

Focused NPIs in statements and questions

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Abstract

Negative Polarity Items (NPIs) with emphatic prosody such as ANY or EVER, and minimizers such as *lift a finger* or *sleep a wink* are known to generate particular contextual inferences that are absent in the case of non-emphatic NPIs such as unstressed *any* or *ever*. It remains an open question, however, what the exact status of these inferences is and how they come about. In this paper, we analyze these cases as NPIs bearing focus, and examine the interaction between focus semantics and the lexical semantics of NPIs across statements and questions. In the process, we refine and expand the empirical landscape by demonstrating that focused NPIs give rise to a variety of apparently heterogeneous contextual inferences, including domain widening in statements and inferences of negative bias in questions. These inferences are further shown to be modulated in subtle ways depending on the specific clause-type in which the NPI occurs (e.g., polar questions vs. wh-questions) and the type of emphatic NPI involved (e.g., ANY vs. *lift a finger*). Building on these empirical observations, we propose a unified account of NPIs which posits a single core semantic operator, EVEN, across both focused and unfocused NPIs. What plays a central role in our account is the additive component of EVEN, which we formulate in such a way that it applies uniformly across statements and questions. This additive component of EVEN, intuitively paraphrased as the implication that all salient focus alternatives of the prejacent of the operator must be settled in the doxastic state of the speaker, is selectively activated depending on the presence of focus alternatives, and is shown to be able to derive all the observed contextual inferences stemming from focused NPIs, both in statements and in questions.

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1 Introduction

Negative polarity items (NPIs) owe their name to the fact that, on a first approximation, they can be used in negative statements but not in positive ones. For instance, the English NPI *ever* is licensed in (1) but not in (2).

- (1) a. I don't think Robin ever goes to the gym.
b. Nobody has ever seen Robin at the gym.
- (2) a. *I think Robin ever goes to the gym.
b. *Mary has ever seen Robin at the gym.

Besides in negative statements, however, NPIs can also be used in *questions*. For instance, *ever* is felicitous in the polar question in (3a) and the wh-question in (3b).

- (3) a. Have you ever seen Robin at the gym?
b. Who has ever seen Robin at the gym?

Most theories of NPIs concentrate on their behavior in statements. The present paper contributes to a relatively small body of work which aims to achieve a uniform characterisation of the behavior of NPIs across both statements and questions. In particular, it addresses puzzles concerning the interaction between NPIs and focus in both sentence types.

Emphatic NPIs in statements: domain widening effects An influential idea in the literature, originating in the work of Kadmon and Landman (1993), is that NPIs like *ever* and *any* are so-called 'domain wideners'. That is, they are existential quantifiers which quantify over a domain (of individuals in the case of *any*, and of time intervals in the case of *ever*) which is wider than some contextually salient domain of quantification.

Kadmon and Landman (1993, §2.3) hold that NPIs like *any* involve domain widening no matter whether they are emphatic or not. However, Krifka (1995) and van Rooij (2003), among others, have argued that domain widening effects are only obligatory for emphatic NPIs.

Evidence for the latter position can in fact already be found in Kadmon and Landman's work (although they themselves did not present it as evidence for this position). First, the primary examples that they provide to illustrate domain widening effects involve emphatic NPIs. For instance, they point out that the response in (4) (their example (30)) conveys that B does not have any potatoes suitable for making French fries, but leaves open the possibility that B has other kinds of potatoes (e.g., decorating potatoes). On the other hand, the response in (5), with an emphatic NPI, conveys that B doesn't have potatoes at all, not even decorating ones.

- (4) A: I want to make French fries. Do you have cooking potatoes?
B: No, I don't have potatoes.
- (5) A: I want to make French fries. Do you have cooking potatoes?
B: No, I don't have ANY potatoes.

Second, Kadmon and Landman also explicitly note that domain widening effects seem absent in the following examples (their examples (34) and (35)), which involve non-emphatic NPIs.

- (6) A: Why don't we make some French fries?
B: We don't have any potatoes.
- (7) A: Are you prepared for school tomorrow?
B: Yes. We didn't get any homework.

To this evidence, we add the minimal pair in (8)-(9), which brings out the subtle difference between emphatic and non-emphatic NPIs particularly clearly. Statements with non-emphatic

any such as B’s statement in (8) allow the addressee to ask follow-up questions that relax the relevant domain, whereas statements with emphatic *any* such as B’s statement in (9) do not.

- (8) A: I need a blue whiteboard marker.
B: I’m sorry, we don’t have any markers left.
A: Green or red ones perhaps?
- (9) A: I need a blue whiteboard marker.
B: I’m sorry, we don’t have ANY markers left.
A: #Green or red ones perhaps?

These observations give rise to the following question, which, to the best of our knowledge, has not yet been addressed in any depth in the literature.

- (10) **Question 1:** Why do emphatic NPIs in statements give rise to domain widening effects?

Emphatic NPIs in questions: negative bias Many authors have observed that emphatic NPIs in questions typically convey a negative bias (Borkin, 1971; Heim, 1984; Krifka, 1995; Abels, 2003; van Rooij, 2003; Guerzoni, 2004; Asher and Reese, 2005, among others). To illustrate this, consider the following minimal pair.

- (11) Does Bill know anything about cars?
- (12) Does Bill know ANYTHING about cars?

The question in (12), where the NPI is emphatic, conveys a belief on the part of the speaker that Bill doesn’t know a lot about cars, if he knows anything at all. On the other hand, the question in (11), where the NPI is not emphatic, does not convey such a belief. This gives rise to the following question:

- (13) **Question 2:** Why do emphatic NPIs in questions convey a negative bias?

This question has been addressed quite extensively in previous work (see the references above; a more detailed survey will be provided later). However, there is no general consensus yet on the precise nature of the negative bias involved and the way in which this should be derived from general properties of focus, the lexical semantics of NPIs, and the semantics of questions. Moreover, as we will observe later, negative bias appears to be missing in certain wh-questions with emphatic NPIs, leading to the issue of how the presence of a negative bias depends on question type (polar vs. wh-questions), an issue which, to our knowledge, has not yet been addressed in previous work.

Proposal in a nutshell Following Lee and Horn (1994), Lahiri (1998), Crnič (2014b, 2019), and Roelofsen (2018), among others, we assume that NPIs like *any* and *ever* generally involve an operator whose semantics is similar to that of the particle *even*. We will denote this operator as EVEN. A sentence like (14), with the overt particle *even*, has both a *scalar* component—‘Mary was relatively unlikely to leave’—and an *additive* component—‘someone other than Mary left as well’ (Karttunen and Peters, 1979; Wilkinson, 1996, among others).

- (14) Even MARY left.

Interestingly, only the scalar component of *even* has played a significant role in *even*-based theories of NPIs. The additive component only plays a minor role in Lahiri (1998) and no role at all in Crnič (2014b, 2019) and Roelofsen (2018). We propose that the **additive component** also has a crucial role to play. We suggest that it is strictly focus-sensitive, i.e., it is only activated when the NPI is focused, which requires prosodic emphasis. When activated, it is

responsible both for domain widening effects in statements and for conveying a negative bias in questions.

To develop this idea, the semantic treatment of the additive component of *even* must be generalized. After all, it is normally assumed that ‘*even S*’ presupposes that some contextually salient focus alternative of *S* is *true*, but this does not make sense when *S* and its focus alternatives are questions, which cannot be true or false. However, a natural generalization of this requirement, which applies no matter whether *S* is a statement or a question, can be formulated in inquisitive semantics (Ciardelli et al., 2018). In this framework, the semantic value of a sentence is not identified with the conditions under which the sentence is *true* in a given situation, but rather with the conditions under which it is *settled* in a given information state. Both statements and questions can be settled in an information state. For instance, the statement *Sue left* is settled in a state *s* if it follows from the information available in *s* that Sue left. Similarly, the question *Where did Sue go?* is settled in *s* if it follows from the information in *s* where Sue went. Returning to the additive component of *even*, the idea is that ‘*even S*’ requires that some salient focus alternative of *S* be *settled in the speaker’s information state*. This, we will argue, is a key step toward a uniform theory of focused NPIs in statements and questions.

