertions).<sup>6</sup> This will be referred to in shorthand as *the speaker commits to the proposition*. The second type is found in utterances, in the making of which the speaker commits to the realisation of a goal, namely the addressee committing

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<sup>4</sup>We do not consider matching tags – i.e. negative anchors with negative tags – in this chapter, though we do find a very small number of them in the dataset.

<sup>5</sup>We recognise here that terminology such as "speaker" and "speech act" can be exclusionary and ableist. We use the terms "speaker" and "speech act" throughout because our primary empirical data is spoken child English, but we believe that our theoretical assumptions and claims about interlocutor-information relationships can apply whether or not the interlocutors in question use spoken or signed languages.

<sup>6</sup>In Gu & Roeper (2011) and Roeper (2016), a slightly different perspective is advanced about implicit arguments, general point of view and what the affirmation of a speech act involves. Of course, a dialogues carries implications and invokes inferences beyond calculation of Common Ground or commitments and the pursuit of assent or confirmation.

to acting as though some proposition is true (essentially, questions).<sup>7</sup> This will be referred to in shorthand as *the speaker commits to resolving the issue of some proposition*. These operators, ASSERT and QUESTION, are often realised in English as different intonation contours on the right edge of the utterance, so for our purposes, on the tag part of negative tag structures.<sup>8</sup>

These operators are not unique to NegQs or tag structures, but these non-canonical question structures are excellent proving grounds for their presence and effects. We will claim that NegQs are fundamentally QUESTION structures containing interrogative clauses that generate the commitments typical of questions – i.e. that the speaker is committed to the goal of resolving an issue, via an expectation that the addressee will provide an answer. Note that this implies that NegQs will typically be used when the speaker believes this expectation will be met; an assumption made by speech act theorists from Searle (1969) to Farkas (2022) and many in between.

Negative tag structures, on the other hand, are split into two types. ASSERT negative tag structures are fundamentally assertions and behave as such in discourse, while QUESTION negative tag structures are fundamentally questions in their discourse commitments.

We move down the structure in (3), now, to the second discourse-related projection, PerspectiveP, which encodes interlocutor perspective. That is, elements in PerspectiveP mark and modify from whose perspective we should understand the propositional content of the CP. The range of operators that can merge in PerspectiveP is much larger, ranging from representations of the speaker and addressee, to modal and logical operators. In the case of NegQs, we will argue that metalinguistic negation is merged in PerspectiveP; for negative tag structures, we argue for representations of the speaker and addressee.

With these two projections, SpeechActP and PerspectiveP, and the elements that merge in them, we can make specific claims about the source of bias in NegQs and tag structures; that is to say, how the speaker expresses their prior knowledge or beliefs while still looking to elicit a response from their addressee. We will claim that the bias in a NegQ arises from the metalinguistic negation and

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<sup>7</sup>Note that there are issues here around pragmatic recursion or recursion of interlocutor goals, which could have interesting consequences for theories of pragmatic development and evolution of communication. We do not have space to deal with these issues here and leave them for future work.

<sup>8</sup>See Heim (2019) for an approach to mapping prosody and speech acts that does not assume speech act operators, but demonstrates a relationship between pitch excursion and commitment; namely that rising pitch contours correlate with reduced speaker commitment to the proposition.

its interaction with interrogative clause typing. In **ASSERT** negative tag structures, *bias* arises from the fact that the user actually does assert that a particular proposition is true from their perspective. In **QUESTION** negative tag structures, bias arises through the interaction of the anchor proposition and an **ADDRESSEE** operator in **PerspectiveP** (details to follow in Section 3.1.3.1). We will demonstrate that these proposals predict, correctly, that the bias in **QUESTION** tag structures is more similar to that in NegQs than to **ASSERT** tag structures, without being identical or derived from NegQ bias.

In addition to our syntactic claims, we use Farkas & Bruce's (2010) Table model, as updated by Farkas (2022), to fully model the pragmatic characteristics of these utterances that fall in part out of our syntactic analyses. These frameworks allow us to demonstrate our claims that NegQs and negative tag structures are syntactically different (contra Sailor 2012, Jamieson 2018, a.o.) and pragmatically distinct in how they generate and communicate bias. Note that we do not give in this chapter formal semantic denotations for metalinguistic negation or the operators we propose. In this chapter we will demonstrate the meanings of these operators using paraphrase and leave formalisations for future work.

Our account is motivated by empirical evidence from the developmental path of English-acquiring children that we present in this chapter: children acquire and use negative tag structures before they begin to use NegQs. This evidence strongly supports an account of these constructions that is parsimonious in its lexical array in order to explain very early, target-like acquisition of negative tag structures. However, it is fine-grained with respect to the high left-periphery of the clausal structure to allow children to express the complex relationships between interlocutors and propositional material that they develop the ability to conceptualise. We therefore exhort theorists to take account of acquisition data wherever possible rather than relying on adult production and intuitions, not least so that we do not try to reduce to specialised operators that which we can achieve with a compositional, acquirable concept of syntactic structure and its interfaces with other modules.

The chapter is structured as follows. In Section 2 we give a quantitative overview of how children produce negative tag structures and NegQs before looking deeper into the qualities of these utterances. We present our proposal for the syntax of negative tag structures (Section 3.1) and NegQs (Section 3.2), then in Section 3.3 demonstrate how our proposal captures the child's developmental path. In Section 3.3 we also introduce new diagnostics pertaining to response and assent patterns that further support our syntactic claims. We then summarise in Section 4.

## 2 “High” negation in child English

### 2.1 Quantitative data

The use of “high” negation in child English follows a child’s first use of tense, auxiliaries (sentence-medially and sentence-initially) and fronted wh-elements. However, it is still used quite early in acquisition despite the complexity of the meanings attributed to it and the fact that it requires fronting of the tensed auxiliary and fronting (or base-generation) of clitic negation.

We used the Wang CHILDES browser<sup>9</sup> to search 44 UK and US English corpora for “high” negation. We searched the CHI tier for instances of BE, DO and HAVE auxiliaries with clitic negation<sup>10</sup> in children up to age 4, returning over 20,000 hits. We then removed all instances of negative declaratives, utterances with non-overt or indecipherable subjects, song lyrics, and one example of a misattribution of an adult utterance to CHI. We also separated off imitations, wh-questions, negative anchors with positive tags, lone tags without a clear anchor within 5 lines, negative polar questions without inversion, and any unclear structures.

This left us with 633 instances of true “high” negation structures from 67 children across 24 corpora including negative tag structures with positive anchors, negative imperatives with overt subjects, and auxiliary-initial structures containing “high” negation. These latter we then tagged for the act that was being performed by the structure: biased polar question (NegQ), negative polar exclamative, or ‘persuasion’ question.<sup>11</sup> We did this by hand using features of individual utterances (e.g. the absence of a gradable predicate predicts that the structure is not an exclamative) and up to 5 lines of discourse preceding and following the utterance to judge the utterance in context. We also included an “other” category for imperatives with overt subjects, as these are not used as question acts, in addition to instances where other aspects of syntax left us unsure as to the act

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<sup>9</sup><https://naclo.cs.umass.edu/childe-search/>, currently maintained by Christa Bowker. The corpora are pulled from CHILDES (<https://childe.talkbank.org/>, MacWhinney 2000). To avoid overlong citations in our in-text examples, please see the appendix for a guide to references for the CHILDES corpora cited in this chapter.

<sup>10</sup> *isn’t, wasn’t, aren’t, weren’t, don’t, didn’t, doesn’t, haven’t, hasn’t, hadn’t, ain’t*.

<sup>11</sup> Persuasion questions are polar questions used to exhort the addressee to do something – they are similar in effect to an imperative. Imagine a parent trying to get out of the house who says to their child “Can’t you just put your shoes on already!” This utterance is neither a question requiring a response, nor an exclamative in the typical, surprise at some exceeded degree, sense. They are termed ‘suggestion’ questions by Romero & Han (2004), who also mention them briefly.

involved, context suggested a different reading, or context didn't help to differentiate possible readings. Examples of each of the categories are shown below.<sup>12</sup>

- (4) TAG: Got got a small boy haven't we Mummy Anne (Manchester), 1;11
- (5) IMPERATIVE: Don't you pee pee in the big girl pants. Eve (Brown), 1;11
- (6) BIASED Q: There, don't you see it? Ross (MacWhinney), 2;4
- (7) EXCLAMATIVE: Isn't it sweet. Anne (Manchester), 2;5
- (8) PERSUASION: Mommy, don't you think we could play? Abe (Kuczaj), 3;4
- (9) OTHER: Mommy, isn't this a house or apartment? Abe (Kuczaj), 3;6

We found that tag structures were by far the most common structures containing high negation in the corpus (457 instances). NegQs were next most common (74), followed by imperatives with overt subjects (38) and negative polar exclamatives (36). There were just 3 examples of 'persuasion' questions. Tag structures were also used earliest (38/51 utterances before age 2;6), followed by NegQs (7/51) and exclamatives (1/51). The full breakdown of act by age is shown below, in this table adapted from Woods & Roeper (2021: 765):

Table 1: High negation questions by age and act

|          | TagQ | NegQs | NegExcl | Persuasion | Other | Total |
|----------|------|-------|---------|------------|-------|-------|
| <2;0     | 7    | 2     | 0       | 0          | 1     | 10    |
| 2;0–2;5  | 31   | 5     | 1       | 0          | 4     | 41    |
| 2;6–2;11 | 268  | 25    | 5       | 1          | 31    | 330   |
| 3;0–3;5  | 94   | 15    | 14      | 1          | 12    | 136   |
| 3;6–3;11 | 57   | 27    | 16      | 2          | 14    | 116   |
| Total    | 457  | 74    | 36      | 4          | 62    | 633   |

Emerging in Table 1 is an acquisition path that we aim in the rest of this chapter to capture: tag structures emerge before (and in greater numbers) NegQs, which emerge before negative polar questions and persuasion questions. This holds across children, as illustrated in Table 1, but also within individuals. Table 1 also suggests that children acquiring English have a sophisticated and nuanced understanding of different types of negation that interacts with different relationships

<sup>12</sup>For access to the resulting database of English "high" negation, please contact the first author.

between interlocutors and the propositional material they are trying to share. This understanding develops and changes over a short space of time.

The rest of this chapter aims to make sense of and account for the first steps in the acquisition path in Table 1. We will focus on unpacking the syntax and pragmatics of negative tag structures and NegQs in child production and in adult English. We first take a qualitative look at the earliest NegQs and negative tag structures in the child data (Section 2.2). As mentioned above, we will argue that our acquisition data supports an analysis of negative tag structures whereby the tag is not simply an elided NegQ, principally because negative tag structures precede NegQs in acquisition. We provide an analysis for NegQs that combines insights from Krifka (2015), Goodhue (2022a) and Holmberg (2016) to capture our data and form the basis for a minimal and plausibly acquirable analysis of “high” negation structures (Section 3).

## **2.2 Qualitative data**

Existing work on negative tag structures and NegQs is clear that sophisticated discourse management skills are required to use and interpret such structures. Negative tags require the user to recognise conventional uses of particular syntactic structures and model the cognitive state, however shallowly, of their interlocutor (see, e.g. Sadock 1974, Ladd 1981, Asher & Reese 2007, Reese & Asher 2006, Malamud & Stephenson 2015 a.m.o.). NegQs also require the user to recognise marked uses of syntactic conventions, in this case combining negation and polar interrogatives to express a bias that they hold. The data in Table 1, therefore, demonstrate that children around the age of 2 are already sophisticated conversationalists. Some of them are aware of the possibility that their beliefs are not shared by others and they are capable of expressing this through the choice of linguistic structures that they employ. Take as an example the two NegQs used before age 2, which are used after the child’s assumptions are put into doubt by a previous utterance.

- (10) 02b.cha (Valian), 1;9

MOT: did you play marbles with cousin George?

CHI: yeah! [laughs]

MOT: that’s funny?

CHI: isn’t that funny?

- (11) Joel (Manchester), 1;11

MOT: tell Caroline what you’re gonna have for your dinner.

INV: what are you gonna have for your dinner?

CHI: **don't you know?**

In both cases, the child's interlocutor asks a question that causes them to question some previously held belief; they then ask a NegQ to check whether the propositional content of the belief can still hold. These uses of NegQs chime with adult uses of the same structures.

The earliest negative tag structures in our corpus behave a little differently. Negative tags can be used to request confirmation of a proposition that the speaker believes to be true, as in (12). However, they can also be used when the speaker is more certain of the proposition, but wishes to "hedge" (in Ladd's (1981) terms) or seeks only "acknowledgement" of the proposition by their addressee (in Asher & Reese's (2007) terms), as in (13).

- (12) Context: A is fairly sure that B wants to go to the park, but they're slow to put their shoes on at the door.

A: You want to go to the park, don't you?

- (13) Context: A and B have discussed going out after lunch. At 12.30pm, B is by the front door, shoes on, with bucket and spade in hand.

A: You want to go the park, don't you.

In the earliest part of our dataset, acknowledgement-type uses appear to be more common.<sup>13</sup> In (14), a child of 1;11 appears to be looking simply to gain her mother's attention using a negative tag structure, in the middle of a period of monologuing (numbers in brackets represent pauses in seconds). In this instance, during a period of toy play, it is thought that knowledge about the smallness of the boy is shared knowledge:

- (14) Debbie (Wells), 1;11

CHI: Gotto pick it up. Throw it out. Pick it up. Throw it out. xxx (14). Got a boy. Got a got a small boy, **haven't we** Mummy? We've got a big girl (2). xxx get a big girl. Look Mum I'm nearly getting big.

MOT: You are getting big, mm.

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<sup>13</sup>We identify the uses of tag structures in our dataset on the basis of context alone; none of the corpora below have audio files attached, so prosodic information is not available to us. We do not infer prosodic information from punctuation in the transcript (i.e. the use of turn-final . vs ? to represent intonation) because this is not consistent across corpora. In any case, it is unclear what the prosody of tag structures is when they are produced by children, as this has not yet been studied.

In this case, both discourse participants appear have the same shared knowledge, and the proposition asserted by the declarative anchor is used as a summary or a verbal recognition of an event in the world, while the negative tag functions to recognise that the other participant is present and knows this too. This could be considered a highly biased use of the negative tag structure as the question part of the structure is barely a question at all. Another such example is found in (15), where the child's negative tag structure is uttered at the same time as MOT's second utterance:

- (15) Emma (Tardif), 1;9

CHI: It's driving

MOT: voom. It ran into the blocks. voom. voom.

CHI: voom. the blocks. blocks. the blocks fell, <**didn't they**>.

MOT: where is the car going? oops, it's on the floor.

Similarly, in (16), a child repeats information she has already given, followed by a tag question that appears to seek acknowledgement that her mother has understood the proposition. She is unlikely to be asking for confirmation from her mother, who has originally requested this information.

- (16) Anne (Manchester), 1;11

CHI: closer

MOT: closer? what was it close to?

CHI: Rachel.

MOT: [unintelligible]

CHI: close to Rachel's feet, **wasn't it**?

MOT: huh?

Note that the data in (14–16) suggest that early negative tag structures are truly generated rather than fixed forms, given that they (a) contain a range of auxiliaries in a range of forms inflected for tense and person, (b) contain subject pronouns of various persons and numbers and that (c), the auxiliary and subject in the tag always match those in the anchor.

Given the quantitative and qualitative child data, we now move on to our proposal for the structure of negative tag structures and NegQs. We diverge from accounts that claim negative tag structures contain NegQs (e.g. Sailor 2012) on the grounds that if acquisition order reflects complexity of syntactic structure, negative tag structures must be syntactically less complex than NegQs. This is

counterintuitive on a surface level, since NegQs are monoclausal while negative tag structures are biclausal. However, we argue for a complex discourse-oriented left periphery that hosts syntactic, prosodic and interpretive cues to the child and that from this point of view, negative tag structures are globally less complex. Specifically, we claim that the discourse-oriented left periphery is a target for movement and affects scope relations; the English-acquiring child must learn for NegQs that sentence-initial metalinguistic negation entails an operation on the discourse-oriented left periphery and not simply on CP. We will also go on to examine adult response patterns to negative tag structures and NegQs to refine our syntactic and pragmatic proposals.

### 3 Tag structures, NegQs, and non-canonicity

#### 3.1 Our proposal

##### 3.1.1 Assumptions

We assume an extended left periphery where CP is split into three positions. The highest position, SAP (Speech Act Phrase), hosts speech act adverbs and operators that express speaker commitments (or the speaker's expectations for their interlocutor to commit). This scopes over PerspectiveP, which hosts operators that express speaker intentions and point of view. PerspectiveP scopes over CP, which hosts clause typing elements. Thus we assume that clause type and "illocutionary force" are not automatically linked, in line with Coniglio & Zegrean (2012) a.o. There are parallels between this approach and proposals by Hill (2013), Krifka (2023) and Wiltschko (2021); see Woods (2021) for a summary of specific similarities and differences.

##### 3.1.2 Joining two clauses (a first pass at a negative tag structure proposal)

Using the assumptions above, we propose that negative tag structures are embedded in an extended left periphery containing a speech act projection as in (17), where DECL and Q are clause-typing, not speech act, operators.

(17) Negative tag structure: first pass

- a. Lucy is coming, isn't she?
- b. [SAP OPERATOR [CP [CP DECL [IP Lucy is coming ]][C  $\wedge$ ][CP Q isn't [IP she t<sub>isn't</sub> eoming ]]]]

Note that the conjunction in (17) is not of speech acts, but of the two CPs, i.e. typed clauses that have not been specified for a particular speaker perspective or commitment. The decoupling of clause typing and perspective is important but often only implicit in speech act theorising; we explicitly justify this decoupling in Section 3.1.3. There is no contradiction in the conjunction of the typed clauses in (17b), as we will demonstrate below.

Negative tag structures can receive either final falling or rising intonation contours (see, e.g. Dehé & Braun 2013). For this reason we claim that in (17), OPERATOR may be ASSERT or QUESTION. The realisation of ASSERT and QUESTION in English are prosodic and contribute to the interpretation of the tag structure. Taking ASSERT first, the tag structure receives falling intonation in the tag part; that is, the rightmost, last pronounced part of the utterance, represented by the final ↘ in (18a). (18b) contains a step-by-step paraphrase for each part of the structure in (18a).

(18) ASSERT tag structure: first pass

- a. [SAP [CP [CP DECL [IP Lucy is coming ]][C  $\wedge$ ][CP Q isn't [IP she t<sub>isn't</sub> coming ]]]] ↘
- b. [SAP ASSERT: I am committed  
[[CP<sub>1</sub> DECL: to the one proposition in the following (singleton)  
set being true: Lucy is coming]  
[AND]  
[CP<sub>2</sub> Q: to one of the propositions in the following set being  
true: Lucy is coming; Lucy is not coming]]]

In other words: the speaker asserts both that Lucy is coming is true, and that either Lucy is coming or Lucy is not coming is true. An ASSERT tag structure essentially is very similar to an asserted declarative – indeed, it contains one. This suggests that ASSERT tag structures should be interpreted and responded to much like canonical asserted declaratives, so example, a speaker may use an ASSERT tag structure not to elicit a new-to-the-speaker answer from the addressee but to elicit acknowledgement, e.g. because they want to indicate to their interlocutor that they know that their assertion may not be new news, but they still want it to be explicitly part of the discourse content. We already saw examples of acknowledgement-type tags in (14–16) above.

Turning now to a QUESTION tag structure, this receives a rising intonation contour (↗) over the tag element. Here, the speaker expects a response from their addressee, e.g. to confirm the proposition in the anchor. We did not see an example of such a use of negative tag structures in the earliest (pre-2;0) examples

in our corpus. A first pass structure and paraphrase for a QUESTION tag structure is as follows:

(19) QUESTION tag structure: first pass

- a. [SAP [CP [CP DECL [<sub>IP</sub> Lucy is coming ]][<sub>C</sub>  $\wedge$ ][CP Q isn't [<sub>IP</sub> she <sub>t</sub><sub>isn't</sub> coming ]]]]  $\nearrow$ ]
- b. [SAP QUESTION: I am committed to resolving the issue  
 [[CP<sub>1</sub> DECL: of the one proposition in the following set being  
 true: Lucy is coming]  
 [AND]  
 [[CP<sub>2</sub> Q: of one of the propositions in the following set being  
 true: Lucy is coming; Lucy is not coming]]]

Through (19), we predict that negative tags with rising intonation will be responded to and intended more like canonical information-seeking questions because (19) contains an interrogative clause scoped over by a QUESTION operator.

(18) and (19) predict that there may be some sense of redundancy or contradiction associated with the use of tag structures because one proposition from the set that could be true (i.e. from the tag) is the same as the proposition expressed in the anchor. Claims of redundancy in tag structures have, in fact, been made before by linguists (e.g. Lakoff 1975), particularly with reference to polarity matched tags (e.g. You're coming, are you?, e.g. O'Connor 1955), and by non-linguists (e.g. psychiatrists, Winefield et al. 1989). We will expand on why this apparent redundancy does not result in infelicity in reverse polarity tags in Section 3.1.3.1.

Note once more that conjunction in tag structures by our analysis is at the clausal, not at the speech act level. Speech act conjunction is shown in (20) where a declarative is asserted and a polar interrogative containing the same proposition (and its negation) is asked as a question. This creates a clear logical contradiction.

(20) #Lucy is coming and isn't she?

(20) makes clear that we are dealing with a single speech act in the production of a negative tag structure, but that act is not self-evidently a type of question. In fact, much like the Canadian English examples in (21–22), where declaratives are modified by the discourse particle *eh*, negative tag structures can be either assertions or questions depending on the intonational contour.

(21) You have a new dog, eh? $\nearrow$

- (22) All the girls came from the West eh→, to work in the factory.

(Adapted from Wiltschko et al. 2018: 587, 589)

In (21), the rising contour on *eh* contributes to the utterance meaning “Confirm you have a new dog”, which has a question-like use and response pattern. In contrast the level contour on *eh* in (22) means “I believe you agree with me”, such that this *eh* has an assertion-like use in narratives.

We turn now in more detail to the structure of the right-most adjoined clause; the tag.

### 3.1.3 The tag

In (17), we claim that the tag part of a tag structure is not derived from a NegQ. In terms of existing accounts, our approach is most similar to Holmberg (2016), shown in (23). Note that, according to Holmberg, <+Pol> represents an affirmative declarative variable in C and <±Pol> represents a question variable. Holmberg treats <Pol>, however, as separate from illocutionary force (represented by Q-force).

- (23) [Q-force [CP [CP<sub>1</sub> Lucy <+Pol> is coming][CP<sub>2</sub> [C isn't <±Pol>][PolP she <±Pol> coming]]]]

(Based on Holmberg 2016: 185)

Note that we diverge from Holmberg in proposing that some negative tag structures (specifically, falling ones) are scoped over by assertive force, whereas the tag structures in Holmberg (2016) all carry question force.<sup>14</sup>

In proposing (23), Holmberg differentiates negative tags from NegQs. He states that “they are [...] formally different in that the [proposition towards which there is bias] is encoded as a clause with valued (positive) polarity in the tag structure, but is derived by application of the high negation to the question variable in the [NegQ].” (Holmberg 2016: 188) His formulation of a NegQ is shown in (24):

- (24) [CP Q-force [CP Neg [CP [±Pol] [C [PolP ...<±Pol>...]]]]]

(Based on Holmberg 2016: 189)

Note that negation in (24) scopes above the question variable [± Pol] and so does not behave like propositional negation in terms of polarity licensing, amongst other things. We subscribe to this view too, proposing the following structure for NegQs:

<sup>14</sup>The confirmation-type rising negative tag structure, which we think typically aligns with our QUESTION tag structure, was the focus of Holmberg (2016), whereas we look to account for all child negative tag structures in our naturalistic corpus data.

- (25) a. Isn't Lucy coming?  
 b. [SAP QUESTION [PerspectiveP Is+n't [CP Q t<sub>is</sub> [IP Lucy t<sub>is</sub> coming ]]]]

The differences between (24) and (25) are largely notational and pertain to our different perspectives on the left periphery rather than to differences in the structure of NegQs specifically.

A question raised here, then, is what interrogative clause typing is doing in NegQs and in negative tags, as in both our and Holmberg's proposals, this is a point of commonality between the two structures.

### 3.1.3.1 Separating clause typing from perspectives from speech acts

Clause-typing in English is intimately linked with tense and aspect phenomena; that is, grammaticalized methods for expressing a proposition, situating it in time, and indicating what item in the world it should associate with. Clauses are typed by the realisation and relative position of subjects and elements bearing markers of (non-)finiteness.

In standard adult English, when an overt subject precedes a tensed verb (auxiliary or lexical), a canonical declarative results and a truth value or set of possible worlds is typically indicated. When a tensed auxiliary verb precedes the overt subject, a canonical (polar) interrogative results and possible truth values or sets of sets of possible worlds are typically indicated. When a non-finite form appears in a root clause without an overt subject, an imperative results, which indicates a property that the speaker wishes were true of the world.

Though these clause types align canonically with certain perspectives or commitments, this alignment may be disrupted in a number of ways, whether through embedding, discourse particles, polarity operators, intonation, or other means. A non-exhaustive set of examples of canonical and non-canonical uses of clause types are shown in Table 2.

This means that clause type does *not* inherently carry information about perspective or commitment<sup>15</sup> – that is to say, how the speaker uses a clause or intends it to be understood. Cross-linguistic evidence abounds that clause-typing is separate from speaker perspective and commitment, from the mechanisms of discourse particles (e.g. Canadian English *eh* in (21–22), Romanian *oare* in Coniglio & Zegrean 2012 and Farkas 2022, West Flemish *kwestje* in Woods & Haegeman

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<sup>15</sup>See also Schmitz (2021) for a similar recent proposal, which runs counter to a Fregean perspective in which sentence 'mood' (clause typing) and speech act are often conflated.

Table 2: Canonical and non-canonical uses of clause types in English

| Clause type   | Canonical use | Non-canonical use                                                                                                                                     |
|---------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Declarative   | Assertion     | Question (e.g. rising declaratives); Request (with modal auxiliaries); Exclamative (with intonation); Command (with attitude verbs e.g. <i>want</i> ) |
| Interrogative | Question      | Request (e.g. with <i>please</i> ); Exclamative (e.g. negative polar exclamatives); Assertion (e.g. <i>fuck</i> -inversion; Sailor 2020)              |
| Imperative    | Command       | Request (e.g. with <i>please</i> )                                                                                                                    |

2023) to the interpretation of embedded clauses. Moreover, embedded typed clauses are easily dissociable from their canonical speech acts. For example, interrogative clauses under response verbs like *know* are not interpreted as open questions, but rather as something like the answers to that question (e.g. Lahiri 2002, Uegaki 2015).

Returning to the role of clause types in negative tag structures, the conjunction of different clause types in a negative tag structure means that it points both to a set of possible worlds and a set of sets of possible worlds, where the former is a subset of the latter. Though this seems to be redundant, it is important to note there are (at least) two perspectives at play when a negative tag structure is used.

Let us start with an **ASSERT** tag structure. If a proposition is simultaneously true and maybe true for the same person, the questioning of the proposition seems redundant, or even contradictory. However, we noted in Section 2.2 and Section 3.1.2 that **ASSERT** tag structures tend to be used when the speaker recognises that the addressee might already know the proposition to be true. This runs against the core felicity condition of an assertion: that the speaker believes that the addressee does not already believe that some proposition is true (Searle 1969, Farkas 2022). However, that proposition might not have been accepted publicly as true by the addressee, whether because they have previously refused to accept it or it has not been addressed directly by the addressee.<sup>16</sup> In either case, **ASSERT**

<sup>16</sup>An interesting case of such uses of tag questions with falling intonation is in the case of predicates of personal taste. For an example, imagine that a co-worker mentions that she has a new neighbour, and blushes while saying so. You might say: *He's attractive, isn't he?* to determine the cause of the blushing (see Malamud & Stephenson 2015). In this case the speaker

tag structures are used when the issue of the proposition is not publicly settled for the addressee. Therefore, if the anchor reflects the speaker's commitments, but the tag reflects the speaker's perception that the addressee lacks public commitment to the proposition in this discourse context, there is no longer any redundancy in the structure or its use. We can consider the negative tag structure to carry a conventional implicature (in the sense of Potts 2005), in that the speaker chooses to assert their proposition using a negative tag structure because they also want to communicate how they view the addressee's commitments.

We therefore update (18) to reflect this by adding a SPEAKER operator into the PerspectiveP of the declarative clause and an ADDRESSEE operator into the PerspectiveP of the interrogative clause to represent their differing worlds of evaluation.<sup>17</sup>

(26) ASSERT tag structure: second pass

- a. Lucy is coming, isn't she. ↴
- b. [SAP [[<sub>PerspP</sub> SPEAKER [CP DECL [<sub>IP</sub> Lucy is coming ]]]] [ / ] [[<sub>PerspP</sub> ADDRESSEE [CP Q isn't [<sub>IP</sub> she t<sub>isn't</sub> eoming ]]]]] ↴]

What about QUESTION tag structures? Here we claim again that the two parts of the tag structure relativise to different interlocutors. The felicity conditions of canonical questions include speaker ignorance and addressee competence – i.e. that the speaker doesn't know the answer and the addressee does – as well as addressee compliance – i.e. that the addressee will provide the true answer (Farkas 2022). However, there are a number of non-canonical questions in which speaker ignorance is weakened because the speaker may already have evidence for the true answer, e.g. rising declaratives (Gunlogson 2003). Given that this type of non-canonical question operationalises a steep rise in intonation, which we also see in QUESTION tag structures (Dehé & Braun 2013: 140), it is possible that the same process is active here: the speaker reflects their perception of addressee competence in the anchor<sup>18</sup> and their need for addressee compliance (due to their

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is making a guess as to the addressee's point of view, but it is important that it is *presented* as an assertion by the speaker for the addressee to publicly weigh in on. Such cases require more independent work – thanks to Dan Goodhue for bringing them to our attention.

<sup>17</sup>We are agnostic as to the exact mechanisms for how the world of evaluation interacts with material in the CP. There are many approaches that are compatible with our proposal, including Tsoulas & Kural (1999), Speas & Tenny (2003) and Schwarz (2012), i.a. Approaches such as Sigurðsson (2014) are not compatible with our proposal as in that case, the speaker/addressee features are lower in the clausal hierarchy than e.g. the clause-typing head.

<sup>18</sup>This analysis is actually quite similar to Malamud & Stephenson's (2015) approach to rising tags whose polarity matches that of the anchor, as they claim that such tags place the commit-

own uncertainty) in the tag. Therefore, (19) can be updated for QUESTION tag structures as follows:

- (27) QUESTION tag structure: second pass
- a. Lucy is coming, isn't she? ↗
  - b. [SAP [[PerspP ADDRESSEE [CP DECL [IP Lucy is coming ]]]][ $\wedge$ ][[PerspP SPEAKER [CP Q isn't [IP she t<sub>isn't</sub> coming ]]]]]] ↗

A difference to note between the proposal here and rising declaratives is that, in the case of rising declaratives, the addressee is publicly known to know the proposition (Gunlogson 2003: 84–85). This needn't necessarily hold in the case of a tag structure (see also Hepburn & Potter 2011), hence the interrogative tag formally requests that the addressee make public their commitment to the proposition.

These amendments to the proposal may lead a reader to question whether high level speech act operators are necessary when there are also perspectival operators which appear to be doing the same job – in other words, why can't the difference between ASSERT and QUESTION tag structures boil down to the SPEAKER/ADDRESSEE operators and their relationship to the different types of clause?

One reason that SPEAKER/ADDRESSEE operators and their interaction with clause types cannot alone explain the different structures is intonation. There is evidence from languages like Korean that intonation expresses that a particular response pattern is expected – i.e. that a specific speech act is being performed (Ceong 2019). Korean also represents interlocutor perspective and clause typing separately through specific verbal morphology, as shown in (28–29), in which the arrows represent final falling or rising intonation (examples from Ceong 2017: 12–13).