Let us now give a sketch of our answers to Questions 1 and 2 above. As for **Question 1**, we propose that ‘domain-widening effects’ are in fact better thought of as ‘anti-domain-restriction effects’. Semantically, the domain of *any* is the set of all entities, just like the domain of *some* and *every*. This domain can in principle be contextually restricted. For instance, in B’s statement in (8), *any markers* can be contextually interpreted as ‘any blue whiteboard markers’. However, when *any* is focused, as in (9), such contextual domain restriction is blocked. Why? Because of the additive component of the EVEN operator that the NPI contributes, which is activated by focus. Namely, the additive component of EVEN requires that its prejacent has a contextually salient focus alternative which is supported by the speaker’s information state. This alternative, in order to count as a proper alternative, must of course be different from the prejacent of EVEN itself. Now, this is possible if the domain of *any* is kept wide. In that case, a suitable contextually salient focus alternative of ‘we don’t have ANY markers left’ is ‘we don’t have blue whiteboard markers left’. However, if *any markers* is contextually interpreted as ‘any blue whiteboard markers’ through domain restriction, then there is no distinct focus alternative which is contextually salient, which means that the additive requirement of EVEN cannot be satisfied. This, we propose, is how an anti-domain-restriction effect arises.

Let us now turn to **Question 2**. Why does a question like (12) convey a belief on the part of the speaker that Bill doesn’t know a lot about cars? Again, because of the additive component of the EVEN operator contributed by *anything*. This requires that its prejacent has a contextually salient focus alternative which is supported by the speaker’s information state. Assuming that the prejacent of EVEN is the entire question ‘Does Bill know anything about cars?’ (we will show later that other scopal possibilities for EVEN are ruled out), the relevant focus alternatives are other questions, such as ‘Does Bill know a lot about cars?’. Indeed, (12) cannot be felicitously uttered out of the blue, but requires that such a focus alternative is already contextually salient. Further, it is required that the contextually salient focus alternative is already supported by the speaker’s information state. Now, there are two possibilities. Either the speaker believes that Bill knows a lot about cars, or she believes that Bill does not know a lot about cars. However, if the speaker already believed that Bill knows a lot about cars, there would be no point in asking (12), for the answer would already be known. So, if the speaker behaves in a rational way, it must be the case that she believes that Bill does *not* know a lot about cars. This, in a nutshell, is how focus on NPIs in questions can convey a negative bias.

The paper is structured as follows. Section 4 provides some further background and delineates the empirical scope of the paper in more detail. Section 3 discusses the empirical properties of focused NPIs in statements and questions. Section 4 provides the necessary theoretical background for our proposal, and Section 5 presents the proposal itself. Section 6 illustrates the predictions of the analysis in some detail, and Section 7 discusses related work. Finally, section 8 concludes, and the appendix reports on an experiment we conducted to elucidate the

range of environments in which focused NPIs are licensed.

2 Background and scope of the paper

Approaches to NPIs in questions Broadly speaking, two kinds of approaches have been taken in the analysis of the behavior of NPIs in questions. **Reductive approaches** assume that the logical forms of questions like those in (3), repeated in (15) below, involve certain covert operators which are known to license NPIs in statements.

- (15) a. Have you ever seen Robin at the gym?
b. Who has ever seen Robin at the gym?

For instance, Guerzoni and Sharvit (2014) assume that the logical form of (15a) contains a covert negation operator, and Nicolae (2013) assumes that the logical form of (15b) contains a covert operator whose semantic contribution is similar to that of the particle *only* (which licenses NPIs in statements).

Non-reductive approaches on the other hand do not try to reduce the problem of NPI licensing in questions to the problem of NPI licensing in statements, but rather attempt to formulate a theory of NPIs in terms that are general enough to apply to both statements and questions in a **uniform** way. To get an idea of what this involves, note that theories of NPI licensing in statements are often formulated in terms of *truth-conditional* semantic notions, such as truth-conditional entailment. As such they do not straightforwardly apply to questions, since the meaning of a question cannot be characterized in terms of truth-conditions. Rather, for a theory of NPIs to apply uniformly to statements and questions, it needs to be formulated in more general terms. For instance, the approach of van Rooij (2003) and Schwarz (2017a,b) is based on the notion of *entropy* from information theory (Shannon, 1948; Bar-Hillel and Carnap, 1953), the proposal of Barker (2018) is based on a generalised notion of entailment from the semantic literature on questions (Groenendijk and Stokhof, 1984; Ciardelli et al., 2018), and the proposal of Roelofsen (2018) is based on a notion of strength defined in terms of likelihood (based on Heim, 1984; Lahiri, 1998; Crnič, 2014b, among others).

The present paper contributes to the second line of work, i.e., to the development of a uniform, non-reductive theory of the behavior of NPIs in statements and questions.

Strong versus weak NPIs The contribution that the paper makes to this line of work concerns a subclass of English NPIs which are referred to as *weak* NPIs. Let us briefly review the distinction between weak NPIs such as *ever* and *any*, and strong ones such as *in years* and *until June*. This distinction is based on the observation that the former have a much wider distribution than the latter. For instance, weak NPIs are not only licensed under negation and in the scope of negative quantifiers like *nobody* and *never*, as was illustrated in (1), but also in the antecedent of a conditional and in the restrictor of a universal quantifier, as illustrated in (16).

- (16) a. If Mary ever goes to the gym, she will meet Robin there.
b. Every girl who has ever gone to the gym has met Robin there.

Strong NPIs on the other hand are licensed under negation and negative quantifiers like *nobody*, but not in the antecedent of a conditional or in the restrictor of a universal quantifier.

- (17) a. Robin hasn't been to the gym in years.
b. Nobody has seen Robin at the gym in years.
c. *If Mary goes to the gym in years, she will meet Robin there.
d. *Every girl who has gone to the gym in years has met Robin there.

Strong NPIs are not licensed in questions either:

- (18) a. *Have you seen Robin at the gym in years?
 b. *Who has seen Robin at the gym in years?

We will not be concerned with strong NPIs here but only with weak ones, in particular emphatic ones. For brevity, we will from now on generally refer to ‘weak NPIs’ simply as ‘NPIs’.

Contingently versus inherently emphatic NPIs We distinguish two kinds of emphatic NPIs. The first are emphatic occurrences of NPIs like *any* and *ever*. We refer to such occurrences as **contingently emphatic** NPIs, because the lexical items involved can also occur without emphasis. Examples of contingently emphatic NPIs in various environments are given in (19)-(23), where we use capitalization to indicate emphasis.

- (19) a. I don’t think Robin **EVER** talked about this in public. [negation]
 b. Robin didn’t tell **ANYONE** about this.
- (20) a. If he **EVER** talks about this in public, he will be fired. [conditional]
 b. If he tells **ANYONE** about this, he will be fired.
- (21) a. Everyone who **EVER** talks about this in public will be fired. [universal]
 b. Everyone who tells **ANYONE** about this will be fired.
- (22) a. Did Robin **EVER** talk about this in public? [polar question]
 b. Did Robin tell **ANYONE** about this?
- (23) a. Who would **EVER** talk about this in public? [wh-question]
 b. Who would tell **ANYONE** about this?

The second class of emphatic NPIs are so-called **minimizers**, such as *lift a finger to help* and *sleep a wink*. Following Krifka (1995), Asher and Reese (2005) and others, we assume that minimizers always bear focus prosody, i.e., that they are **inherently emphatic**. Their use in various environments is exemplified in (24)-(28).¹

- (24) a. Robin didn’t lift a finger to help. [negation]
 b. Robin didn’t sleep a wink last night.
- (25) a. If Robin’s children lift a finger to help, they get rewarded immediately. [conditional]
 b. If participants in this experiment sleep a wink the night before the final test, they are excluded from the analysis.
- (26) a. Robin thanked everyone who had lifted a finger to help. [universal]
 b. The researchers excluded all participants who had slept a wink the night before the final test.
- (27) a. Did Robin lift a finger to help when Mary was in trouble? [polar question]
 b. Did you sleep a wink the night after 9/11?
- (28) a. Who lifted a finger to help when Mary was in trouble? [wh-question]
 b. Who slept a wink the night after 9/11?