- (28) Meysi-lul manna- ss- ta- ko- ↘  
Messi-ACC meet- PAST- DECL- COMP- SPEAKER-COMMITMENT  
'I said I met Messi.' Reinforcing assertion

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ment for the proposition in the addressee's future commitments and not those of the speaker. However, they also mitigate the speaker's commitment to the proposition in their account of mismatching tags, by suggesting that the speaker only commits provisionally to the proposition, on the proviso that the addressee confirms its truth. Moreover, they do not address how the structure of the tag and anchor result in these discourse effects. As we do not address matching tags in this chapter, and Malamud & Stephenson (2015) restrict themselves to rising tags, more work is to be done on how intonation contour and polarity interact.

- (29) Meysi-lul manna- ss- ta- ko- ↗  
 Messi-ACC meet- PAST- DECL- COMP- ADDRESSEE-COMMITMENT  
 'Are you saying you met Messi?' Echo question

This justifies the inclusion of specific speech act operators that are separate from representations of perspective. Moreover, intonation does not appear to accompany perspectival shifts in the same way. To our knowledge, shifting phenomena such as monstrous indexicals (e.g. in Uyghur, Shklovsky & Sudo 2014) do not trigger specific intonational contours. Additionally, we might expect a completely different intonational contour for ASSERT tag structures than we actually see if SPEAKER/ADDRESSEE operators were the locus of intonation, given that (we argue) they contain an ADDRESSEE operator scoping over an interrogative clause, just like a typical information-seeking question might.

Another reason for including SPEAKER/ADDRESSEE operators as well as speech act operators is that we believe we have evidence that these are just two examples from a large range of operators, including overt items, can be hosted in PerspectiveP in different constructions, and that these other operators are compatible with the intonational contours introduced by ASSERT/QUESTION speech act operators. We present this evidence now, as we turn to discuss NegQs in more detail.

### 3.2 Metalinguistic negation

Recall that we presented our NegQ structure in (25), repeated here:

- (25) a. Isn't Lucy coming?  
 b. [SAP QUESTION [PerspectiveP Is+n't [CP Q t<sub>is</sub> [IP Lucy t<sub>is</sub> coming ]]]]

In (25), the clitic negation *n't* is above the level of the proposition. Evidence for this stems back to Ladd's (1981) observation that NPIs are not licensed in NegQs.

- (30) Isn't Jane coming {too/#either}?

Many linguists before us have proposed that some negation is metalinguistic as it scopes over some object that is bigger than the proposition alone (Horn 1985, 1989; Wood 2014; Holmberg 2016, a.o.). We join this tradition in claiming that negation in PerspectiveP negates, from the speaker's perspective, that the typical interpretation of a typed clause holds. This is similar to Krifka's (2015; see also Cohen & Krifka 2014) concept of denegation of speech acts, whereby negation over a speech act "prunes [the] legal developments" (Krifka 2015: 330) of some speech act in a discourse; in other words, it prevents certain discourse

continuations that would usually stem from canonical use of some clause type from being licit.

How does this fall out? We propose that negation deployed in PerspectiveP indicates that the speaker rejects the interrogativity of the CP – in other words, that they do not believe that alternatives to the proposition are true. This is an indirect, weak method of expressing belief in the truth of the proposition, hence it is not at odds with the question force and corresponding felicity conditions of the NegQ (the speaker’s commitment to resolving the issue and their expectation that the addressee will provide the information required). We paraphrase (25) as below:

- (31) I the speaker am committed to resolving the issue [QUESTION] of my not believing that there is a plausible alternative proposition to  $p$  [NEG-in-PerspectiveP] in the set  $p$  or not  $p$  [CP Q]

This means that biased meanings in tag structures cannot fall out from the same mechanism as NegQs because there is no metalinguistic negation in negative tag structures and therefore no rejection of interrogativity in QUESTION tag structures. Bias in QUESTION tag structures is generated by the interaction of the ADDRESSEE operator with the proposition: the speaker expresses that they perceive the addressee as knowing a proposition and as asking them to publicly express this commitment. In ASSERT tag structures, bias is created by asserting the proposition in the anchor. As such, the bias in negative tag structures is not homogenous, and in a QUESTION tag structure it is indirect – it is achieved by the speaker looking to resolve the issue of whether they’re right to perceive the addressee as believing the proposition to be true. This could be the root of ‘deferential’ readings of some tag structures (as in Lakoff 1975), as the speaker appears to be adopting the addressee’s perspective in uttering the declarative clause, but this is an example of discourse inference that we expect to be outside the core, syntactically articulated speech act mechanisms we are presenting here.

If we are right so far, we make predictions for both adult and child English in terms of response patterns to NegQs and negative tags. Our approach predicts that adult NegQs should have a response pattern like, but not identical to, canonical questions and unlike assertions. This is because the speaker does not directly assert belief in the positive proposition; this belief is only implied by the speaker’s rejection of the interrogativity of CP. ASSERT tag structures will differ from NegQs as acceptable responses to ASSERT tag structures should be almost identical to that of a canonical assertion, given that they contain a declarative clause under an ASSERT operator. QUESTION tag structures, finally, are predicted

to provoke response patterns like those of canonical questions, even though they are not neutral questions, because they contain an interrogative clause under a QUESTION operator. We return to this prediction in Section 3.3.2 and Section 3.3.3.

Our approach also predicts that negative tag structures should be acquired earlier and more accurately than NegQs by English-acquiring children. This is because the negation in tag structures is propositional, therefore lower in the syntactic tree, than the metalinguistic negation of NegQs (following logic first propounded by Rizzi 1993/1994 in his Truncation Hypothesis and updated in Friedmann et al. 2021). Metalinguistic negation also scopes over a more complex object (a CP) and requires more complex computation. It is also likely to be harder to acquire because it is realised in the same way phonologically as cliticised propositional negation, so the child must create two categories for the same phonological realisation. We return to this prediction in Section 3.3.1.

### 3.3 Strengths of our account

We turn now to showing how our proposal in Section 3.1 accounts for both the child and adult data. We will show that our proposal is compatible with aspects of Asher & Reese's (2007) discourse-driven account, and many aspects of Holmberg's (2016) syntactic approach, at least as far as QUESTION tag structures are concerned. Section 3.3.1 demonstrates that children are not as target-like in their production of NegQs as in their production of negative tags, with respect to how clitic negation is realised and how they encode bias outside of tag structures. Section 3.3.2 shows that negative tag structures differ from NegQs in terms of their response patterns, and that differences obtain between the two types of negative tag structure, further supporting our claim that neither is derived from NegQs. Section 3.3.3 demonstrates how these response patterns fall out from the structures of the different constructions, using Farkas's (2022) update of Farkas & Bruce's (2010) Table model.

#### 3.3.1 Child "high" negation structures – are they target-like?

We have already seen in Section 2 that negative tag structures are used early and with adult-like syntax. Section 2.1 showed that NegQs are produced later, but we will now show that they display more evidence of non-target-like syntax.

In 306 negative tag structures up to and excluding age 3, there are only 8 errors concerning using the correct auxiliary and two where a full DP subject is used (we do not report here on tense and agreement errors, as we consider these orthogonal). However, in 32 NegQs up to and excluding age 3, 10 of them contain

errors concerning the auxiliary (again, excluding errors of tense and agreement), which hosts negation. In fact, they are all errors of auxiliary doubling like in (32):

- (32) Do they don't eat people up? Nina (Suppes), 2;9

Some of these examples are also plausibly different from NegQs as the bias appears to be towards the negative proposition; an adult-like paraphrase of (32) might be *Do they not eat people up?* In this case, we have even fewer examples of target-like NegQs in child speech despite clear evidence that they are able to conceive of, and try to express, biased meanings in questions with bias towards a positive proposition. For more on auxiliary doubling errors, see Woods & Roeper (2020), who connect this type of error directly to early attempts by children to express biased meanings, where the child is biased towards the negative proposition.

Given the above, our proposal already accounts for the child data more effectively than approaches in which the tag part of a negative tag structure is an elided NegQ, however that is construed.

### 3.3.2 Response patterns

It has been established since Sadock (1971, 1974) that both negative tag structures and NegQs show evidence of questionhood (e.g. using the *Tell me...* test) and assertionhood (e.g. the *After all...* test; see also Asher & Reese 2007). However, as Asher & Reese's (2007) work suggests, different types of negative tag structures, and NegQs, invite slightly different response patterns. Our proposal also predicts different response patterns and some work on this by Holmberg (2016) already exists, so we devote this section to response patterns.

Let's lay out the data. We take our three structures of interest and compare them with canonical assertions and canonical polar questions, as well as a modalised assertion, given that some proposals for tag questions postulate a modal operator in the anchor (e.g. Bill & Koev 2025 [this volume]). We will use the basic proposition *Bilal is coming*. We also take the following possible responses: polarity particles with matching elided propositions (*Yes he is; no he isn't*) to model polarity-based answers, polarity particles with non-matching elided propositions to model truth-based answers (*Yes he isn't*)<sup>19</sup>, “agreement indicators” *right* and *so he is* (as dubbed and investigated by Holmberg 2016) and silent acceptance, represented by [silence]. Note that we have used Holmberg's (2016) judgments,

<sup>19</sup>See Holmberg (2016: Chapter 4.1), Jones (1999), and references therein for more on truth-based or polarity-based answering systems.

which we agree with, except in the modalised assertion condition (which he does not discuss).

The data are as follows:

(33) ASSERT tag

- A: Bilal is coming, isn't he. ↘  
 B: Yes (he is); #Yes (he isn't); No (he isn't); Right; So he is; [silence].

(34) QUESTION tag

- A: Bilal is coming, isn't he? ↗  
 B: Yes (he is); #Yes (he isn't); No (he isn't); Right; So he is; #[silence].

(35) NegQ

- A: Isn't Bilal coming?  
 B: Yes (he is); %<sup>20</sup> Yes (he isn't); No (he isn't), ??Right; #So he is; #[silence].

(36) Assertion

- A: Bilal is coming.  
 B: Yes (he is); #Yes (he isn't); No (he isn't); Right; So he is; [silence].

(37) Modal assertion

- A: Bilal might be coming.  
 B: Yes #(he is); #Yes (he isn't)<sup>21</sup>; No (he isn't); Right; #So he is; [silence].

(38) Polar question

- A: Is Bilal coming?  
 B: Yes (he is); #Yes (he isn't); No (he isn't); #Right; #So he is; #[silence].

This paradigm demonstrates that an ASSERT tag structure patterns just like an assertion in terms of licit responses to it. QUESTION tag structures differ in that they require a response – silence is not appropriate – but they differ from canonical polar questions by allowing the agreement indicators (see also Holmberg 2016: 183). NegQs pattern most closely with canonical polar questions, with some gradability or dialectal variation with respect to truth-based responses and confirmational *right*.

Why should response patterns differ between negative tag structures and NegQs when existing assertiveness and questionhood tests suggest that they are

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<sup>20</sup>Based on author intuitions, this is fine in UK English but not in US English.

<sup>21</sup>While *He isn't* is fine as a response to a modalised assertion, it is the use of *yes* here that leads to infelicity.

the same? We think that existing tests are not granular enough when it comes to understanding the nuances around bias and interlocutor perspective in these two structures: in short, speaker belief that the proposition may be true is not the end of the story.

Recall that we spelled out the difference between speaker belief and speaker commitment in our motivation of an extended left periphery in Section 3.1. We have devised a test to demonstrate this distinction with respect to tag structures and NegQs which we call the *Don't you agree...?* test. Using the English verb *agree*, it is possible either to agree with an asserted proposition or with the person who expresses that proposition. These are expressed using different pronouns to point to these different referents. We use agreement with the asserted proposition (*that*) to reflect matching commitments to the proposition in the shared discourse context and agreement with the individual (*me*) to reflect matching perspectives. What we find is that it is possible to ask whether an addressee agrees with the proposition, but not the perspective (i.e. the speaker), following a NegQ (39) or a QUESTION tag structure (40), but with either following an ASSERT tag structure (41):

- (39) Isn't Jane a good choice? [silence from addressee] Don't you agree with that/#me?
- (40) Jane's a good choice, isn't she?↗ [silence from addressee] Don't you agree with that/#me?
- (41) Jane's a good choice, isn't she.↘ [silence from addressee] Don't you agree with that/me?

Moreover, *Don't you agree...* is completely incompatible with canonical polar questions and entirely natural with canonical assertions.

- (42) Is Jane a good choice? #Don't you agree with that/me?
- (43) Jane is a good choice. Don't you agree with that/me?

In these examples the pie is cut slightly differently again, but along lines predicted by our analysis: our structures of interest with QUESTION operators pattern together, and the structures with ASSERT operators pattern differently. In short, NegQs and QUESTION tag structures do not offer up a proposition asserted by the speaker to agree with, despite having some assertion-like properties (see Sadock 1971, 1974, Asher & Reese 2007, i.a.).

This suggests that ASSERT tag structures differ from NegQs in that they express speaker commitment in addition to foregrounding some proposition. This chimes

with recent work by Ceong (2019), Krifka (2014, 2023), Wiltschko & Heim (2016, 2021), Woods (2021) and Woods & Vicente (2021) that commitment is a part of grammar over and above (doxastic) belief. It also highlights that longstanding diagnostics for assertion can obscure nuanced differences between different types of non-canonical speech act.

One last new diagnostic. We borrow and extend a test that Asher & Reese (2007: 10) apply to NegQs to our three structures of interest – the *prior beliefs* test. Note that boldface is used to indicate stress on the auxiliary verbs in T and we include arrows here to indicate intonation contours.

- (44) I have no prior beliefs on the matter. I just want to know that Lucy **is** coming, isn't she?↗
- (45) I have no prior beliefs on the matter. I just want to know #**isn't** Lucy coming?
- (46) I have no prior beliefs on the matter. I just want to know that #Lucy **is** coming, isn't she.↘

Another distinction emerges – where a **QUESTION** tag structure is compatible with the speaker claiming no prior beliefs, NegQs and **ASSERT** tag structures are not. (44) in particular supports our claims about **QUESTION** tag structures that the "assertion flavour" of them is derived and not directly attributable to the speaker.

We represent the different profiles of our three structures of interest in Table 3, where we mark whether the different types of "high" negation structure pattern with canonical assertions, canonical questions, or neither, in our three diagnostics. While **ASSERT** tag structures are predominantly assertion-like, and **QUESTION** tag structures/NegQs are predominantly question-like, the latter two diverge in different ways and all structures also diverge from both questions and assertions too. All of these nuances are captured by our proposal.

Table 3: Negative tag and NegQ profiles

|                           | <b>ASSERT</b> tag | <b>QUESTION</b> tag | NegQ      |
|---------------------------|-------------------|---------------------|-----------|
| Response patterns         | Assertions        | Neither             | Questions |
| <i>Don't you agree...</i> | Assertions        | Questions           | Questions |
| Prior beliefs             | Neither           | Questions           | Neither   |

### 3.3.3 Modelling response patterns

We will now use a model grounded in representing discourse moves to formalise how the propositional and extrapropositional information expressed in negative tag structures and NegQs is communicated by the constituent parts of their structures, resulting in the response patterns mapped in the previous section. To do this, we utilise Farkas & Bruce's (2010) Table model, updated by Farkas (2022). The model maps how propositions, as part of utterances, move from discourse commitment spaces relativised to interlocutors, into a negotiated and negotiable conversational space known as the Table, and from there into public, shared commitments (cf. previous work by Stalnaker 1978 through Gunlogson 2008). Along the way, choices made by the speaker about *how* to present these propositions, syntactically and prosodically, communicate something about how they expect the addressee to respond (relative to that proposition). The model can also be used to capture how extra-propositional material affects the movement of the proposition through these spaces.

The full discourse structure outlined above is represented in Table 4.

Table 4: Basic discourse structure (Farkas 2022: 305)

| Discourse commitments of speaker (DC <sub>Sp</sub> ) | Table | Discourse commitments of addressee (DC <sub>Ad</sub> ) |
|------------------------------------------------------|-------|--------------------------------------------------------|
| Projected Set (ps)                                   |       |                                                        |

When an utterance is pronounced, the propositional content is placed onto the Table. Broader informational content, which includes, for example, the speaker's commitment with respect to the proposition, is placed into the speaker's discourse commitments. The projected set is then generated; this consists of adding to the addressee's discourse commitments some proposition, such that that proposition would constitute a canonical response to the utterance if the addressee were to commit to it. If there is more than one proposition for which this is the case, then the projected set is not a singleton set.

Table 5 demonstrates this process when an assertive utterance containing a declarative clause is uttered. The sincere utterer of such an utterance commits<sup>22</sup>

<sup>22</sup>Explicitly spelling *commitment* out in the speaker's discourse commitments is technically redundant, as the fact of the speaker's placing *p* on the Table indicates their public commitment to *p*. However, we want to be fully explicit for clarity and to highlight the contrasting perspectives that the speaker manipulates.

to a single true proposition  $p$ . They place  $p$  on the Table, and project a single future discourse move, namely that the addressee will commit to  $p$  too. If the addressee is cooperative, they will demonstrate commitment to  $p$ , though this may be implicit, as acceptance of (via commitment to)  $p$  can be considered a default response, as it's the only response indicated by the speaker's utterance choices. The presence of  $p$  on the Table and in the addressee public discourse commitments leads to redundancy, so  $p$  can then be added to the interlocutors' shared discourse commitments and be considered a resolved issue.

Table 5: Conversational state following the utterances of a declarative with propositional content  $p$  (Farkas 2022: 308)

| $DC_{Sp}$                           | <b>Table</b> | $DC_{Ad}$ |
|-------------------------------------|--------------|-----------|
| Sp commits to $p$                   | $\{p\}$      |           |
| <b>ps:</b> $\{DC_{Ad} \cup \{p\}\}$ |              |           |

Polar interrogative utterances differ in that the speaker commits not to propositions, but to worlds in which holds a set consisting of two propositions,  $p$  or not  $p$  – in other words, all possible worlds that are compatible with the current discourse context. We can rephrase this in commitment terms as a commitment by the speaker that the question of  $p$  or not  $p$  is open and unresolved in the current discourse context, and this is added to their public discourse commitments. The set  $\{p, \neg p\}$  is added to the Table to be resolved. The projected set consists of the addressee committing to either  $p$  (e.g. by responding *yes*) or not  $p$  (by responding *no*). This is modelled in Table 6. Note that a response such as *I don't know* is not canonical because in a canonical information-seeking question, the utterer of the question should believe that the addressee knows and can provide the true answer (recall mention of addressee competence in our discussion of QUESTION tag structures in Section 3.1.3.1). Moreover, an explicit response is required in cases like Table 6 because there is no single projected set and hence no default addressee response.

Table 6: Conversational state following the utterance of a polar interrogative querying  $p$  (adapted from Farkas 2022: 312)

| $DC_{Sp}$                                                    | <b>Table</b>    | $DC_{Ad}$ |
|--------------------------------------------------------------|-----------------|-----------|
| Sp commits to<br>wanting to<br>resolve $\{p, \neg p\}$       | $\{p, \neg p\}$ |           |
| <b>ps:</b> $\{DC_{Ad} \cup \{p\}, DC_{Ad} \cup \{\neg p\}\}$ |                 |           |

Let's now see how our three structures of interest play out in the Table model. We argued in Section 3.1.2 and Section 3.1.3.1 that the **ASSERT** tag structure is fundamentally an assertion of  $p$  whose structure conventionally implicates the speaker's belief in a second not-at-issue proposition  $q$ , namely that the addressee has not yet committed to  $p$  publicly.<sup>23</sup> The speaker commitments, both at-issue and not-at-issue, are expressed in the speaker's discourse commitments ( $DC_{Sp}$ ) while the at-issue propositional material is expressed on the Table. Given that the **ASSERT** tag structure is fundamentally an assertion, and because the speaker is committing explicitly to  $p$  (this is indicated by the intonation contour), the projected set of discourse moves is a singleton set in which the addressee also publicly commits to  $p$ , just like in the canonical assertion in Table 5. This is consistent with the overarching discourse aim of clearing the Table because if the addressee commits to  $p$ , both sets of propositions on the Table are resolved; it is also compatible with the individual interlocutors' public discourse commitments. This is schematised in Table 7.

Table 7: Conversational state an utterance of **ASSERT** tag structure *Lucy is coming, isn't she.*

| $DC_{Sp}$                                                                                      | <b>Table</b>                                                         | $DC_{Ad}$ |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------|
| Sp commits to $p$ ;<br>Sp commits to $q$<br>(= Ad hasn't yet<br>publicly<br>committed to $p$ ) | <Lucy is coming> = $\{p\}$ ; <Isn't she<br>coming> = $\{p, \neg p\}$ |           |
| $ps: \{DC_{Ad} \cup \{p\}\}$                                                                   |                                                                      |           |

Note that to disconfirm  $p$  in Table 7 is considered a non-canonical move, just as it is following a canonical assertion. This doesn't mean that disconfirming  $p$  is impossible, but rather that it will take some negotiation between speaker and addressee until they agree, and  $p$  is resolved into their shared commitments, or until they agree to disagree.

In contrast, in a **QUESTION** tag structure, the speaker commits to wanting to resolve the question of  $\{p, \neg p\}$ . They also express a not-at-issue proposition  $q$

<sup>23</sup>Incidentally **ASSERT** tag structures and their proposed meaning are a good test case for pure intensionalist vs. commitment-based models of discourse exchanges (see Geurts 2019 for more on the matter). It is very complex to express the addressee's lack of public commitment to  $p$  in terms of knowing or believing, because lack of public commitment need not be due to lack of knowledge/belief. **ASSERT** tag structures are compatible both with the addressee knowing or not knowing  $p$ , but crucially are only licensed when the addressee has not already *publicly committed* to  $p$ , as explained in Section 3.1.3.1.

about the beliefs of the addressee, namely that the addressee believes  $p$ . The Table is exactly the same as in the **ASSERT** tag structure in Table 7 but the projected set reflects the speaker's at-issue public commitments as indicated by the intonation contour – the speaker expects the addressee to commit to  $p$  or not  $p$  and either would be considered a canonical response. Note that because the projected set is not a singleton set, silence cannot be used as default method of committing to  $p$ . This discourse impact of uttering a **QUESTION** tag structure is schematized in Table 8.

Table 8: Conversational state an utterance of **QUESTION** tag structure  
*Lucy is coming, isn't she?*

| $DC_{Sp}$                                                                                             | <b>Table</b>                                                         | $DC_{Ad}$ |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------|
| Sp commits to<br>wanting to<br>resolve $\{p, \neg p\}$ ;<br>Sp commits to $q$<br>(= Ad believes $p$ ) | <Lucy is coming> = $\{p\}$ ; <Isn't she<br>coming> = $\{p, \neg p\}$ |           |
| <b>ps:</b> $\{DC_{Ad} \cup \{p\}, DC_{Ad} \cup \{\neg p\}\}$                                          |                                                                      |           |

A brief note on not-at-issueness: the propositions  $q$  in Table 7 and Table 8 are not-at-issue because they cannot be directly challenged, though they can be demonstrated to be wrong:

- (47) Intended reading: challenging A's expression that B lacks public commitment
  - a. A. Lucy is coming, isn't she.
  - b. B. No, #I already said that.
  - c. B'. Yeah, I already said that.
- (48) Intended reading: challenging A's expression that B believes  $p$ 
  - a. A. Lucy is coming, isn't she?
  - b. B. (#No,) I don't know if she's coming.
  - c. B'. Sorry, I don't know if she's coming.

Moreover, while the speaker in Table 8 might have to repeal their commitment to  $q$  in the case that the addressee commits to  $\neg p$ , this is still compatible with projecting a set in which a commitment to  $\neg p$  is a canonical discourse move for the addressee because (a) it is compatible with the Table and (b) it is compatible with

the speaker's *own* commitment to  $p$  (because there isn't one). For comparison, in (49), A presents Laura Muir's nationality as a not-at-issue proposition in an appositive relative clause (see Potts 2005). In response, B can respond canonically to the question and separately point out A's mistake (as in (49b) and (49c)), but cannot directly challenge A's mistake using a polarity particle see (49d) in the way that they might if Laura Muir's nationality were presented as at-issue content (see (50)).

- (49) *Laura Muir is English* = not-at-issue

- a. A. Did you hear that Laura Muir, that amazing English runner, won silver in Tokyo?
- b. B. I did but, er, Laura Muir is Scottish.
- c. B'. No, but, er, Laura Muir is Scottish.
- d. B''. #No, Laura Muir is Scottish.

- (50) *Laura Muir is English* = at-issue

- A. Laura Muir is English.
- B. No, she's Scottish.

Finally, we must account for the fact that one can respond using agreement indicators like *right* and *so she is* to a QUESTION tag structure. We assume that these indicators can target the singleton proposition  $p$  on the table, which simultaneously "counts" as committing to the member  $p$  of the non-singleton set  $\{p, \neg p\}$ . Recall that the singleton proposition  $p$  is not on the Table as a single item in canonical polar questions, hence the difference in response patterns.

In (brief) summary, QUESTION tag structures are like ASSERT tag structures in terms of the propositions that are at issue (i.e. on the Table), but they differ in terms of projected sets. They are similar in that speakers of both make at-issue commitments with respect to  $p$  and make not-at-issue commitments about the addressee's stance on  $p$ , though the exact nature of these commitments differs. This accounts for the differences we find in response patterns but the similarities in acquisition: they contain identical amounts and types of at-issue material, identical syntactic structures, and equally complex speaker commitments.

Now we turn to NegQs. NegQs place one set of at-issue propositions onto the Table. Like with the negative tag structures above, this non-singleton set contains  $p$  and not  $p$ . As the negation in a NegQ is analysed as metalinguistic, the Table for a NegQ looks just like the Table for a canonical polar question and the speaker commits to wanting to resolve  $\{p, \neg p\}$ . The projected set is then predicted

to be identical to that of a canonical polar question too. However, the speaker commitments expressed by a NegQ are not equivalent to those in neutral polar questions. We argued above that metalinguistic negation essentially negates the plausibility of the alternative to  $p$  (see also Holmberg 2016: 188). If we model this as in Table 9, then the projected set must be a singleton set  $DC_{Ad} \cup \{p\}$ , because  $DC_{Ad} \cup \{\neg p\}$  would be incompatible with the speaker's public discourse commitments. Ultimately, then, the model fails, because there is no projected set that follows from both the speaker's public discourse commitments.

Table 9: A failed model for NegQs if metalinguistic negation = propositional (logical) negation

| $DC_{Sp}$                                                                     | Table                              | $DC_{Ad}$ |
|-------------------------------------------------------------------------------|------------------------------------|-----------|
| Sp commits to<br>wanting to<br>resolve<br>$\{p, \neg p\}; \neg\{\neg p\} = p$ | <Is Lucy coming> = $\{p, \neg p\}$ |           |

**ps:** ?

The problem is the representation of the negation in Table 9. Recall that we argued in the tradition of Horn (1985, 1989) that metalinguistic negation is not formally equivalent to propositional (logical) negation. If it were, the wrong predictions (or no predictions) about response patterns would be made, as they are in Table 9. We see that if the speaker commits to  $\neg\{\neg p\}$ , this reduces to  $p$  and it should not be projected that a canonical move for the addressee is to commit to  $\neg p$ , but we know that it can be.

To avoid the failure of Table 9, we represent metalinguistic negation using all caps (NOT) in Table 10.

Table 10: Conversational state after an utterance of NegQ "Isn't Lucy coming?"

| $DC_{Sp}$                                                                                              | Table                              | $DC_{Ad}$ |
|--------------------------------------------------------------------------------------------------------|------------------------------------|-----------|
| Sp commits to<br>wanting to<br>resolve $\{p, \neg p\}$ ;<br>Sp commits to $q$<br>(= NOT $\{\neg p\}$ ) | <Is Lucy coming> = $\{p, \neg p\}$ |           |

**ps:**  $\{DC_{Ad} \cup \{p\}, DC_{Ad} \cup \{\neg p\}\}$

The entry in the speaker’s discourse commitments in Table 10 means that the speaker commits to there being no plausible alternative to  $p$  given their knowledge and beliefs. This is not logically equivalent to asserting  $p$  because the truth of  $p$  could be left undefined, therefore it is only implied that the speaker must, therefore, believe  $p$  to be true. In Horn-style terms, the speaker is registering their objections to accepting  $\neg p$  in the face of some possible evidence for it. This follows traditional accounts of metalinguistic negation that claim that “rectification or correction is a necessary part of the interpretation of [...] metalinguistic negation” (Kay 2004: 689, discussing Horn 1985). However, because NegQs fold metalinguistic negation into a question structure, the burden of rectifying or correcting falls on the addressee rather than on the user of metalinguistic negation themselves.

Because the speaker does not formally commit to  $p$ , the inclusion of  $DC_{Ad} \cup \{\neg p\}$  as a canonical response to the NegQ is formally licit and does not logically contradict the speaker’s public commitments.

If we are correct, the analyses above demonstrate more precisely why negative tag structures are acquired before NegQs. Negative tag structures are transparent in that their at-issue content directly follows from their surface structure. NegQs, on the other hand, are not transparent as their at-issue content is “less than” the phonologically expressed material. To put this another way, metalinguistic negation is phonologically expressed in the middle of (indeed, it is cliticised to) propositional, at-issue material, but is not itself propositional or at-issue. It is therefore a complex task for the child to separate out at-issue and not-at-issue expressions that are phonologically tightly bound together.

## 4 Summary

In this chapter we focused on the production of English nuclear negative tag structures and NegQs by very young children and adults, as well as their contribution to discourse.

Our empirical contributions are as follows. We created a dataset containing over 600 utterances of “high” negation structures by 67 English-acquiring children, demonstrating that negative tag structures precede and outnumber NegQs. Qualitatively, the dataset shows that children use negative tag structures accurately both in terms of adult-like syntax and discourse contribution. We also discussed a particular non-target-like NegQ that uses auxiliary doubling, noting that target-like NegQs with positive bias are even more rare than the dataset suggests.

We also demonstrated using adult judgements that negative tag structures in English divide into two types, both of which are also distinct from NegQs, in terms of interpretation and in terms of response pattern. We propose two new diagnostics, the *don't you agree?* test and the *prior beliefs* test that further refine our understanding of speaker commitment and belief in the deployment of negative tag structures and NegQs.

Our empirical findings feed our theoretical claims. Contra much of the existing literature (see Holmberg 2016 and Krifka 2015 for exceptions), we argue that English nuclear negative tag structures are simple speech acts that are complex at the clausal level. They do not consist of an assertion combined with a NegQ – indeed, to speak of complex speech acts creates problems further down the theoretical line in terms of predicting and understanding responses to such acts. Negative tag structures are a declarative clause conjoined with an interrogative clause containing propositional negation, and this whole is interpreted in one of two ways depending on (a) the perspective attributed to each clause (SPEAKER or ADDRESSEE) and (b) the speech act operator that scopes over the whole (ASSERT or QUESTION).

In contrast, English NegQs consist of an interrogative clause scoped over by metalinguistic negation and a QUESTION speech act operator. We demonstrated how clauses, perspectives and speech act operators interact using Farkas's (2022) version of Farkas & Bruce's (2010) Table model. Bias is created in nuclear negative tag questions via the relationship of speech act operator, perspective and proposition in the anchor, whereas in NegQs it arises from the metalinguistic rejection of the interrogativity of the CP – in other words, the speaker expresses that they believe there to be no plausible alternative to the main proposition.

A number of areas for future study remain, most pertinently the prosody of tag structures in child speech and in their input. We hope, however, that the breadth of the predictions made by the proposals here, and the empirical evidence that we have been able to offer in this chapter, provide support for the enterprise of trying to understand how children acquire different types of speech acts and will invite energetic debate.