The overall classification of NPIs that we assume is depicted in Figure 1.

Finally, we should note that the empirical scope of the present paper is restricted to English. Examining the cross-linguistic validity of the empirical observations that we will make and the theoretical analysis that we will propose is an important task for future work.

¹Even though minimizers bear focus prosody, we will not capitalize them, to enhance readability. We will only use capitalization to distinguish emphatic from non-emphatic occurrences of *any* and *ever*.

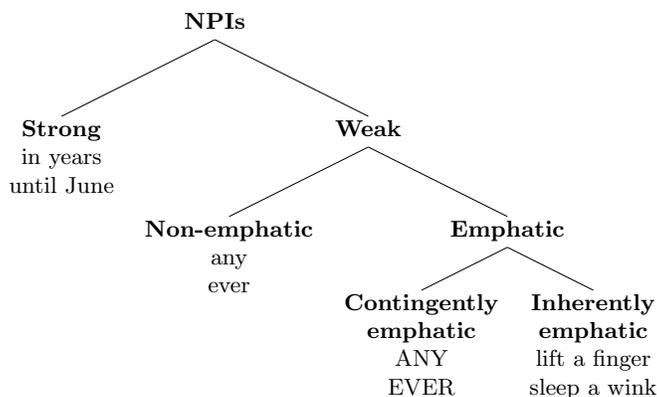


Figure 1: Broad classification of NPIs, with two examples for each class.

3 Empirical properties of emphatic NPIs

We begin by examining the distribution of emphatic NPIs in statements and in questions, clarifying the main explananda of our analysis. We demonstrate that, broadly, the distribution of emphatic weak NPIs is similar to that of non-emphatic ones: they are licensed in a variety of downward entailing environments in statements, as well as in certain types of questions. At the same time, we also show that emphatic weak NPIs give rise to additional contextual inferences absent in utterances with non-emphatic weak NPIs. At the base level, we confirm the previously made observations that (i) statements with contingently emphatic NPIs give rise to domain widening effects, and that (ii) questions with emphatic NPIs give rise to an inference of negative bias. Building on (i) however, we also further clarify the notion of ‘domain widening effects’. In addition, building on (ii), we make two new empirical observations about variation in the presence/strength of the induced negative inference: we argue that the presence/strength of the inference varies depending on question type (polar vs. *wh*-questions) and NPI type (contingently vs. inherently emphatic).

3.1 Emphatic NPIs in statements

3.1.1 Distribution

It is widely established that strong NPIs are more restricted in their distribution than non-emphatic weak NPIs. Broadly speaking, the former require an anti-additive environment, whereas the latter are licensed more generally in Strawson downward entailing (DE) environments, including in the antecedent of a conditional and in the restrictor of *every*.

However, it has not been settled in the literature where *emphatic* weak NPIs are situated with regards to their distribution. Eckardt and Csipak (2013) argue that minimizer NPIs such as *lift a finger* behave like strong NPIs, and are thus *not* licensed in certain contexts that do license non-emphatic weak NPIs. In particular, they argue that minimizer NPIs are infelicitous in the restrictor of *every* and in the antecedent of a conditional (unless the statement at hand has a law-like interpretation, see also Heim, 1984). In a similar vein, Hoeksema (2013) argues that minimizer NPIs are infelicitous in certain Strawson DE contexts such as under superlatives.

- (29) From Heim (1984); originally from Linebarger (1980)
- a. Every restaurant that charges so much as a dime for iceberg lettuce ought to be closed down.
 - b. ??Every restaurant that charges so much as a dime for iceberg lettuce actually has four stars in the handbook.

- (30) From Eckardt and Csipak (2013)
- a. If a restaurant charges so much as a red cent for tap water, it ought to be closed down.
 - b. ??If a restaurant charges so much as a red cent for tap water, its name starts with the letter ‘L’.
- (31) From Hoeksema (2013)
- a. ?She was the most beautiful woman I have cared a pin about.
 - b. ?Fred is the smartest man who ever lifted a finger to help.

We argue, however, that minimizer NPIs are in fact *not* generally infelicitous in the environments mentioned above. This is supported by data from the Corpus of Contemporary American English (COCA), as well as by the results of an experiment we ran, which is reported in detail in the Appendix. The examples in (32) show that minimizer NPIs can be felicitous in non-law-like conditional antecedents, (32a), comparative constructions, (32b), and in the restrictors of *the only*, *the first*, and *the last*, (32c)–(32e).² The data in (33) suggest that minimizer NPIs are also felicitous in restrictors of universals, even when they do *not* give rise to law-like interpretations.

- (32)
- a. If anyone will lift a finger to help me, it will be Prue.
 - b. Too weak to lift a finger, Nikolayev lay in a listless rage, feeling the cat eyeing him from the stove. (from COCA)
 - c. The only one to lift a finger was a photographer who sold the New York Post horrifying photos of the [...]. (from COCA)
 - d. This is the first project she has cared a pin about.
 - e. Fred Sullivan was the last CEO of the company who cared a pin about his employees.
- (33) From the experiment reported in the Appendix
- a. Everyone who slept a wink was excluded from the test phase.
 - b. At the end of the party, Susan thanked everyone who had lifted a finger to help.

Based on these observations, we conclude that it is *not* a general property of minimizers that they are infelicitous in these environments. In cases where they are, the infelicity must arise not from the interplay between the semantics of minimizers and the logical properties of the relevant environments, but rather from pragmatic or contextual factors. While one such potential factor is tested in the Appendix, an in-depth analysis of these infelicities is not the focus of this paper (see Crnić 2014a and Eckardt and Csipak 2013 for relevant discussion).

Turning now to contingently emphatic NPIs, we illustrate in (34) and (35) that these, too, are generally licensed in non-anti-additive Strawson DE contexts. We should note that this is compatible with the positions of Eckardt and Csipak (2013) and Hoeksema (2013), whose focus is on minimizer NPIs rather than contingently emphatic NPIs.

- (34)
- a. If he EVER talks about this in public, he will be fired. [conditional]
 - b. If he tells ANYONE about this, he will be fired.
- (35)
- a. Everyone who EVER talks about this in public will be fired. [universal]
 - b. Everyone who tells ANYONE about this will be fired.

In sum, both contingently and inherently emphatic NPIs are licensed in Strawson DE environments in statements. Our analysis should be able to capture this basic distributional pattern.

²Hoeksema (2013) acknowledges that minimizers can appear in the restrictor of *the only* and provides an example from his corpus.

3.1.2 Interpretation and contextual requirements

We have so far examined the distributional patterns of emphatic weak NPIs in statements, which are similar to those of non-emphatic weak NPIs. At the same time however, emphatic vs. non-emphatic weak NPIs *differ* in their discourse effects when they are used in statements. Specifically, we argue that contingently emphatic NPIs give rise to what Kadmon and Landman (1993) refer to as *domain widening effects*. Kadmon and Landman observe that the response in (36) (their example (30)) just conveys that B does not have any potatoes suitable for making French fries, while the response in (37), with an emphatic NPI, conveys that B doesn't have any kind of potatoes, not even inedible ones.

(36) A: I want to make French fries. Do you have cooking potatoes?
B: No, I don't have potatoes.

(37) A: I want to make French fries. Do you have cooking potatoes?
B: No, I don't have ANY potatoes.

Kadmon and Landman (1993, §2.3) hold that both emphatic and non-emphatic *any* convey domain-widening, although they acknowledge that with non-emphatic *any* the presumed effects of domain-widening are not always perceived. In particular, they note that domain-widening effects seem absent in the following examples (their examples (34) and (35)).

(38) A: Why don't we make some French fries?
B: We don't have any potatoes.

(39) A: Are you prepared for school tomorrow?
B: Yes. We didn't get any homework.

We argue that while contingently emphatic NPIs necessarily give rise to a domain widening inference, this inference is only optional in the case of non-emphatic NPIs. The minimal pair given in (8)-(9) in the Introduction, repeated in (40)-(41) below, brings out this subtle divergence between emphatic vs. non-emphatic NPIs particularly clearly. Statements with non-emphatic *any* such as B's statement in (40) allow the addressee to ask follow-up questions that relax the relevant domain, whereas statements with emphatic *any* such as B's statement in (41) do not.