## Abbreviations

|      |                       |        |                          |
|------|-----------------------|--------|--------------------------|
| ACC  | accusative            | Q      | "high" negation question |
| Ad   | addressee             | PerspP | Perspective Phrase       |
| COMP | complementiser        | Pol(P) | Polarity (Phrase)        |
| DC   | discourse commitments | ps     | projected set            |
| DECL | declarative           | SA(P)  | Speech Act (Phrase)      |
| NegQ | interrogative         | Sp     | speaker                  |

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## Guide to CHILDES corpora references and DOIs, in order of first mention

Manchester corpus: Theakston et al. (2001). DOI: <https://doi.org/10.21415/T54G6D>  
Valian corpus: Valian (1991). DOI: <https://doi.org/10.21415/T5ZS3T>  
MacWhinney corpus: MacWhinney (1991). DOI: <https://doi.org/10.21415/T5JP4F>  
Gleason corpus: Masur & Gleason (1980). DOI: <https://doi.org/10.21415/T5101R>  
Belfast corpus: Henry (1995). DOI: <https://doi.org/10.21415/T5VG79>  
Brown corpus: Brown (1973). DOI: <https://doi.org/10.21415/T5HK5G>  
Kuczaj corpus: Kuczaj (1977). DOI: <https://doi.org/10.21415/T5H30R>  
Higginson corpus: Higginson (1985). DOI: <https://doi.org/10.21415/T5S31M>  
Suppes corpus: Suppes (1974). DOI: <https://doi.org/10.21415/T5WS4K>  
Tardif corpus: DOI: <https://doi.org/10.21415/T5TK58>  
Wells corpus: Wells (1981). DOI: <https://doi.org/10.21415/T5T60K>

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# Chapter 12

## Everything that rises must converge: Toward a unified account of inquisitive and assertive rising declaratives

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In English, matrix declaratives with a final rising intonation typical of polar questions are frequently used as a kind of biased question: they can only be used when there is contextual evidence in favor of the proposition denoted by the declarative. However, not all rising declaratives are used to pose a question about their content – some are used to assert the content of the declarative, while raising a second issue. In this paper, I offer a unified account of rising declaratives that seeks to explain both of these kinds of uses while positing unitary meanings for clause types and intonations. This goal cannot be achieved if we take the illocutionary force of an utterance to be completely determined by clause type and linguistic intonation, as many recent accounts have done. Instead, I propose that clause type and intonation merely constrain what a speaker could intend to do with them; pragmatic inference must play a key role in enabling an audience to uncover the speaker's illocutionary intention. In other words, there can be no hard and fast conventional discourse effects tied to particular clause type + intonation pairings. I demonstrate that the proposed account enables a derivation of assertive force, and comparisons to other recent accounts are made.

### 1 Introduction

The main claim of this paper is that one particular rising intonation, the *polar question rise*, has only one specific meaning across its disparate uses, roughly, the speaker does not commit to a relevant proposition. My account unifies inquisitive



and assertive rising declaratives by deriving their distinct global interpretations from the same inputs – polar question rises and declarative clauses – used in different contexts.<sup>1</sup>

The following classic examples demonstrate that rising declaratives (RDs) can be used to ask biased questions. The questions are biased in the sense that they require contextual evidence in favor of the proposition denoted by the declarative. Throughout this paper, I use ‘↗’ (pronounced “rise”) to represent the utterance final rising intonation typical of polar questions in English. The relevant intonation will be discussed further in Section 2.

- (1) S is in her windowless office. A has just arrived holding a wet umbrella and raincoat.
    - a. S: Hey! It's raining↗
    - b. S: Hey! Is it raining↗
- (based on Gunlogson 2003: 96)

Intuitively, both the RD in (1a) and the polar interrogative in (1b) are felicitous means of asking whether it is raining in the context of (1). Contrast this with (2):

- (2) S is in her windowless office. A has just arrived, and exhibits no evidence whatsoever about the weather outside.
    - a. S: # Hey! It's raining↗
    - b. S: Hey! Is it raining↗
- (based on Gunlogson 2003: 95)

The context of (2) lacks any evidence for rain. Intuitively, the RD in (2a) is infelicitous, while the polar interrogative in (2b) is just fine. In prior work, examples like these establish (3) as a robust generalization about RDs (see e.g. Beun 2000, Gunlogson 2003, 2008, Truckenbrodt 2006, 2009, 2012, Trinh & Crnič 2011, Malamud & Stephenson 2015, Farkas & Roelofsen 2017, Krifka 2017, Westera 2017, 2018, Jeong 2018, Rudin 2018, 2022).

- (3) (Inquisitive) Rising Declaratives are felicitous only if there is contextual evidence in favor of the content of the declarative clause.

What we learn from such RDs is that declaratives are not reserved for assertions. With a particular rising intonation, declaratives can be used to ask a biased question.

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<sup>1</sup>So the title does not refer to *every* rising intonation, just polar question rises. The point is that polar question rises converge on a single meaning, even though the global interpretation of utterances they appear in may vary.

However, biased questions are not the only use for rising declaratives. RDs can also be used to assert. Consider the RDs in (4), (5), and (6), which are used by S to assert their propositional content.<sup>2</sup>

- (4) A: Do you speak Spanish?  
S: I speak Ladino↗  
(Jeong 2018, Farkas & Roelofsen 2017, based on Ward & Hirschberg 1985)
- (5) A: What are you eating?  
S: This is a persimmon↗
- (6) S isn't sure that he is in the right doctor's office. He says to the receptionist:  
S: My name is Mark Liberman↗      (Pierrehumbert 1980: 62, from Mark Liberman p.c.)

Besides being used to assert their content, the RDs in (4), (5), and (6) also seem to raise a second issue. In (4) this is something like *Is Ladino close enough to Spanish for your purposes?*, while in (5) and (6) this is something like *Is that enough information?* or *Have you heard of persimmons/me before?*. Most of the literature on RDs cited above has either ignored assertive RDs, set them aside, or tried to account for them separately from inquisitive RDs.<sup>3</sup> This has usually been justified by the claim that there are two distinct rising contours, one used in inquisitive RDs, the other in assertive RDs. The idea is that each contour makes a distinct meaning contribution resulting in the distinct inquisitive and assertive illocutionary forces observed. In Section 2, I will argue that the evidence for this view is weak, and provide further evidence that speaks against it.

As a result of this empirical evidence, as well as for reasons of theoretical parsimony, I will argue that there is only one relevant rising intonation, ↗, with a single meaning attached to it that can explain its use in both inquisitive and assertive RDs, as well as the fact that it is used in most matrix polar interrogatives (see Hedberg et al. 2017 for corpus evidence that over 90% of American English polar interrogatives rise utterance finally, *pace* Geluykens 1988). Furthermore, I

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<sup>2</sup>Ward & Hirschberg (1985) introduced (4) as an example of the rise-fall-rise contour (L<sup>\*</sup>+H L%), which is distinct from the ↗ contour used in RDs. Nevertheless, ↗ is also felicitous in (4), though probably not preferred. On the other hand, (5), (6), and other examples of assertive RDs below are not felicitous with rise-fall-rise.

<sup>3</sup>I believe that assertive RDs are likely related to 'uptalk' and 'high rising terminals'. If so, then they have also been discussed in the sociolinguistics literature (e.g. McLemore 1991, Fletcher et al. 2005, Ladd 2008, Shokeir 2008: a.o.). I leave a full exploration of this connection to future work.

will adopt a semantics for clause types in which declaratives denote propositions while interrogatives denote sets of propositions (answer sets). But if there is a single meaning for  $\wedge$ , and a single denotation for declaratives, then clearly the combination of these two components alone cannot completely explain the variation in speech act interpretation we see across inquisitive and assertive rising declaratives. In other words, intonation plus clause type does not always determine illocutionary force. This is contrary to the predictions of prior work such as Farkas & Roelofsen (2017), Jeong (2018), and Rudin (2018), which claim that an utterance of a specific clause type with a specific intonation results in exactly one discourse update effect (though the details differ substantially across these accounts).

The solution I will propose is to abandon the view that clause type-intonation pairings are specified with conventional discourse effects, and instead allow pragmatic inference to play a greater role in enabling the audience to uncover the illocutionary force intended by the speaker of an utterance. In other words, in order to simultaneously account for inquisitive and assertive rising declaratives, the contributions to illocutionary force made by clause type and intonation need to be weaker than hypothesized in the recent literature on rising declaratives.

In Section 2, I discuss the intonational facts to motivate a unified account of inquisitive and assertive RDs. Then I lay out the ingredients of the unified account in Section 3. In Section 4, I apply the account to the basic data, as well as to incredulous uses of RDs, and I briefly discuss its potential application to rising imperatives. In Section 5, I show how the account enables a derivation of assertive force. Finally, I briefly compare the account to prior work in Section 6.1, and raise issues for future work in Section 6.2.

## **2 Perspectives on the intonation of RDs**

Much work on rising declaratives has claimed that they come with two distinct intonational (phonological) contours, one for inquisitive RDs and another for assertive RDs, with each contour playing a crucial role in determining the illocutionary force of the RD. If this is correct, it means that the two kinds of RDs are orthogonal and can be given independent analyses. In this section, I will cast doubt on this view, and show that the empirical facts are consistent with at least three other views in which intonation does not neatly distinguish the illocutionary force of RDs. If one of these latter views is correct, it means that the two kinds of RDs are not orthogonal and must be given a unified analysis. I will then develop such an analysis in the remainder of the paper.

The earliest empirical evidence motivating the hypothesized intonational distinction between assertive and inquisitive rising declaratives was based on researcher judgments (Pierrehumbert 1980, Pierrehumbert & Hirschberg 1990, Hirschberg & Ward 1995). The hypothesis is that assertive RDs have a high rising contour, represented by  $H^* H-H\%$ , while the standard polar question contour in polar questions and inquisitive RDs is low rising,  $L^* H-H\%$ .<sup>4</sup> It's clear from the discussions in these references that the relevant perceptual distinction is meant to be in the height of the nuclear pitch accent, with  $L^*$  at the bottom of the speaker's range, while  $H^*$  is in the middle. Truckenbrodt (2012) builds on ideas in Pierrehumbert & Hirschberg (1990), Hirschberg & Ward (1995), and Bartels (1999). He analyzes  $H^*$  as signaling addition of a salient proposition to the common ground, while  $H-$  signals the questioning of a salient proposition ( $L^*$  and  $L-$  are treated as meaningless defaults). Thus  $L^* H-H\%$  questions the proposition uttered, while  $H^* H-H\%$  asserts the proposition uttered while questioning a related salient proposition.<sup>5,6</sup>

There is some reason to doubt this empirical picture in which  $L^* H-H\%$  correlates with inquisitive RDs while  $H^* H-H\%$  correlates with assertive RDs. First, Hedberg et al. (2017) claim that their corpus data shows that both contours are used in matrix polar interrogatives. Since matrix polar interrogatives only have an inquisitive interpretation, the meaning contribution of  $H^* H-H\%$  would need to be canceled somehow. Second, Nilsenovà (2006) uses corpus data for stimuli in a comprehension experiment that shows that  $L^* H-H\%$  and  $H^* H-H\%$ , as well as  $L^* L-H\%$ , all significantly increase inquisitive interpretations of declarative clauses. This shouldn't happen if  $H^* H-H\%$  is the assertive contour for RDs. These results

<sup>4</sup>A brief primer on the Tones and Break Indices system (ToBI; Veilleux et al. 2006): There are high (H) and low (L) tones. ‘T\*’ indicates a pitch accent (a tone on a syllable that is more perceptually salient/stressed), ‘T%’ an intonational boundary (the end of an intonational unit, usually the end of a sentence), and ‘T-’ a phrase tone leading up to the boundary tone. The final pitch accent in a sentence is called the *nuclear pitch accent*, and the intonation from that point on is the *nuclear contour*. The nuclear pitch accent is the most salient intonational stress, even though it usually isn't the greatest pitch maximum/minimum acoustically-speaking.

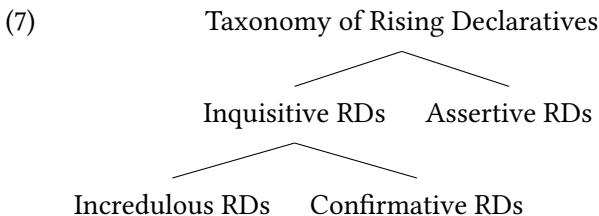
<sup>5</sup>One mystery for uses of  $H^* H-H\%$  in Truckenbrodt's analysis is why the  $H^*$  always targets the content of the utterance while  $H-$  targets some other salient proposition. The account predicts these roles to be reversible, contrary to fact. My analysis in Section 3 pursues the idea that  $\nearrow$  can target salient propositions, but derives which propositions are targeted from pragmatics.

<sup>6</sup>Interestingly, Pierrehumbert (1980: 62–63) does *not* claim that assertive RDs show that an intonational distinction has a strong grammatical link to speech act meaning. On the contrary, despite distinguishing  $H^* H-H\%$  from  $L^* H-H\%$ , she takes them to be family members of a *single* yes/no question intonation, and her point is that assertive RDs like (6) show that this yes/no question intonation does not force the utterance to be interpreted as a yes/no question about the truth of the proposition. She then briefly sketches an analysis of intonational meaning that is actually in the same spirit as the one I pursue in Section 3 through Section 5.

call into question the view that the inquisitive/assertive split in RDs correlates with L\* H-H% and H\* H-H% respectively.

More recently, a view has emerged in which the inquisitive/assertive split is claimed to correlate with the height of the final H% boundary tone: Inquisitive RDs are claimed to rise more steeply to a higher final boundary tone than the contour associated with assertive RDs (Jeong 2018, Rudin 2018, Westera 2018).<sup>7</sup> Jeong (2018: 320ff.) reports on a series of multi-participant comprehension experiments in which the intonation of RDs is manipulated via prosodic resynthesis so that the height of the pitch accent remains constant (neither high nor low, but in the middle of the speaker's range), while the boundary tone is higher in some conditions than others. The results show that the steeper the rise is, the more likely participants are to arrive at an inquisitive interpretation (absent other contextual factors that make inquisitive or assertive interpretations more likely); for the shallowest rise, participants choose between inquisitive and assertive interpretations at around chance levels.<sup>8</sup> Jeong argues that these results can be explained if there are two intonational contours with meanings that determine the illocutionary force of RDs: a steeper one that leads to inquisitive force, and a shallower one that leads to assertive force.

I turn now to showing that there is a competing analysis available (that comes in a few sub-flavors) in which intonation correlates, not with the split between inquisitive and assertive RDs, but instead with a split between incredulous and non-incredulous RDs. To appreciate this, consider the following taxonomy of RDs (cf. the similar taxonomy in Jeong 2018).



<sup>7</sup>Jeong (2018) and Rudin (2018) continue to use the L\* H-H% and H\* H-H% ToBI transcriptions to distinguish these two contours, despite that the key phonetic distinction is in the height of final boundary tones rather than nuclear pitch accents. That's because the phonological distinction between L\* H-H% and H\* H-H% could in principle result in an observed phonetic distinction in the height of the final H% boundary tone. Thus the phonological and interpretational claims of Pierrehumbert & Hirschberg (1990), Hirschberg & Ward (1995) and Truckenbrodt (2012) could still be viable, even if the claim that the perceptual distinction is in the height of the pitch accent may not be. Thanks to Sunwoo Jeong, Jeffrey Lidz, and Michael Wagner for discussion on this point.

<sup>8</sup>Jeong (2018) also shows that relative speaker/addressee knowledgeability strongly impacts interpretation, largely taking precedence over intonation. This factor will play an important role in my analysis as well.

According to (7), uses of inquisitive RDs can be sorted into two kinds: incredulous uses and confirmative uses. (8–10) provide a minimal triple demonstrating the taxonomy in (7). In (8), S utters the RD incredulously because they are shocked by A’s claim that the girl is only nine.

(8) Incredulous

S and A are watching a girl give a very professional performance in a school debate. S thinks that she must be at least 13 years old.

A: I can’t believe she’s only 9.

S: She’s nine↗

In (9), S utters the RD confirmatively; they are not shocked that the girl is nine, they just want to double check that fact.

(9) Confirmative

S and A are buying a birthday card for the daughter of A’s friend. While searching for a card for the correct age, S thinks A told him previously that the girl has just turned nine, but he wants to confirm it.

S: She’s nine↗

In (10), S asserts that their daughter is nine, but doesn’t know whether there is still room for kids in her age group.

(10) Assertive

S wants to enroll his daughter in music lessons with A.

S: My daughter wants to study tuba.

A: Okay, but there are limited places for each age group, and some age groups have already filled up. How old is she?

S: She’s nine↗

I will now lay out three possible analyses of the intonational distinctions to be found among the kinds of RDs in (7), and then show how each analysis can explain the experimental results in Jeong (2018) without positing two phonological intonations that correlate with force in the inquisitive/assertive split.

Starting with the distinction in the height of the final boundary tone postulated by Jeong (2018), Rudin (2018), and Westera (2018), one possible analysis is that it’s a paralinguistic distinction, such that all three sub-kinds of RDs in (7) have the same phonological intonation, best transcribed in ToBI as L\* H-H%, and incredulous RDs have a higher boundary tone due to increased emotional activation, as has been discussed by Gussenhoven (2004), Bänziger & Scherer (2005), Crespo Sendra et al. (2013), Westera (2017), and Goodhue (2021).

Another possible analysis is that there is a phonological distinction between incredulous and non-incredulous RDs. On this view, incredulous RDs would be phonologically specified for a very high H% boundary tone, and would be produced with at least two rises, one earlier in the sentence, and another for the nuclear contour (transcribed in ToBI as L\* H- L\* H-H%). In (8), this would mean a low pitch accent followed by a rise on *she*'s, and then a fall back to a low nuclear pitch accent on *nine* that rises to a very high boundary tone. Intuitively, such a double rise is felicitous in (8), but infelicitous in both (9) and (10). In the production study of Goodhue et al. (2016), incredulity contexts elicited double rises to very high boundary tones in the majority of trials.<sup>9,10</sup>

Finally, the height of the final boundary tone may correlate inversely with the speaker's certainty level about the proposition *p* expressed: the higher the tone, the less certain. The speaker of a confirmative RD tends to think *p* is likely (the basis for the choice to confirm *p* as opposed to some other proposition), which results in a lower H% boundary tone. The speaker of an incredulous RD takes *p* to be unlikely (hence the incredulity), resulting in a higher H% tone (Section 4.2 will nuance this view of the speaker's possible stances toward *p* in incredulous RDs).

Each of these views of possible intonational distinctions among RDs can explain Jeong's (2018: 320ff.) experimental results, which revealed that the steeper the rise is, the more likely participants are to arrive at an inquisitive interpretation, and in the condition with the shallowest rise, participants chose between inquisitive and assertive force at chance levels. Assume the paralinguistic view: Steeper rises imply emotional activation, and emotional activation correlates with incredulity. Furthermore, incredulous RDs are a sub-kind of inquisitive RDs in the taxonomy in (7). Thus, when participants hear a steeper rise, they are more likely to infer an inquisitive interpretation. Shallower rises on the other hand are less emotionally activated, and thus non-incredulous, which is consistent with either an inquisitive (confirmative) interpretation or an assertive interpretation.

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<sup>9</sup>The height of the final boundary tone is in principle separable from the phonological contour.

So a third analytic option would be that there are two linguistic contours – the normal polar question rise and an incredulous double rise – and the incredulous double rise generally has higher final H% boundary tones for paralinguistic reasons, namely because speakers using them are emotionally activated.

<sup>10</sup>The incredulous double rise discussed here is *not* the incredulity contour of Hirschberg & Ward (1992), which they describe as L\*+H L-H%, identical to the rise-fall-rise contour but with a larger pitch excursion (Barnes et al. 2012 argue it is better transcribed as L+H\* L-H%). Crucially, the incredulous double rise and the incredulity contour are perceptually distinct, and likely also have subtly different felicity conditions, which once understood should explain why the incredulity condition of Goodhue et al. (2016) elicited incredulous double rises in over 95% of trials, but only a single incredulity contour.

Now suppose the linguistic incredulous double rise view is correct: The steeper rises were interpreted as corresponding (albeit imperfectly) to a linguistic contour specified with an incredulity meaning. Since incredulous RDs are a sub-kind of inquisitive RDs in (7), this led participants to an inquisitive interpretation. Meanwhile shallower rises were interpreted as corresponding to a normal polar question rise, which is consistent with both confirmative and assertive RD interpretations.

Finally, on the view that steepness has an inverse correlation with certainty, it is clear why steeper rises would lead to more inquisitive interpretations. What remains to be explained is why the shallowest rises were interpreted as either inquisitive or assertive at chance levels. The answer is that a speaker can be relatively certain, even completely certain, about a proposition  $p$  and still ask a question about it, especially if the addressee is known to have more authority over whether  $p$  is true or not in the context. The following example from a squib by Sider (2022) demonstrates this well:

- (11) While S is feeding his daughters breakfast, he hears someone stirring upstairs. S's daughters go up, and S hears talking. On a typical day in S's house, this is when S's wife usually rises. S's daughters come back downstairs.  
S: Mom's up↗

(Sider 2022)

(11) is a confirmative RD. As Sider says, S is relatively certain that the mother is awake. And yet the RD S utters is clearly not an assertion. On my view, it is a question, as evidenced by the fact that the children could provide a *yes* or *no* answer. S is able to ask this question because, even though S has very good evidence that  $p$ , the children are in a better position to know  $p$ : they were upstairs with the mother. Thus we understand why, on this third view in which shallower rises are consistent with high certainty levels, participants interpreted the shallowest rise as either inquisitive or assertive at chance levels in Jeong's experiment.

Here is the upshot of this discussion: The experimental results in Jeong (2018) are compatible with, but do not decide in favor of, the view proposed there in which there are two phonological intonations with meanings that play a direct role in producing inquisitive and assertive illocutionary forces (the illocutionary view). The results are also compatible with three other views in which intonation (whether phonological or paralinguistic) plays an indirect role: two in which intonation distinguishes incredulous RDs from non-incredulous kinds, and a third in which intonational steepness signals uncertainty about the propositional content  $p$ , with certainty about  $p$  being consistent with both inquisitive and assertive

force. What these latter three views share in common is that there is an intonation (again, whether phonological or paralinguistic) that is sufficient but not necessary for producing inquisitive force, and another intonation that is consistent with both inquisitive and assertive force.

Given the complexity of the analytic options, it would be fruitful to investigate the intonations of RDs further via a set of multi-participant production studies in future work. The studies should manipulate the various variables discussed above including contexts to produce the three kinds of RDs in the taxonomy in (7), as well as speaker certainty levels. One challenge will be to find a way to ensure that naïve participants produce the relevant rising intonation in assertive contexts like (10), since a falling declarative would be quite natural there. This could be done by providing the participant with detailed stage directions about their character's thoughts and concerns (e.g. for (10), that S is feeling uncertain, not about their daughter's age, but about whether there will be room in her age group's class).

In the meantime, it is clear that analyses in which a single rising phonological intonation can appear in both inquisitive and assertive RDs are at least as viable as those in which linguistic intonations rigidly correspond to illocutionary force. Moreover, a unified account, besides being more theoretically parsimonious, may also be favored by native speaker judgments. For example, consider again the confirmative inquisitive RD in (9). My judgment, and those of others I have consulted, is that this RD is very natural with a shallow rise, no steeper than the rise in the assertive (10) (as discussed in §3 of Goodhue 2021). Likewise for (11), Sider (2022) argues, and I agree, that a natural rise would be shallow (Sider even labels such examples "slightly rising declaratives").<sup>11</sup> Since these RDs are inquisitive, the illocutionary view incorrectly predicts their rises to be steep.

Jeong (2018: 313, 327) already makes an observation that could serve as a rebuttal to this critique of the illocutionary view, writing "it is likely that the boundary between the two types of intonational configurations that signal assertive vs. inquisitive rising declarative is malleable and heavily dependent on the speaker." The idea is that this variation may swamp the ability to perceive the hypothesized phonological distinction between steep and shallow rises. I agree that such variation is bound to occur, but if Jeong's intonational analysis is correct, it cannot always swamp the distinction, and in fact it must *mostly not* do so. According

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<sup>11</sup>Sider goes so far as to argue that slightly rising intonation on a declarative is reserved for a special kind of epistemic tightening speech act that is neither assertion nor question. The challenge for this view is that the same rise is perfectly felicitous in assertive RDs like (10), hence my pursuit of a unified account for a more general contour ↗ with a more general meaning.

to Jeong's view, speakers must produce a phonetic distinction between inquisitive and assertive RDs on average in well distinguished contexts – if they didn't, then children would never be able to acquire the distinction between the two purported rises. But contrary to the illocutionary view, it seems intuitively clear that well-distinguished contexts that control for factors that might cause paralinguistic phonetic variation (such as emotional activation) make confirmative inquisitive RDs like (9) and (11) *less* likely to be phonetically distinguishable from assertive RDs like (10), not more.<sup>12</sup>

On any of the alternative views I have sketched, such shallow rises on confirmative inquisitive RDs are expected. In the remainder of this paper, I will pursue a unified account of a single linguistic contour ↗ with one conventionally associated meaning, and explain why it can appear in both inquisitive and assertive RDs.

### 3 The account

I assume that declarative clauses denote propositions, functions from worlds to truth values of type  $\langle s, t \rangle$  as in (12a). Following Hamblin (1973), I treat polar interrogative clauses as denoting sets of their two possible answers as in (12b), which are characterized by functions from propositions to truth values of type  $\langle\langle s, t \rangle, t \rangle$ .

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<sup>12</sup>Two reviewers expressed some concern about the legitimacy of a researcher using their own production of the relevant examples as evidence, and therefore about the researcher consulting their own judgments (§3 of Goodhue 2021 is a rough approximation of the argument in the first round manuscript that spurred these reviewer comments). Their comments helped me drastically reshape the argument in this section, and my call for a multi-participant production study above reflects my partial agreement with them. Generally speaking, intonational research will often need to be conducted via multi-participant experimentation because fewer researchers have confident judgments about their tacit intonational knowledge (compared to other linguistic knowledge), and because it can be challenging to tease apart gradient paralinguistic prosody and linguistic intonation. That said, like in other areas of linguistics, researcher judgments (which are really just single-participant auto-experiments) have always played a crucial role in intonational research and we need to preserve that role, in part because trained researcher judgments will often be more reliable than naïve speaker judgments, and in part because insisting on multi-participant experiments for all empirical data when many facts can be easily and reliably established via researcher judgments is not an efficient use of resources (see the more detailed metascientific discussions in Phillips 2009 and Jacobson 2018). While I think the full intonational facts for RDs should be explored in a multi-participant production study, the fact that some confirmative RDs like (9) and (11) are natural with shallow rises of the sort that are also found in assertive RDs like (10) strikes me as uncontroversial based on researcher judgments.

- (12) a. Declarative:  $\llbracket \phi \rrbracket = p$   
 b. Polar interrogative:  $\llbracket ?\phi \rrbracket = \{p, \neg p\}$

I assume a model of context à la Farkas & Bruce (2010), which incorporates notions from Hamblin (1971), Stalnaker (1978), and Roberts (2012), and therefore is akin to other approaches to rising declaratives working in this framework (e.g. Gunlogson 2003, 2008, Malamud & Stephenson 2015, Farkas & Roelofsen 2017, Jeong 2018, Rudin 2018, 2022).

- (13) A context  $c$  is a tuple  $\langle DC, CG, T, QUD \rangle$
- a.  $DC$  is a set of sets of discourse commitments  $DC_a$  for each interlocutor  $a$
  - b.  $CG$  is  $\bigcap DC$ , the common ground, a set of propositions interlocutors are mutually committed to
  - c.  $T$ , the table, is a push-down stack of issues (where issues are sets of propositions)
  - d.  $QUD$  is a salient question in  $T$

Since the questions uttered go onto the table, we might wonder what the role of a separate  $QUD$  is. Its role is seen most clearly in (10) (which will be reviewed below), in which S's RD answers a local question at the top of  $T$ , but in which the relevance of the proposition  $q$  targeted by  $\nearrow$  is determined based on its role in a strategy to resolve some larger question. The larger question in (10) is a prior question, deeper in the push-down stack of  $T$ . Thus the only requirement on  $QUD$  is relatively weak, that it be an issue in  $T$ .

Since rising declaratives can either be questions or assertions, their conventional or mechanistic effect on the context  $c$  needs to be relatively weak. I propose the following, minimal dynamic pragmatics for utterances:

- (14) *Utterance function*
- $\text{UTTERANCE}(\psi, c_n) \rightarrow c_{n+1}$  such that
- a.  $T_{n+1} = T_n + \llbracket \psi \rrbracket^{c_n}, \quad \text{if } \llbracket \psi \rrbracket^{c_n} \in D_{\langle s, t \rangle, t} \quad (\text{for interrogatives})$
  - b.  $T_{n+1} = T_n + \{\llbracket \psi \rrbracket^{c_n}\}, \quad \text{if } \llbracket \psi \rrbracket^{c_n} \in D_{\langle s, t \rangle} \quad (\text{for declaratives})$

(14) has two slightly different effects depending on whether the utterance  $\psi$  denotes a proposition (is a declarative) or denotes a set of propositions (is an interrogative). (14a) says that if  $\psi$  is an interrogative, its content is added directly to the table. (14b) says that if  $\psi$  is a declarative, a singleton set of its content is added to the table. These are subcases of a single utterance function, rather than

two distinct utterance functions depending on clause type, since they have the same basic effect of adding utterance content to the table and nothing more (cf. Farkas & Bruce 2010, Jeong 2018, Rudin 2018, in which different sentence types/ intonations are subject to utterance functions differing in whether content is added to the speaker's discourse commitments). The distinction between (14a) and (14b) is merely for technical reasons, to make sure that everything added to the table is of the same type, a set of propositions, and therefore an issue.<sup>13</sup> While the utterance function in (14) is inspired by prior work in this domain (Farkas & Bruce 2010, Farkas & Roelofsen 2017, Jeong 2018, Rudin 2018, 2022), I'll suggest in Section 5 that my conception of it is somewhat different, closer to a locutionary act than an illocutionary one.

With the above in place, we are ready to introduce the semantics for  $\nearrow$ . Informally, the idea is that  $\nearrow$  conveys that the speaker does not publicly commit to a proposition  $q$  that would help to settle the QUD. As a default,  $q$  gets its propositional content from the declarative or the prejacent of the polar interrogative uttered because that is the easiest relevant proposition to identify. But  $q$  doesn't have to be identified with this overt content  $p$ . I follow Bartels (1999) and Truckenbrodt (2012) in pursuing the idea that intonational meaning can operate on a contextually salient proposition distinct from the propositional content of the utterance. However, unlike Truckenbrodt's (2012) account discussed in Section 2, my approach does not depend on meanings attached to individual tones in an H\* H-H% contour. It is my view that some contexts make the content  $p$  of the clause uttered an unlikely target for the speaker to convey lack of commitment about. In such cases,  $\nearrow$  targets some other proposition, but not just any proposition – the one that is most relevant to the QUD, given  $p$ . Formally, these requirements will be stated as felicity conditions on the use of  $\nearrow$  in (15).<sup>14</sup>

Before the formal semantics can be introduced, a brief discussion of commitments over time is needed.<sup>15</sup> We expect interlocutors to stand by their commitments from the moment they are made onward, at least until they explicitly

<sup>13</sup>An alternative would be to adopt a semantics that gives interrogatives and declaratives the same type (cf. Farkas & Roelofsen 2017, Rudin 2018, 2022). However I prefer to impose this minor complexity on the utterance function so as to maintain uniformity with the view that the intensions of declarative clauses are functions of type  $\langle s, t \rangle$ , rather than to complicate our semantics of declarative clauses in order to smooth the interface with pragmatics.

<sup>14</sup> $\nearrow$  is defined to compose with propositions, which is necessary in order to have a unified semantics for  $\nearrow$  that can coherently state the lack of commitment conveyed in both RDs and polar questions. As a result,  $\nearrow$  must compose below the  $Q$  morpheme in polar interrogatives.