(40) A: I need a blue whiteboard marker.
B: I'm sorry, we don't have any markers left.
A: Green or red ones perhaps?

(41) A: I need a blue whiteboard marker.
B: I'm sorry, we don't have ANY markers left.
A: #Green or red ones perhaps?

A similar minimal pair involving *ever* rather than *any* is given in (42)-(43).

(42) A: Before they got married, did Bill tell Mary about his father's role in the war?
B: No, I don't think he ever told her.
A: And after they got married?
B: Yes, he did tell her eventually, when they were in their seventies and his father had long passed away.

(43) A: Before they got married, did Bill tell Mary about his father's role in the war?
B: No, I don't think he EVER told her.
A: #And after they got married?

In addition to triggering an obligatory domain widening inference, emphatic NPIs are also subject to stronger contextual constraints than non-emphatic ones, as exemplified in (44)-(45).

What we see here is that a statement with a non-emphatic NPI can function as a felicitous answer to a wider range of questions than the same statement with emphasis on the NPI.

(44) Did you remember to add some fresh oregano?

- a. Oh no! I didn't add any oregano.
- b. Oh no! I didn't add ANY oregano.

(45) Did you remember to add the herbs?

- a. Oh no! I didn't add any oregano.
- b. #Oh no! I didn't add ANY oregano.

In the analysis to come, we argue that both the obligatory domain widening inference and the specific contextual constraint exemplified in (45) are byproducts of, and can be derived from, a more general semantic property of contingently emphatic NPIs. We also show that the same semantic component is present in minimizer NPIs, and explain why nevertheless they do not appear to give rise to strong domain widening effects.

3.2 Emphatic NPIs in questions

3.2.1 Distribution

Besides in DE environments, emphatic NPIs can also be used in questions. For instance, (46)–(47) show that contingently emphatic NPIs are licensed both in polar questions and in wh-questions (though we will return to some constraints on the licensing of NPIs in certain specific kinds of wh-questions).

(46) a. Did Robin EVER help Mary when she was ill? [polar question]
 b. Did the government do ANYTHING to avoid the disaster?

(47) a. What did Robin EVER do to help Mary? [wh-question]
 b. Who did ANYTHING to avoid the disaster?

Minimizer NPIs are also licensed in these environments, as illustrated by (48)–(49).

(48) a. Did Robin lift a finger to help when Mary was ill? [polar question]
 b. Did you sleep a wink the night after 9/11?

(49) a. Who lifted a finger to help when Mary was ill? [wh-question]
 b. Who slept a wink the night after 9/11?

Thus both contingently emphatic NPIs and minimizer NPIs are licensed in polar questions and wh-questions. In this regard, they again pattern like non-emphatic weak NPIs, which are also licensed in these types of questions.³

3.2.2 Interpretation and contextual requirements

In terms of discourse effects, questions with emphatic NPIs differ from questions with non-emphatic NPIs in an important respect. Namely, the former typically give rise to a kind of negative inference and often have a rhetorical flavor, whereas the latter typically don't.

Specifically, it has been observed that questions with minimizer NPIs cannot be used as neutral questions, and generally seem to convey that the speaker believes that the negative answer is true or at least very likely (Borkin 1971, Heim 1984, van Rooij 2003, Guerzoni 2004,

³We leave alternative questions and other types of disjunctive questions out of consideration here. See Nicolae (2013), Schwarz (2017a), Roelofsen (2018), and Abenina-Adar and Sharvit (2020) for recent discussions of the distribution of non-emphatic weak NPIs in such questions.

Asher and Reese 2005, among others). For instance, the question in (48a) conveys that the speaker thinks that Robin did not help when Mary was ill.

Questions with contingently emphatic NPIs also differ from their non-emphatic counterparts. Just like minimizer NPIs, they give rise to a kind of negative inference. This is exemplified in (50). The question in (50a), containing an emphatic NPI, seems to convey that the speaker is biased towards the negative answer, whereas the question in (50b), with a non-emphatic NPI, does not convey such a bias.

- (50) a. Did ANYONE tell Robin that there's no class today?
b. Did anyone tell Robin that there's no class today?

Based on these intuitions, it is usually assumed that both contingently emphatic NPIs and minimizers generally convey a negative speaker bias when appearing in questions. However, there are a few issues concerning the precise characterization of this negative bias which require careful consideration.

Strength of the negative bias First, characterizing the strength of the negative bias has been a matter of some debate. We identify two main views: strong vs. weak. The strong view (Guerzoni, 2004; Asher and Reese, 2005) is that the negative bias conveyed by questions with emphatic NPIs is categorical and that these questions inexorably give rise to rhetorical interpretations.⁴ More specifically, Asher and Reese (2005) claim that in uttering a polar interrogative *whether p* with an emphatic NPI a speaker makes a kind of hybrid speech act whose function overlaps with that of an assertion with content $\neg p$ (the negative answer). In a similar vein, Guerzoni (2004) claims that polar interrogatives with minimizer NPIs convey that the speaker is only effectively entertaining the negative answer $\neg p$. In sum, under both approaches, the negative speaker bias requires a belief on the part of the speaker in the negative answer to the question, $\neg p$.

In contrast, on the weak view (Borkin, 1971; van Rooij, 2003), the negative inference is formulated in terms of negative answers to *alternatives* of the question at hand. That is, under this view, a polar interrogative *whether p* with an emphatic NPI presupposes that all relevant alternative issues *whether p'* have been settled negatively. For instance, the question in (48a) would presuppose that alternative issues such as *Did Robin help when Mary was ill?* have been answered negatively (No, she did not help; $\neg p'$). Importantly, the issue of *whether p* itself can remain open. For instance, the issue of *whether Robin lifted a finger to help* is predicted to remain open in (48a), where 'lifting a finger to help' is understood to include doing things that fall short of properly helping, but can still be distinguished from doing nothing at all.

Regarding this issue, we argue that the empirical facts favor the weak, alternative-based view over the strong view. That is, questions with emphatic NPIs allow for genuine information-seeking readings, as exemplified in (51).

- (51) [Context: A is at a small fruit stand at the market, looking for apples for an apple pie]
A: Do you have tart apples?
B: No, I'm afraid we don't.
A: Do you have gala apples?
B: No, sorry.
A: Do you have ANY kind of apples?

When asking the final question in (51), A may still be genuinely curious as to whether B has any kind of apples. This suggests that a positive answer to the question can still be actively entertained by the speaker. This is incompatible with the way in which the strong view characterizes the negative inference triggered by emphatic NPIs in questions. On the other hand, it is compatible with the weak view, because in this example the first two questions, which

⁴It should be noted that Guerzoni (2004) is only concerned with minimizer NPIs. In particular, she does not explicitly commit herself to any particular view on the bias induced by contingently emphatic NPIs.

are naturally seen as the contextually relevant alternatives to the third question, have indeed already been settled negatively.

Presupposition or speaker belief? van Rooij (2003) and Borkin (1971) characterize the negative implication of emphatic NPIs in questions as *presuppositional*, i.e., imposing a requirement on the common ground. However, examples like (52) show that a question with an emphatic NPI can be felicitous even if the speaker does *not* take it for granted that the negative answers to the relevant alternatives of the question are already commonly presupposed.

- (52) A: I really like Ben. He’s always so kind and helpful to everyone around him.
B: I’m not so sure. Did he lift a finger when Sue was in trouble?

Specifically, in (52), B does not appear to assume that it is mutually established that Ben did not help when Sue was in trouble. Rather, this information merely appears to reflect B’s (possibly heretofore private) beliefs. This is problematic for van Rooij (2003) and Borkin (1971), and leads us to conclude that the negative implication is not presuppositional, but instead constitutes a non-at-issue implication about the speaker’s doxastic state. Thus, to recapitulate, we characterize the negative inference triggered by a question with an emphatic NPI as a non-at-issue implication to the effect that the speaker believes the negative answers to the contextually relevant alternatives of the given question.

Having clarified how to characterize the negative bias conveyed by questions with emphatic NPIs (namely, negative speaker belief about alternative issues), we now turn to some additional empirical observations which to the best of our knowledge have not been made explicitly yet in the literature, and which show that the presence and exact nature of the negative bias crucially depends on the type of NPI (inherently emphatic vs. contingently emphatic) and the type of question (polar question vs. wh-question) involved.

Bias depends on NPI type First, we propose that the negative bias arising from questions with contingently emphatic NPIs differs in flavor from the bias arising from questions with minimizers. This point is worth explicitly establishing, as previous work either focuses exclusively on one type of NPI, or assumes that both types give rise to the same kind of bias. For instance, Guerzoni (2004) restricts her attention to minimizer NPIs and does not take a stand on contingently emphatic NPIs. van Rooij (2003) also mainly focuses on minimizer NPIs, although he does briefly mention that his account would naturally extend to contingently emphatic NPIs. Krifka (1995) and Asher and Reese (2005) on the other hand, explicitly treat minimizer NPIs and contingently emphatic NPIs on a par, and suggest that both give rise to essentially the same kind of negative bias when they appear in questions.

We observe, however, that questions with contingently emphatic NPIs such as (46)–(47) and (51) generate systematically weaker negative inferences than questions with minimizer NPIs such as (48)–(49). More specifically, genuine information-seeking readings appear to be accessible for the former but not the latter. This intuition can be made more precise by considering examples like (53) and (54). Questions with contingently emphatic NPIs allow for follow-ups where the speaker explicitly acknowledges the possibility of a positive answer. This is exemplified in (53).

- (53) Do you have ANY kind of apples?
You must have SOME varieties, you’re a fruit stand!

In contrast, these types of follow-ups are degraded after questions with minimizer NPIs, as exemplified in (54).

- (54) Did Ben lift a finger when Sue was ill?
#He must have helped her in SOME way, he’s her husband!

Our proposal will capture the alternative-based negative inference triggered by questions with emphatic NPIs, as summarized in this section. It will also capture the subtle difference in

behavior between questions with minimizer NPIs and questions with contingently emphatic NPIs. While the two will be given a unified semantic treatment, the difference between them will be derived from a difference in the types of alternatives that they evoke.

Bias depends on question type In addition to NPI type, we propose that question type (polar vs. wh-questions) also introduces variation in the negative bias that emphatic NPIs trigger. Namely, while polar questions with emphatic NPIs always give rise to some kind of negative inference, wh-questions with emphatic NPIs may lack such inferences. Specifically, we observe that, in contrast with previous examples such as (47), a negative inference is absent in cases like (55).

(55) [Context: An official is doing a background check of applicants for a certain benefit and needs to know which of them ever set foot in Siberia. An assistant notes that the applicants' official travel documents, which go back up to 5 years, show that applicants A and B were in Siberia three years ago. The official says:]

Good to know. But (we still need to know) which applicants have EVER been to Siberia?

In this case, the salient alternative issue, *Which applicants have been to Siberia over the last five years?*, is already settled *positively* in the speaker's doxastic state. Still, the use of a wh-question with an emphatic NPIs is felicitous, and receives a natural interpretation.

A similar example is given in (160).

(56) [Context: A healthcare worker is screening patients for a clinical trial and needs to rule out those who have even an inkling of rosacea. A nurse remarks that A and B demonstrated multiple symptoms of rosacea. The healthcare worker responds:]

Thank you. But how about weaker symptoms? Which patients have shown ANY symptoms of rosacea?

Our analysis will predict the absence of negative inferences in these cases. A crucial characteristic of these contexts is that they favor an *exhaustive* interpretation of the wh-question at hand. Our account will predict that, while a negative inference always arises when an emphatic NPI occurs in a polar question or in a wh-question that is interpreted non-exhaustively, it may be absent when the wh-question is interpreted exhaustively.

Summary of old and new empirical observations to be captured The empirical generalizations established in this section can be summarized as follows.

- (57) Licensing
- a. Emphatic NPIs (both inherent and contingent) are licensed in Strawson DE environments in statements.
 - b. Emphatic NPIs are licensed in polar questions and wh-questions.
- (58) Interpretation and contextual requirements
- a. In statements, emphatic NPIs give rise to domain widening effects.
 - b. In polar questions, emphatic NPIs give rise to an inference that the salient alternative issues are settled negatively in the speaker's doxastic state.
 - c. In wh-questions, emphatic NPIs give rise to an inference that the salient alternative issues is settled in the speaker's doxastic state, but they may be settled either positively or negatively, depending on the context.
 - d. Questions with contingently emphatic NPIs give rise to a weaker negative bias than ones with inherently emphatic NPIs, and as such, are licensed in a wider range of contexts, including not only rhetorical ones, but genuinely information seeking ones as well.

In the remainder of the paper, our aim will be to develop a unified analysis of emphatic NPIs in statements and questions which accounts for these empirical generalizations.

4 Theoretical background for the proposal

The account that we will develop here falls within a general approach to NPIs whose main tenet is that NPIs associate with an operator whose semantics is close to that of the English particle *even*.⁵ We will denote the operator as EVEN, and will, following Crnič (2019), refer to the approach as the EVEN approach.⁶ Within the EVEN approach, it is useful to distinguish two views. On the first view, emphatic NPIs (or in some cases only certain kinds of emphatic NPIs) associate with an EVEN operator, but non-emphatic NPIs don't (Schmerling, 1971; Heim, 1984; Krifka, 1995; van Rooij, 2003; Chierchia, 2013). We will call this the **divisive** EVEN approach. On the second view, both emphatic and non-emphatic weak NPIs associate with an EVEN operator (Lee and Horn, 1994; Crnič, 2014a,b, 2019). We will call this the **inclusive** EVEN approach.⁷

We will adopt the inclusive EVEN approach here. That is, we will assume that all NPIs associate with an EVEN operator, whether emphatic or not, and will attempt to derive the empirical differences between emphatic and non-emphatic NPIs from the fact that the former are emphatic and the latter are not. If successful, this will result in a more explanatory account than is provided by divisive EVEN accounts, which simply postulate that only emphatic NPIs associate with EVEN, leaving open *why* this would be the case.

As depicted in Figure 2, the earliest work within the inclusive EVEN approach (Lee and Horn, 1994) concentrated on non-emphatic NPIs in statements, leaving differences between emphatic and non-emphatic NPIs out of consideration, as well as the behavior of NPIs in questions (except for a very brief remark at the end of the paper). Crnič (2014a,b, 2019) also mainly concentrates on non-emphatic NPIs in statements, but discusses certain differences between emphatic and non-emphatic NPIs in some detail as well. He also highlights certain properties of NPIs in questions (see especially Crnič, 2014a), but does not develop a full account of these properties. Roelofsen (2018) pursues a more comprehensive analysis of NPIs in questions, but strictly focuses on non-emphatic NPIs, leaving differences between emphatic and non-emphatic NPIs out of consideration. The present account extends that of Roelofsen (2018) by bringing emphatic NPIs into the picture. The account incorporates a number of important insights from van Rooij (2003), who also pursues a uniform theory of NPIs in statements and questions, and who also assumes that emphatic NPIs associate with an *even*-like operator. A crucial difference between our account and that of van Rooij (2003), not in empirical but in theoretical scope, concerns the relation between emphatic and non-emphatic NPIs. van Rooij postulates that the former but not the latter associate with an *even*-like operator and shows that this can account for some of the differences in empirical behavior, but he leaves open why only emphatic NPIs would associate with the relevant operator, a limitation shared with other work within

⁵While many languages have particles that are similar in meaning to English *even*, there is also substantial semantic variation among such particles, both within and across languages (Gast and van der Auwera, 2011). Therefore, for theories which assume that NPIs associate with an operator whose semantics is close to that of English *even*, it is natural to assume that the semantics of the relevant operator and that of English *even* are not necessarily *identical*. Indeed, we will not be committed to such a semantic identity. That is, our analysis of the operator relevant for NPIs should not be taken as a semantics for English *even*.

⁶The EVEN approach is not the only approach to NPIs that has been pursued. Indeed, many other approaches can be found in the literature (see, among many others, Giannakidou 1998, Chierchia 2013, and Barker 2018). A comprehensive review of all these approaches is beyond the scope of this paper.