<sup>15</sup>Thanks to an anonymous *Sinn und Bedeutung* reviewer for comments that spurred my thinking on this point.

change them. This goes for an expression of lack of commitment too – we expect the lack of commitment to  $q$  that  $S$  conveys in using  $\nearrow$  to persist in future developments of the conversation, until something changes it. To make this explicit in the formal semantics, we need to refer to future developments of the context  $c$  in a nuanced way. As implied in (14),  $c_n$  is the context of utterance, and  $c_{n+1}$  is the context just after the utterance. Focusing just on the lack of commitment to  $q$  conveyed by  $\nearrow$ , suppose  $n' > n+1$  and  $c_{n'+1}$  is a hypothetical context in which some new evidence has caused  $S$  to reconsider their lack of commitment to  $q$ . Then we can define  $\nearrow$  to require  $S$  to lack commitment to  $q$  in the context  $c_{n+1}$  that immediately follows the utterance context  $c_n$ , up through the context  $c_{n'}$  that is just prior to the one in which new evidence causes  $S$  to change their commitments relative to  $q$ ,  $c_{n'+1}$ .

- (15)  $\llbracket \nearrow \rrbracket^{c_n}(p)$  is felicitous only if  $\exists q \in D_{\langle s,t \rangle} \exists \Gamma \in D_{\langle \langle s,t \rangle, t \rangle}$  such that
- a.  $q \notin DC_{S_{c_{n+1}}}, \dots, DC_{S_{c_{n'}}}$  & *(Lack of commitment)*
  - b.  $q \in \Gamma$  &  $p \in \Gamma$  &  $\cap \Gamma \in QUD_{c_{n+1}}$  &  $\cap(\Gamma - \{q\}) \notin QUD_{c_{n+1}}$   
*(Relevance)*
- If felicitous,  $\llbracket \nearrow \rrbracket^{c_n}(p) = p$

(15a) says that the speaker  $S$  is not committed to some proposition  $q$ . (15b) ensures that  $q$  is relevant by requiring  $q$  to be part of a strategy  $\Gamma$  to address the  $QUD$ . Without (15b),  $\nearrow$  would be predicted to be felicitous on any assertion, since presumably there is always some non-relevant proposition  $q$  that  $S$  lacks commitment to.<sup>16</sup> Finally, note that nothing in (15) blocks  $q$  from being equivalent to the content  $p$  of the clause uttered. As I said above, the most likely content for  $q$  to take on is  $p$ :

- (16) *Default assumption for the identity of  $q$*   
 $q = p$ , unless the context makes this assumption implausible.

I believe the default assumption in (16) holds because  $p$  is the easiest propositional content to identify in the context. This sort of content identification is likely related to the resolution of deictic pronouns. However, if the assumption that  $q = p$  is highly implausible in the context, then the listener will identify  $q$  with some other relevant proposition, as in (10), to be discussed further below.<sup>17</sup>

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<sup>16</sup>Ultimately, this relevance component may be handled via a more general pragmatic condition on relevance (Grice 1989, Roberts 2012, among others), however I have chosen to spell it out here to make its role explicit.

<sup>17</sup>In contrast to  $\nearrow$ , I will treat the falling intonation typical of assertions of declaratives ( $H^* L-L%$ , ‘ $\searrow$ ’) as a meaningless default, discussed in Section 5.

Following Stalnaker (1978), Lewis (1979), Roberts (2012), Farkas & Bruce (2010), and others, I assume conversation is a cooperative effort to increase knowledge of the way the world is. This is pursued by asking questions and asserting answers. Both questions and assertions are used to put their content onto a stack of issues to be addressed, the discourse table. When the interlocutors agree to mutually commit to the truth of a proposition in an issue on the table, that proposition is added to a common ground of publicly mutually believed propositions. The more propositions in the common ground, the fewer ways the world might be and the more the interlocutors know about the world. Thus, adding and removing issues from the table is the means by which the purpose of conversation is achieved.

Given this view of the goal of conversation and how it functions, I assume that there is an ever present pressure in conversations:

(17) *Requirement of support for a proposition  $p$  in  $I$*

When an issue  $I$  is added to the table  $T$ , there is pressure for some interlocutor  $a$  to support a proposition  $p \in I$  by adding  $p$  to their discourse commitments  $DC_a$ .

Once someone fulfills this support requirement, other interlocutors can agree with the commitment made, thus resolving that issue and adding the proposition to the common ground. (17) will help to explain both why questions usually signal the desire for a response, and why assertions commit the speaker to their propositional content.

## 4 Application to data

### 4.1 The basic data

One and the same rising declarative form, *She's nine↗*, can be used to ask a question in (9), and to make an assertion in (10).

(9) Confirmative RD

S and A are buying a birthday card for the daughter of A's friend. While searching for a card for the correct age, S thinks A told him previously that she just turned nine, but he wants to confirm it.

S: She's nine↗

(10) Assertive RD

S wants to enroll his daughter in music lessons with A.

S: My daughter wants to study tuba.

A: Okay, but there are limited places for each age group, and some age groups have already filled up. How old is she?

S: She's nine ↗

I define questions and assertions as follows:<sup>18</sup>

- (18) Definition of *question/inquisitive*:

If S's intention in uttering *U* is to raise an issue without settling that issue themselves, and with the expectation that A will settle that issue in reply by committing to a proposition in that issue, then *U* is a question.

- (19) Definition of *assertion/assertive*:

If S's intention in uttering *U* is to settle an issue by committing to a proposition in that issue, then *U* is an assertion.

The solution I'll pursue to explaining why the RD in (9) is a question while that in (10) is an assertion is to allow pragmatic inference to play a key role in enabling the audience to uncover the speaker's intended speech act in uttering a rising declarative. Beyond this, there are some additional effects to be explained: (9) conveys some bias toward the proposition, while (10) raises a second issue.

The QUD in (9) is *How old is the birthday girl?*. S utters a proposition that would answer it, *that she is nine*, which I'll call *q*. According to (14), this puts *{q}* on the table. However, according to (15) and (16), S's use of ↗ conveys that S is not committing to *q*. Given the support requirement in (17), since S is not committing to *q* and S is talking only to A, S must intend A to address the issue *{q}* that S raised by giving an answer. So given the definition of question in (18), the account in Section 3 explains why the RD in (9) is regarded as a question.

The second meaning effect to explain about inquisitive RDs like (9) is that they convey a bias in favor of the proposition denoted by the declarative. I pursue an explanation somewhat similar to those in both Rudin (2018) and Westera (2018): In choosing to use a RD that denotes only *that she is nine*, S raises an issue that contains only that one proposition, instead of the two propositions *{that she is nine, that she is not nine}* that would have been raised via a polar interrogative, *Is she nine?*. Given the support requirement in (17), S could not have done this if S did not have some reason to think that A was in a position to commit to this

<sup>18</sup>Possible counterexamples to (18) may include rhetorical questions and reflective questions. However it could be argued that rhetorical questions are in fact indirect assertions whose derivation transits through the usual understanding of questions in (18), while reflective questions are questions in which one talks to oneself, which fits with (18) when viewed in that light.

particular proposition. Thus we understand why inquisitive rising declaratives necessarily convey a contextual bias as formulated in (3): the contextual evidence provides the justification for S to restrict A to the single proposition denoted by the declarative.

Note that the speaker does not themselves need to be biased for the content of the RD. The above logic is met even if S is skeptical of that proposition, so long as S thinks A can and will commit to the proposition, as is the case for incredulous RDs (on which, more below). Note also that private speaker bias for the content of the declarative is not enough to meet the bias condition in (3). E.g., if S had private reasons to believe that it is raining in (2), and S knew that A was arriving from outside, but there was no publicly available contextual evidence of rain, then the RD in (2a) would still be infelicitous. It seems that, if S is going to raise an issue that contains only one proposition and ask A to settle it, then there must be contextual evidence available to explain why S would do so. Otherwise, S is required to provide A with more than one alternative.

Now for (10): According to (15),  $\nearrow$  conveys that S is not committing to a relevant proposition  $q$ . However, unlike in (9), in (10) the default assumption that  $q$  is equivalent to the propositional content of the RD, *that she is nine*, is made contextually implausible by the fact that S is the clear epistemic authority with respect to that proposition. So the audience can safely assume that S's use of  $\nearrow$  is not meant to convey lack of commitment to the declarative content. Furthermore, since S has not conveyed a lack of commitment to this content, and given S's position of authority, along with the support requirement in (17) and the prior conversational context, the audience can further infer that S intends to commit to the proposition *that she is nine*, settling A's question *How old is your daughter?* (this derivation of assertive commitment is revisited in greater detail in Section 5). Given the definition of assertion in (19), the account in Section 3 explains why the RD in (10) is regarded as an assertion.

The second meaning effect to explain about assertive RDs like (9) is that they raise a second issue. This is caused by  $\nearrow$ , which still conveys that S is not committing to some proposition  $q$  that is relevant to the QUD. In (10), the goal is to enroll S's daughter in music lessons with A. A has said that whether this can be achieved depends on whether there is room in her age group. S's answer settles what her age group is, but leaves open whether there is still room in that age group. Thus, the proposition  $q$  that S expresses lack of commitment about is *that there is still room in the nine-year-old group*, since if this proposition were combined with the content of the declarative *that she is nine*, they would together form a strategy  $\Gamma$  for resolving the QUD, *Can my daughter study tuba with you?*. By working backward from the proposition asserted and the remaining issues

that need to be resolved to achieve the goal, the audience can infer the proposition targeted for lack of commitment by ↗ in assertive RDs.

## 4.2 Incredulous uses of RDs

On one of the possible analyses I sketched for the intonation of incredulous rising declaratives in Section 2, they have their own unique phonological contour, the incredulous double rise, distinct from ↗. If so, then the analysis given for ↗ in Section 3 won't be required to explain the incredulous RD data. However, on another analysis I sketched, incredulous RDs feature the same linguistic contour ↗ found in other RDs, and the difference is only a paralinguistic one affecting the height of the final boundary tone. In case this view turns out to be correct, the following discussion explores how the account of ↗ in Section 3 can be applied to incredulous RDs.

The speaker's beliefs with respect to the content proposition *p* of inquisitive RDs can vary. In (1) for example, S could have no prior bias either way before being confronted with the evidence of A's wet umbrella. And in the confirmative RDs of (9) and (11), S has a prior *p* bias. Incredulous RDs on the other hand all come with a prior *not-p* speaker bias, though S's beliefs may or may not change in the face of the contextual evidence for *p* that is required in order for the inquisitive RD to be felicitous. In (20), S believes that they should not apologize, so there is a prior *not-p* speaker bias that persists through speaking time.

- (20) S believes that they did nothing wrong:

A: You should apologize.

S: I should apologize↗ (based on Pierrehumbert & Hirschberg 1990: 292)

Unlike (20), the context in (8) does not establish such a strong form of *not-p* speaker bias. There the speaker previously thought that the child was older than nine, and thus had a previous *not-p* bias. But suppose A and S both take A to be in a better position to know the child's age, perhaps because A works at the school and S is merely visiting. In that case S should be inclined to accept A's claim that the child is nine, and so after A's utterance, S should be on the way to believing *p*, even if S may not have completely accepted *p* yet as there is still some chance that A could be wrong.

The prior *not-p* bias in common across incredulous RDs plays a key role in explaining their incredulity. First, incredulous RDs are a subkind of inquisitive RDs, so according to (15) and (16), the ↗ in incredulous RDs conveys S's lack of commitment to the propositional content of the declarative, *p*. Moreover, since

they are inquisitive RDs, they require contextual evidence for  $p$ . It is the contrast between the prior  $\textit{not-}p$  bias and this contextual evidence for  $p$  that makes the speakers of incredulous RDs incredulous.

(21) exhibits one more kind of incredulous RD that features a prior  $\textit{not-}p$  speaker bias like (8) and (20), but that differs from them in that the contextual evidence immediately settles the issue in favor of  $p$ , which creates a challenge for applying the non-commitment analysis of  $\nearrow$  in (15) to it.<sup>19</sup>

- (21) S believes that her friend A is abroad on vacation and not due back for some time. Then, S bumps into A at the local café.  
 S: You're back $\nearrow$

The truth of  $p$  in (21) is so obvious to S that she can't help but be publicly committed to it. Alexander Williams noted to me (p.c.) that her use of the pronoun *you* even shows that she has updated her discourse model with A's presence.

How can S's lack of commitment to  $p$  as required by  $\nearrow$  according to (15) and (16) be satisfied in (21)? One possible response is to say that it can't, similar to the case of assertive RDs like (10), and so lack of commitment is interpreted to be about some other relevant proposition  $q$ . However, this would be counter-intuitive, since it would force us to give distinct analyses for different kinds of incredulous RDs: those like (21) would be assertions while those like (20) would be questions.<sup>20</sup> This is undesirable since (8), (20), and (21) are intuitively all very similar to one another. All three could be paraphrased as "S is incredulous that  $p$ ", so we'd like to have a unified analysis of them.

The solution is to extend the analysis I gave for (8) and (20) to (21) by taking (21) to involve pretense: while S clearly knows that  $p$  is true, she is nevertheless shocked at  $p$  because just prior to new evidence supporting  $p$ , S would have happily committed publicly to  $\textit{not-}p$ . Thus S conveys her surprise via the lack of commitment expressed by  $\nearrow$ . Compare this to exclamations of *I can't believe it!* or *I can't believe you're here!* when the proposition is evidently true (thanks to an anonymous reviewer and to Alexander Williams for this comparison).

### 4.3 A similar illocutionary ambiguity in rising imperatives

Rudin (2018) observes that  $\nearrow$  can appear with imperatives, and that it has a roughly similar effect as with declaratives and interrogatives, conveying a lack

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<sup>19</sup>Thanks to an anonymous reviewer for *Sinn und Bedeutung* for this example.

<sup>20</sup>Treating all incredulous RDs as assertions, on the other hand, appears even less likely to work, since examples like (20) could never be analyzed as S asserting  $p$ .

of commitment that manifests as suggested actions that the addressee could take but is not required to. For example, consider the imperatives used by the boss in (22a), which have standard list intonation on the first two (either a slight rise to a plateau or a rise-fall-rise), culminating in a final fall ( $H^* L-L\%$ , '↖'), and compare them to the rising imperatives used by the coworker in (22b):

- (22) New employee: What should I do now?
- Boss: Take the trash out, wash the sink, (then) take your break↖
  - Coworker: Take the trash out↗ wash the sink↗ take your break↗

The boss is issuing a set of commands to be carried out in a particular order, while the coworker is merely offering a menu of suggested options. Now consider the boss's use of a rising imperative in (23):

- (23) The boss has just told the new employee to replace the trash bags in all of the trash cans, tie up the used ones, and put them by the back door. After doing this, the employee asks:  
New employee: What should I do now?  
Boss: Put them in the dumpster↗

The boss's rising imperative in (23) could be interpreted as a weak suggestion if we assume that the boss is either inappropriately negligent or inappropriately unauthoritative. However, another possible interpretation is that the boss is issuing a normal command, and that ↗ raises another issue, roughly *How do you not know this?*, or more rudely *Are you stupid?* (indeed, the use of ↗ in (23) has the effect of insulting and belittling the employee). An explanation parallel to that given for the inquisitive/assertive RD split above can be given here, namely the boss has the social authority to issue commands while the coworker does not. This explains why the most natural interpretation of the rising imperatives in (22b) is a weakening of the commands themselves, while one natural interpretation of the rising imperative in (23) is that it retains its usual commanding force, and ↗ raises another issue that the audience is left to infer pragmatically.

I leave a more formal exploration of the interaction of my account of ↗ with imperatives to future work. But we can already see the family resemblance to the analysis of declaratives: In both declaratives and imperatives, ↗'s meaning usually targets the content of the clause it appears with, but it doesn't *have to*. Whether the audience is cued to search for some other relevant content for ↗ to interact with depends on whether the context renders its application to the clausal content improbable.