⁷The work of Lahiri (1998) should be mentioned here as well, since it has made important contributions to the EVEN approach. We are not sure, however, which of the two views distinguished here applies best to Lahiri. He offers a general analysis of NPIs in Hindi as involving EVEN. However, he points out that such NPIs are always emphatic. He also discusses in some depth whether his analysis may be applied to emphatic and/or non-emphatic NPIs in English, but ultimately leaves this question open. Thus, he does not commit to the assumption that both emphatic and non-emphatic NPIs involve an EVEN operator, but does not conclude the opposite either.

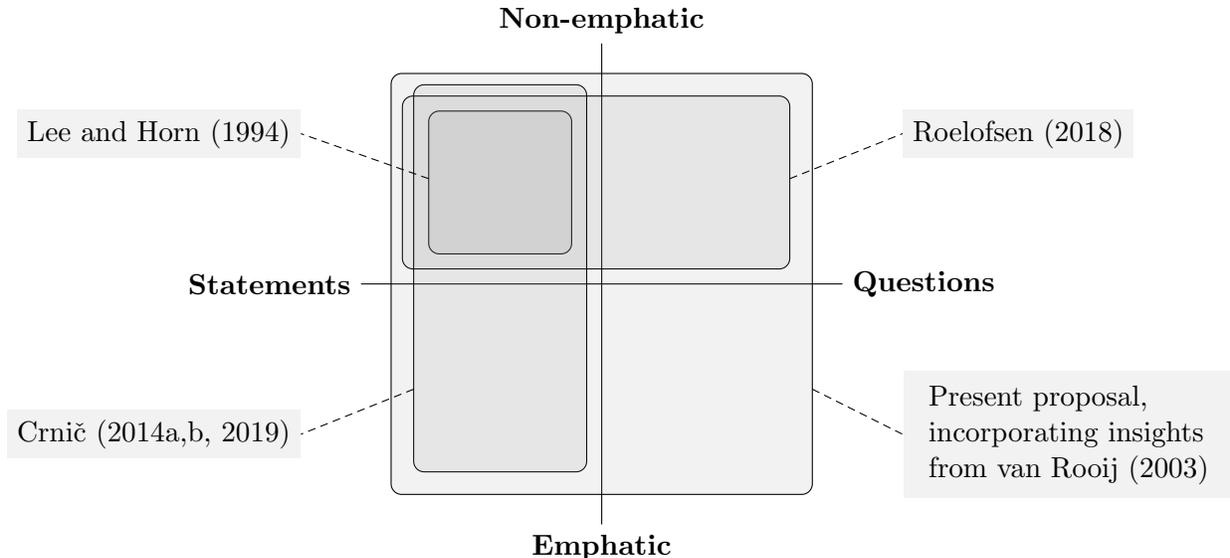


Figure 2: The empirical scope of the present proposal and the ones it primarily builds on.

the divisive EVEN approach. We will attempt to overcome this limitation by showing how the empirical differences between emphatic and non-emphatic NPIs can be derived from their emphatic/non-emphatic nature.

In order to spell out our account we will need to make some basic assumptions concerning the semantics of statement and questions. We will formulate these basic assumptions in inquisitive semantics (Ciardelli et al., 2018). This framework is useful for our purposes here, because it allows for a uniform semantic treatment of statements and questions, which in turn facilitates a uniform treatment of NPIs across the two sentence types. Inquisitive semantics is similar in this respect (and many other respects) to Hamblin semantics (Hamblin, 1973). The differences between the two frameworks are not essential for our purposes here, and our analysis could straightforwardly be translated into Hamblin semantics. Indeed, we will attempt to formulate things in such a way that readers more familiar with Hamblin semantics than inquisitive semantics will immediately recognize how such a translation would go. Our choice for inquisitive semantics over Hamblin semantics is based on considerations orthogonal to the treatment of NPIs (see Roelofsen, 2013; Ciardelli, 2017; Ciardelli and Roelofsen, 2017; Ciardelli et al., 2017, 2018, for discussion).

The remainder of this section is organized as follows. Section 4.1 provides the necessary notions from inquisitive semantics, Section 4.2 spells out our background assumptions about the semantics of statements and questions, and Section 4.3 reviews the treatment of non-emphatic NPIs developed in Lee and Horn (1994), Crnič (2014a,b, 2019), and Roelofsen (2018). With this background in place, our account of emphatic NPIs will be presented in Section 5.

4.1 Relevant notions from inquisitive semantics

Informative and inquisitive content While in truth-conditional semantics the meaning of a sentence φ is taken to capture just the information conveyed by φ , in inquisitive semantics it is intended to capture the *issue* expressed by φ as well. The information that is conveyed by a sentence is called its *informative content*, and the issue expressed by it its *inquisitive content*. To encode both kinds of content at once, the semantic value of a sentence is construed as a set of propositions, no matter whether the sentence is a statement or a question. By uttering a sentence φ with semantic value $\llbracket\varphi\rrbracket$, a speaker is taken to raise an issue whose resolution requires

establishing one of the propositions in $\llbracket\varphi\rrbracket$, while simultaneously providing the information that the actual world is contained in the union of these propositions, $\bigcup\llbracket\varphi\rrbracket$. Thus, $\bigcup\llbracket\varphi\rrbracket$ is the informative content of φ , and is therefore also written as $\text{info}(\varphi)$.

Downward-closure and elementary resolutions The semantic value of a sentence in inquisitive semantics is always *downward closed*: if $p \in \llbracket\varphi\rrbracket$ and $q \subset p$, then also $q \in \llbracket\varphi\rrbracket$. This captures the intuition that, if a proposition p resolves a given issue, then any stronger proposition $q \subset p$ will also resolve that issue. As a limit case, it is assumed that the inconsistent proposition, \emptyset , trivially resolves all issues, and is therefore included in the semantic value of every sentence. For any set of propositions P , we write P^\downarrow for the downward closure of P :

$$(59) \quad P^\downarrow := \{q \mid q \subset p \text{ for some } p \in P\}$$

The maximal elements of $\llbracket\varphi\rrbracket$, which we will denote as $\llbracket\varphi\rrbracket^{\text{max}}$, are those propositions that contain precisely enough information to resolve the issue expressed by φ .⁸ Non-maximal elements of $\llbracket\varphi\rrbracket$ also resolve the issue expressed by φ but provide more information than is strictly necessary to do so. In this sense, the propositions in $\llbracket\varphi\rrbracket^{\text{max}}$ can be thought of as the elementary resolutions of φ .

Truth and settledness The semantic value of a sentence in inquisitive semantics determines whether the sentence is true in any given world and also whether it is settled in any given information state. Specifically, a sentence φ is said to be true in a world w just in case w is not ruled out by the information conveyed by φ , i.e., $w \in \text{info}(\varphi)$, and it is settled in an information state s (modelled in the usual way as a set of possible worlds) just in case (i) the information conveyed by φ is already available in s , and (ii) the issue raised by φ is resolved by the information available in s . These two conditions are satisfied just in case $s \in \llbracket\varphi\rrbracket$.

Informative and inquisitive sentences The informative content of φ is trivial if $\text{info}(\varphi)$ covers the set of all possible worlds that are compatible with the presuppositions triggered by φ , which we will denote as $\text{pre}(\varphi)$. In this case, i.e., when $\text{info}(\varphi) = \text{pre}(\varphi)$, φ is called *non-informative*. Conversely, φ is called *informative* if $\text{info}(\varphi) \neq \text{pre}(\varphi)$. The inquisitive content of a sentence can also be trivial. This is the case if the issue expressed by φ is already resolved by the information provided by φ itself, i.e., if $\text{info}(\varphi) \in \llbracket\varphi\rrbracket$. In this case, φ is called *non-inquisitive*. Conversely, φ is called *inquisitive* if $\text{info}(\varphi) \notin \llbracket\varphi\rrbracket$. If φ is non-inquisitive, its semantic value always has a unique maximal element, namely $\text{info}(\varphi)$. Vice versa, if $\llbracket\varphi\rrbracket$ contains multiple maximal elements, it is always inquisitive.

These are all the notions from inquisitive semantics that are needed for our purposes here.