## 5 Deriving assertion

In asserting  $p$ , whether via a falling or rising declarative, the speaker S intends to commit to  $p$ , and so from S's perspective, commitment is achieved from the moment the utterance is complete. Likewise, from the perspective of the addressee A, as soon as A has understood S's utterance as an assertion, A will take S to be committed to  $p$  starting with whatever context immediately follows the utterance. My account so far leaves open how this assertive commitment comes about. Dynamic semantics/pragmatics models this by treating utterances as functions from contexts to contexts, and assertions in particular as updating discourse commitments in the output context  $c_{n+1}$  to reflect the new assertive commitment. The utterance function as I defined it in (14) is at odds with this view, since it only adds clausal content to the table and has no effect on commitments. This was done intentionally to avoid building commitment into a conventional discourse effect for particular clause types or intonations (*pace* Farkas & Bruce 2010, Lauer 2013, Farkas & Roelofsen 2017, Jeong 2018, Rudin 2018, 2022). Instead, my aim was to separate out linguistic meaning from context update, creating space for pragmatics to operate on linguistic meaning and context to produce assertive force. On this view, (14) can be thought of as a special addition to locutionary force. When S utters  $\phi$ , the context is updated with the fact of S having said it. This update includes the syntactic structure and the compositional interpretation computed on it, including the contribution of the prosodic contour, though not yet the full pragmatic consequences of any of these. Going beyond the usual locutionary act, I also take this update to include the addition of the content of  $\phi$  to the table  $T$ , changing that component of our formal model of context. It's from this position in the conversation that the audience can, if need be, draw inferences to recover S's intended illocutionary force.

To see how this works for assertive force, consider S's assertion of a falling declarative in (24):

- (24) A: How old is your daughter?  
 S: She's nine ↴

Recall that '↘' stands for the falling intonation typical of assertions of declaratives, H\* L-L%. One approach to the analysis of assertive commitment in falling declaratives would be to treat ↴ as conveying commitment, an opposite counterpart of ↗. However, I reject this view and instead treat ↴ as a meaningless default. There are a few reasons for this. First, ↴ does not impose a sufficient condition for the presence of assertive commitment, as it is also the

standard contour for constituent questions.<sup>21</sup> Beyond this, ↘ also appears in imperative commands/requests, as noted in Section 4.3, and below I will discuss its presence in falling declarative questions (Bartels 1999, Gunlogson 2008). Given the breadth of ↘'s distribution, it's hard to see how to maintain a unified commitment analysis. ↘ appears to be a default elsewhere intonation. Second, ↘ does not impose a necessary condition on the presence of assertive commitment, as other, non-falling contours can be used in assertive utterances. For example the rise-fall-rise contour (Ward & Hirschberg 1985) and the contradiction contour (Liberman & Sag 1974) are two well-studied rising contours that are used in assertions that commit the speaker to the declarative content. Put otherwise, analyzing falling and rising intonation as manipulating the presence or absence of speaker commitment produces an empirically inadequate dichotomy.<sup>22</sup> To maintain an intonation-encodes-commitment view while accounting for these other contours, a list of contours that speakers use to make commitments would need to be made. But if commitment is the elsewhere case, it suggests that it shouldn't be baked into lexical meanings for contours. Third, the assertive RDs discussed in this paper are another case of a non-falling contour appearing in assertive utterances. But in this case, the contour, ↗, cannot be added to a list of commitment contours since it frequently appears in inquisitive speech acts. For these reasons, I don't want to lean on ↘ to explain assertive commitment. Even if it did play a direct role in producing commitment in all utterances it appears in (which it doesn't), it would still leave assertive commitment unexplained in other utterances that ↘ does not appear in.

Instead I will pursue an approach in which assertive commitment is derived. An anonymous reviewer asked why I don't do this the other way around, arguing that it is more intuitive to have ↘ convey commitment and derive lack of commitment from ↘'s absence (the reviewer is not the only linguist to have made this argument to me). While the preceding paragraph gives several sufficient reasons not to imbue ↘ with commitment, my approach can also be defended on the grounds of the Stalnakerian view of conversation I have assumed. Conversation is about increasing understanding of how the world is, and commitment plays a central role in achieving this goal. So commitment is part of the normal course of conversational events, and is in that sense relatively unmarked. Lack of

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<sup>21</sup>Bartels (1999) and Truckenbrodt (2009) make the argument that constituent questions give rise to an existential presupposition, which ↘ expresses commitment to. Whatever the merits of this argument are, there are other reasons below to question that ↘ conveys commitment.

<sup>22</sup>Cf. Rudin (2018) for an example of an analysis along these lines. Rudin (2022) revises the analysis so that commitment is built into all utterances (within a restricted domain), and ↗ cancels that commitment.

commitment, on the other hand, presents a detour on the road to achieving the conversational goal. Sometimes detours are necessary, but they are best avoided if possible. Thus the choice to convey lack of commitment is relatively less likely, and therefore more marked, and so more likely to be marked with a meaningful contour than commitment is.

So how is assertive commitment to the proposition expressed in (24) *that she is nine*, call it  $p$ , derived? In a nutshell, if S had intended to convey lack of commitment to  $p$ , S should have marked that with  $\nearrow$ ; since S didn't do so, S must intend to commit to  $p$ . In greater detail: According to (14), S adds the singleton set of  $p$  to the table  $T$ . There is nothing in the meaning of the declarative clause itself, or in  $\searrow$ , or in the utterance function that implies S's commitment to  $p$ . Given the broadly Stalnakerian view of conversation adopted here, and the support requirement in (17) in particular, I assume that by adding  $\{p\}$  to  $T$ , S either intends to commit to  $p$  or not (i.e., S intends a lack of commitment to  $p$ ). I also assume a requirement to maximize non-at-issue content (MaxNAI), comparable to Gricean Quantity and Maximize Presupposition, that says that if S intends to convey certain non-at-issue content  $\gamma$ , and there is a linguistic expression  $l$  that conveys  $\gamma$ , then an utterance  $\phi$  that includes  $l$  is preferred to an alternative utterance  $\psi$  that does not include  $l$  but is otherwise identical. MaxNAI can render  $\nearrow$  preferred to  $\searrow$  in appropriate utterances: There is a linguistic form,  $\nearrow$ , that explicitly conveys lack of commitment. So if S intends to convey lack of commitment to  $p$  while uttering declarative  $\phi$ , S should explicitly do so via  $\nearrow$ . In the case of the falling declarative in (24), S has chosen not to use  $\nearrow$ , and so we can infer that S doesn't intend lack of commitment to  $p$ . But since, in uttering  $\phi$ , S either intends commitment to  $p$  or lack of commitment to  $p$ , it follows that S intends to commit to  $p$ .

Here is the same train of reasoning, in schematic form:

1. S utters “She's nine  $\searrow$ ” (24)
- $\neg S$  explicitly conveys  $p \notin DC_S$  (consequence of (1))
2.  $T + \{p\}$  ((1), utterance function in (14))
3.  $S \text{ intends } p \in DC_S \vee S \text{ intends } p \notin DC_S$  ((2), Stalnakerian pragmatics/(17))
4. S' utters “She's nine  $\nearrow$ ” (NAI-stronger alternative to (1))
- S' explicitly conveys  $p \notin DC_S$  (consequence of (4))
5.  $S \text{ intends } p \notin DC_S \rightarrow S \text{ explicitly conveys } p \notin DC_S$  ((1), (4), MaxNAI)

- |                                            |                                      |
|--------------------------------------------|--------------------------------------|
| 6. $\neg S \text{ intends } p \notin DC_S$ | (modus tollens on (1) & (5))         |
| 7. $S \text{ intends } p \in DC_S$         | (disjunctive syllogism on (3) & (6)) |

This is how assertive commitment can be derived for falling declaratives based on the proposed meaning of  $\nearrow$  in (15), combined with a broadly Stalnakerian view of conversation, including the support requirement in (17), as well as Gricean pragmatics.

Given that assertive commitment is essentially an implicature on this view, it's reasonable to wonder if it can be canceled. The answer may be yes, and the evidence comes from falling declarative questions:

- (25) A and S are colloquium committee organizers. A is in charge of today's colloquium, so both A and S know that A has more information about what is going on with it than S.  
A: We have a problem: We need someone to go pick the invited speaker up from the airport, but Kate is on the other side of town.  
a. S: And James isn't available $\searrow$   
b. S: And James isn't available $\nearrow$

From A's claim that they have a problem, S is able to infer that the people who would usually be asked to pick the speaker up from the airport are unavailable. But A only mentioned Kate, so S asks about the other usual person James. The felicity of the falling version in (25a) shows that falling declaratives are not always assertions, which suggests a cancellation of the derivation sketched above (cf. Bartels 1999: 243 and Gunlogson 2008 for more discussion of falling declarative questions).

However, the felicity of the rising version in (25b) raises a question for the account I gave above: Why doesn't MaxNAI make the use of  $\nearrow$  necessary for an inquisitive interpretation? Note that there is an intuitive difference between (25a) and (25b): In (25a), S seems to be pretty confident about the conclusion they have drawn that James isn't available based on A's claim that they have a problem; but given A's epistemic authority, S wants A to confirm this conclusion, and so S's utterance is still a question looking for a *yes* or *no* response. In (25b), on the other hand, S seems a little less confident that this inference about James is true. So the choice to use  $\searrow$  instead of  $\nearrow$  in (25a) still has an interpretational effect, even if it doesn't lead to full assertive commitment. The reason (24) leads to full assertion while (25a) does not is that A is the clear epistemic authority

in (25); A's authority disrupts the derivation of assertion (25).<sup>23</sup> In Gunlogson's (2008) terms, S is making a dependent commitment in (25a). While these remarks remain preliminary, the existence of falling declarative questions, distinct from both falling declarative assertions and rising declaratives, further suggests that it is correct to derive assertion pragmatically instead of baking it into the meaning of the declarative+↖ pairing.

## 6 Conclusion

The advantage of the account I have proposed is its ability to explain how we arrive at distinct illocutionary forces when interpreting one and the same linguistic form. I have posited unitary meanings for linguistic forms (declaratives denote  $p$ , polar interrogatives denote  $\{p, \neg p\}$ , ↗ conveys lack of commitment to a relevant proposition  $q$ ), as well as a single utterance function that adds utterance content to the table. Speakers can employ the combination of declarative and ↗ to assert or to question, thanks primarily to the ability of ↗ to apply directly to the declarative content or not. I further observed that pragmatic pressure to grow the common ground in turn leads to pragmatic pressure to raise and resolve issues via interlocutor support for a proposition in the issue. This combined with the meanings of the linguistic forms enables speakers to implicate, and addressees to derive, the distinct discourse effects of inquisitive and assertive RDs such as *She's nine*↗ in (9) and (10), as well as falling declaratives as in (24). Illocutionary force on this view resides purely in the pragmatics, with the audience's ability to recover the speaker's intended force depending only in part on input from the linguistic system.

### 6.1 Comparison to prior accounts

Farkas & Roelofsen (2017), Jeong (2018), and Rudin (2018, 2022) produce distinct accounts that nevertheless arrive at the same conclusion that clause type + intonation determines illocutionary force as a matter of convention. Farkas & Roelofsen (2017) argue that ↗ is a semantic operator that forms polar interrogatives.

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<sup>23</sup>Relative authority then seems to play a central role in the force interpretation of utterances, especially if the intonational form of the utterance would otherwise usually be used to convey the opposite force: Assertive rising declaratives are identified in cases where S is the authority on  $p$ , while falling declarative questions are identified in cases where A is the authority on  $p$ . Cf. a similar observation in Jeong (2018), and see Mosegaard Hansen (2001) for a related observation about the use of French polar interrogatives with declarative word order from a conversation analytic perspective.

Rudin (2018, 2022) argues that intonation manipulates the utterance function, with ↗ calling off commitment to declarative content. The result is that each of these accounts are in their own way too rigid to handle assertive RDs like (10), and are forced to set them aside. Jeong (2018) meanwhile proposes that there are two phonological contours – a steep one corresponding to inquisitive RDs, and a shallow one corresponding to assertive RDs (even if the distinction may often be masked by phonetic variation). I argued against these intonational claims in Section 2, in particular arguing that shallow rises appear quite naturally in inquisitive RDs. Furthermore, Jeong's account hypothesizes four distinct sentence types with four overlapping but distinct conventional discourse effects: falling declaratives, polar interrogatives, steep RDs, and shallow RDs. The theoretical advantage of my account is that these overlapping but distinct discourse update effects emerge from a unitary semantics for clause types and ↗, combined with pragmatics.

Westera also offers a unified account of inquisitive and assertive RDs (Westera 2013, 2017, 2018): On this view, ↗ is claimed to convey that S is violating a Gricean maxim. A general challenge for this view is that it incorrectly predicts ↗ to be felicitous for run-of-the-mill quantity implicatures (e.g. *some* implicates *not all*), since quantity implicatures involve a violation of the maxim of quantity. But this analysis also faces a specific challenge from one of the key phenomena it is meant to explain, assertive rising declaratives: In an example like (10), S is respecting all maxims, and so ↗ should be infelicitous contrary to fact. First, S's utterance is relevant and informative enough relative to the local question *How old is your daughter?*. Second, an anonymous reviewer for *Sinn und Bedeutung* suggests that Westera would say that S's RD violates relevance relative to the larger QUD, *Can my daughter study tuba with you?*. While an account of relevance could be stated so that it predicts S's utterance to be irrelevant to the larger QUD, such an account would be undesirable. After all, S's utterance is clearly a relevant step in a strategy to resolve the larger QUD, indeed the most helpful step S can take at that juncture, so it would be odd to claim that ↗ is felicitous in (10) because S's utterance is *not* relevant to the larger QUD. For a useful comparison, consider a genuine relevance violation example like (4) (discussed in Westera 2013).

- (4) A: Do you speak Spanish?

S: I speak Ladino↗

(Jeong 2018, Farkas & Roelofsen 2017, based on Ward & Hirschberg 1985)

In (4), S doubly violates relevance, first for A's local question by not directly answering it, and again for the larger *QUD* because S is unaware of what it is and

so is uncertain about the relevance of the present utterance to it. This obviously contrasts with (10), in which the relevance of S's utterance to both the local question and the larger QUD is quite clear. The account I have proposed has no issue here, since ↗ conveys that S lacks commitment to a relevant proposition, *that Ladino is good enough for your purposes (whatever they might be)*.

## 6.2 Looking ahead/other issues for future work

Future work is needed on the view that assertive force is pragmatically derivable. This view of assertion may have consequences for the acquisition of the illocutionary force, since it suggests that children might be able to build the pragmatic category of assertion from more basic components of pragmatics and grammar.

Another avenue for future work is to more carefully explore and model relative authority between speaker and addressee on both the epistemic and the social dimension, which played crucial roles in explaining assertive RDs and falling declarative questions, as well as rising imperative commands. Perhaps contextual models should include authority parameters along these two dimensions, which could be appealed to when determining whether ↗ applies to the clausal content *p* or to some other relevant proposition *q* (cf. Merin & Bartels 1997, who don't discuss rising declaratives, but who do propose that intonational meaning encodes relative social power between speakers and addressees).

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# Biased questions

Asking a question means, essentially, presenting the hearer with a set of propositions with the request that she choose from it those that are true. It is a well-known fact about natural language that questions can be “biased”: the propositions presented are not all equal, so to speak. For example, the speaker’s belief, or contextual evidence, might favor some against others. The formal means employed by grammar to express such biases have been of interest to linguists for a long time, and the investigation is still ongoing. The contributions in this volume all pertain to biased questions. They grew out of talks presented at the workshop Biased Questions: Experimental Results and Theoretical Modelling, which took place at the Leibniz-Zentrum Allgemeine Sprachwissenschaft as part of the ERC project Speech Acts in Grammar and Discourse (SPAGAD). The papers are written mostly by senior researchers of different expertise who have previously published on the same topic, and who explore this fascinating linguistic phenomenon from a variety of theoretical angles: pragmatics, semantics, syntax, phonology, psychology, and acquisition. The languages under discussion include Chinese, English, Hungarian, Russian, Turkish, and Vietnamese. The collection provides the reader with a rich set of data and several open issues for future research.