4.2 Assumptions about the semantics of statements and questions

We use the term ‘statements’ here for declarative sentences with falling intonation. Following Ciardelli et al. (2018) and many others, we assume that such sentences are never inquisitive.⁹ That is, the semantic value of a statement φ always contains a single maximal element, which coincides with its informative content, $\text{info}(\varphi)$. For example:

$$(60) \quad \llbracket\text{Ann left}\rrbracket = \{ \{w \mid \text{Ann left in } w\} \}^\downarrow$$

⁸In the inquisitive semantics literature the maximal elements of $\llbracket\varphi\rrbracket$ are usually referred to as the *alternatives* that φ introduces. We avoid this terminology here because we will be using the term ‘alternatives’ in a different sense below.

⁹There is also work in inquisitive semantics that does not make this assumption (e.g., Groenendijk, 2009; AnderBois, 2012; Coppock and Brochhagen, 2013). This is possible when a different perspective is taken on what is encoded by the semantic value of a sentence. In particular, it requires a view under which uttering an inquisitive sentence does not necessarily involve issuing a request for information. See Ciardelli et al. (2012) for discussion.

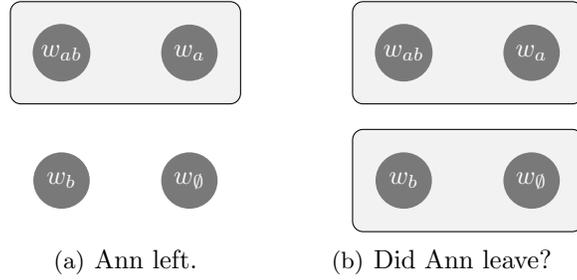


Figure 3: Statements and polar questions.

The semantic value in (60) is depicted in Figure 3a. In this Figure, w_{ab} is a world in which both Ann and Bill left, w_a one in which only Ann left, w_b one in which only Bill left, and w_\emptyset one in which neither Ann nor Bill left. The shaded rectangle contains the two worlds in which Ann left, thus representing the unique maximal element of $\llbracket \text{Ann left} \rrbracket$.

While statements are never inquisitive and typically informative (except when they are tautological), questions are never informative and typically inquisitive (again, except when they are tautological). This means that the semantic value of a question typically contains multiple maximal elements, ‘elementary resolutions’, which together cover the set of all possible worlds that are compatible with the question’s presuppositions.

For instance, the polar question *Did Ann leave?* has two elementary resolutions, the proposition that Ann left and the proposition that Ann did not leave. These two propositions together cover the set of all possible worlds. The question does not have any presuppositions.

$$(61) \quad \llbracket \text{Did Ann leave?} \rrbracket = \left\{ \begin{array}{l} \{w \mid \text{Ann left in } w\}, \\ \{w \mid \text{Ann didn't leave in } w\} \end{array} \right\}^\downarrow$$

Turning to wh-questions, consider the simple example in (62):

$$(62) \quad \text{Who left?}$$

This question is usually assumed to have both an exhaustive and a non-exhaustive reading (also called a ‘mention-some’ reading). On an exhaustive reading, its resolution requires information determining for every person in the contextually given domain of quantification whether they left or not, while on a non-exhaustive reading, its resolution merely requires information establishing for one person in the domain that he or she left.¹⁰

There are different views in the literature as to whether the proposition that *nobody left* resolves the issue expressed by (62). Some authors assume that a question like (62) carries an existential presupposition, i.e., the presupposition that someone left. For these authors, the proposition that *nobody left* does not resolve the issue that the question expresses, but rather denies its presupposition (e.g. Keenan and Hull, 1973). Others assume that the question does not carry an existential presupposition, and accordingly classify the proposition that *nobody left* as a proper resolution of the question (e.g., Groenendijk and Stokhof, 1984). We will not take a stand here in this debate,¹¹ but will simply consider both presuppositional and non-presuppositional readings of wh-questions like (62), and will spell out the predictions of the

¹⁰We are restricting our attention here to matrix questions. It has been argued that when wh-questions are embedded, further levels of exhaustivity (i.e., weak exhaustivity and intermediate exhaustivity) may have to be distinguished. We refer to Dayal (2016, Ch.3) and Onea and Zimmermann (2019, p.22-27) for recent surveys of the literature concerned with this issue, and to Theiler et al. (2018) for a concrete proposal that is directly compatible with the analysis of matrix questions assumed here.

¹¹See Dayal (2016, p.51-52) and Onea and Zimmermann (2019, p.20.22) for recent surveys of the debate and further references.

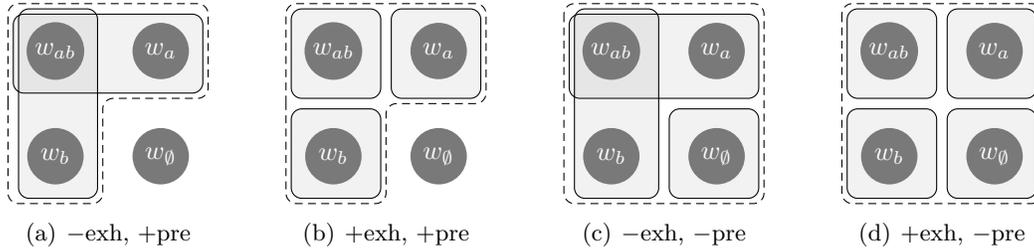


Figure 4: Four possible interpretations of *Who left?*

theory developed below for both types of readings.

This means that, in total, we will consider four readings: plus or minus exhaustive, and plus or minus existential presupposition. The semantic values encoding these four readings in inquisitive semantics are displayed in Figure 4, under the assumption that the domain of quantification consists of just two individuals, Ann (*a*) and Bill (*b*). We use dashed lines here to represent presuppositions. In Figures 4a and 4b the set of worlds enclosed by the dashed line is $\{w_{ab}, w_a, w_b\}$, i.e., the set of worlds where at least one person left. This means that under these readings the question presupposes that someone left. On the other hand, in Figures 4c and 4d the set of worlds enclosed by the dashed line is the set of all worlds. Thus, under these readings, the presupposition of the question is trivial, i.e., satisfied in all worlds.

To see how the difference between exhaustive and non-exhaustive readings is represented, compare Figures 4a and 4b. The first displays an issue with two elementary resolutions, the proposition that Ann left and the proposition that Bill left. This is the issue expressed by *Who left?* on a non-exhaustive presuppositional reading. On the other hand, Figure 4b displays an issue with three elementary resolutions: the proposition that both Ann and Bill left, the proposition that only Ann left, and the proposition that only Bill left. This is the issue expressed by *Who left?* on an exhaustive presuppositional reading. The difference between Figures 4c and 4d is parallel; only in these cases there is no existential presupposition and the proposition that no one left is included as an elementary resolution.

4.3 Non-emphatic NPIs

Having introduced the relevant notions from inquisitive semantics and our background assumptions about the semantics of statements and questions, we now summarize the account of non-emphatic NPIs developed in Roelofsen (2018), building on Lee and Horn (1994) and Crnić (2014a,b, 2019). In Section 5, we will propose an extension of this account to capture the behavior of emphatic NPIs.

4.3.1 Lexical semantics of NPIs

Weak NPIs are treated as existential quantifiers over a certain domain. That is, the lexical specification of an NPI involves two components, one that determines its existential quantificational force and one that determines its lexical domain of quantification. We denote these two components as \exists and D , respectively.¹² In the case of *any* D is the set of all entities D_e ; in the case of *ever* it is the set of all time intervals. In general, the lexically specified quantificational

¹²The line of work that we are building on here makes the basic assumption that indefinite NPIs like *any* are existential quantifiers, even though the quantificational analysis of indefinites is known to face many challenges, and alternative analyses of indefinites have been developed to overcome these challenges, especially in dynamic semantics (see Kamp, 1981; Heim, 1982, and much subsequent work). We adopt the quantificational analysis of indefinites here. In principle, we think it should be possible to reformulate the approach to NPIs that we build on in such a way that it no longer relies on a quantificational treatment of indefinites, but we leave such a reformulation for another occasion.

domain of the kind of NPIs that we are analysing here is the set of *all* objects of a certain type (entities, time intervals, etc.).

$$(63) \quad \textit{any} = [\exists D_e]$$

When used in a particular context, the lexically specified domain of quantification is contextually restricted. Concretely, we assume that every context of utterance c comes with a particular domain of discourse D^c , which is the set of all entities, time intervals, etc. that are deemed relevant in that context. The domain of quantification of *any* when used in context c is the intersection $D_e \cap D^c$.

For concreteness, the semantic value of *any* relative to a context c is spelled out in (64).

$$(64) \quad \llbracket \textit{any} \rrbracket^c = \lambda P_{e\langle st \rangle} . \lambda P'_{e\langle st \rangle} . \lambda p_{st} . \forall w \in p . \exists x \in D_e \cap D^c . P(x)(w) \wedge P'(x)(w)$$

In words: *any* combines with two properties P and P' of type $e\langle st \rangle$, and yields the set of all propositions p which consist of worlds in which there is at least one object in the contextually restricted domain $D_e \cap D^c$ that satisfies both P and P' .

4.3.2 Lexically specified alternatives

The line of work that we build on further assumes that NPIs are lexically specified to generate certain *alternatives*, which serve as input for the EVEN operator that they associate with. Given their treatment as existential quantifiers over a domain consisting of all objects of a certain type (possibly restricted contextually), they are naturally assumed to generate two types of alternatives: **quantity alternatives** and **subdomain alternatives**. Quantity alternatives are obtained by replacing the existential quantifier by other quantifiers that form a scale with it, either the proportional scale $\langle \textit{some}, \textit{many}, \textit{all} \rangle$ or the numerical scale $\langle \textit{one}, \textit{two}, \textit{three}, \dots \rangle$. Subdomain alternatives, on the other hand, are obtained by replacing the lexically specified domain D by more narrow domains $D' \subseteq D$.

Some theories of non-emphatic NPIs assume that EVEN only associates with quantity alternatives (e.g., Lahiri, 1998; Crnič, 2014b), others assume that it only associates with subdomain alternatives (Roelofsen, 2018; Crnič, 2019), and yet others assume that it can associate with both types of alternatives (Lee and Horn, 1994). The repercussions of this choice are not directly relevant here.¹³ In reviewing the EVEN approach to non-emphatic NPIs we will concentrate on subdomain alternatives. In Section 5, where we extend the approach to emphatic NPIs, we will return to quantity alternatives.

The set of subdomain alternatives generated by *any* in a context c is specified in (66).

$$(65) \quad \llbracket \textit{any} \rrbracket_{\text{alt}}^c = \{ \lambda P_{e\langle st \rangle} . \lambda P'_{e\langle st \rangle} . \lambda p_{st} . \forall w \in p . \exists x \in D' \cap D^c . P(x)(w) \wedge P'(x)(w) \mid D' \subset D_e \}$$

In words: for every $D' \subset D_e$ there is one subdomain alternative, namely a function that takes two properties P and P' of type $e\langle st \rangle$ as its input, and yields as its output the set of all propositions p which consist of worlds in which there is at least one object in the domain $D' \subset D_e$ that satisfies both P and P' .

When an NPI is part of a larger constituent, the alternatives generated by that constituent are computed by composing the alternatives generated by the NPI in a point-wise manner with the semantic values of the other lexical items in the larger constituent. For instance:

$$(66) \quad \llbracket \textit{Bill saw anything} \rrbracket^c = \lambda p_{st} . \forall w \in p . \exists x \in D_e \cap D^c . \textit{saw}(\textit{Bill})(x)(w)$$

$$(67) \quad \llbracket \textit{Bill saw anything} \rrbracket_{\text{alt}}^c = \{ \lambda p_{st} . \forall w \in p . \exists x \in D' \cap D^c . \textit{saw}(\textit{Bill}, x)(w) \mid D' \subset D_e \}$$

¹³It is worth noting that such repercussions have in fact not been discussed in much depth in the literature, though see Crnič 2019, fn.12, for an argument in favour of assuming that EVEN associates only with subdomain alternatives.

In words: the semantic value of *Bill saw anything* in context c is the set of all propositions p which consist of worlds in which Bill saw at least one element of the contextually restricted domain $D_e \cap D^c$. For each subdomain D' of D_e , there is one subdomain alternative, namely the set of all propositions consisting of worlds in which Bill saw at least one element of $D' \cap D^c$.

Making use of the $\{\cdot\}^\downarrow$ operator, defined in Section 4.1, we can also write this as follows:

$$(68) \quad \llbracket \text{Bill saw anything} \rrbracket^c = \{ \{w \mid \exists x \in D_e \cap D^c. \text{saw}(\text{Bill})(x)(w)\} \}^\downarrow$$

$$(69) \quad \llbracket \text{Bill saw anything} \rrbracket_{\text{alt}}^c = \{ \{ \{w \mid \exists x \in D' \cap D^c. \text{saw}(\text{Bill})(x)(w)\} \}^\downarrow \mid D' \subset D_e \}$$

This notational variant will be especially convenient when we consider questions. To further simplify formulas we will henceforth often use D_e^c as a shorthand for the contextually restricted domain of entities $D_e \cap D^c$.

4.3.3 Semantics of EVEN

The alternatives generated by an NPI serve as input for the associated EVEN operator. We now specify a basic treatment of this operator closely based on Crnič (2019) and Roelofsen (2018). In Section 5 this treatment will be extended to deal with emphatic NPIs.

Syntactically, Crnič (2019) argues that EVEN is merged with the NPI but then moves to the left periphery of a full clause containing the NPI. Semantically, we assume for now that EVEN requires its prejacent φ to satisfy two conditions. First, φ should not already be completely ruled out by the contextually available information. And second, it should be at most as likely as any of its alternatives in light of the contextually available information. If these requirements are met, then the semantic value of EVEN φ is just that of φ itself. On the other hand, if these requirements are not met, then the semantic value of EVEN φ is undefined.¹⁴ This is captured formally by the following lexical entry for EVEN, where we write $\text{info}(c)$ for the set of worlds that are considered possible given the information available in c .

- (70) a. $\llbracket \text{EVEN } \varphi \rrbracket^c$ is defined only if:
- (i) $\bigcup \llbracket \varphi \rrbracket^c \cap \text{info}(c) \neq \emptyset$
 - (ii) no $A \in \llbracket \varphi \rrbracket_{\text{alt}}^c$ is such that $\llbracket \varphi \rrbracket^c >_c A$
- b. If defined, $\llbracket \text{EVEN } \varphi \rrbracket^c = \llbracket \varphi \rrbracket^c$

Note that the interpretation function $\llbracket \cdot \rrbracket$ has a context parameter c . To enhance readability, we will often suppress this parameter in what follows. It remains to be specified what $\llbracket \varphi \rrbracket >_c A$ means exactly. We first consider the standard definition, which is adopted in Crnič's work, and then a more general definition, proposed in Roelofsen (2018) in order to deal with questions.

For Crnič, both $\llbracket \varphi \rrbracket$ and its alternatives are simple propositions, i.e., sets of possible worlds (rather than sets of propositions as in inquisitive semantics). For any context c , let P^c denote the probability distribution over possible worlds such that for each world w , $P^c(w)$ is the likelihood that w is the actual world, given the information available in c . Moreover, for any proposition p , let $P^c(p)$ be the sum of all the probabilities assigned by P^c to worlds in p :

$$(71) \quad P^c(p) := \sum_{w \in p} P^c(w)$$

Then, $\llbracket \varphi \rrbracket >_c A$ is naturally taken to mean that the probability assigned to $\llbracket \varphi \rrbracket$ in c is greater than that assigned to A :

¹⁴The second definedness condition in (70) is taken from Roelofsen (2018). It differs slightly from that assumed in Crnič's work. The latter requires that φ be strictly *less* likely than every alternative. Roelofsen (2018) allows for the possibility that some alternatives are equally likely as φ . This does not seem to affect the predictions for NPIs in statements, but is crucial for questions. The first definedness condition in (70) is added here. As will become clear below, it avoids unwelcome predictions in certain boundary cases, specifically when the contextually available information is inconsistent. See, for instance, the discussion of example (74) right below.

$$(72) \quad \llbracket \varphi \rrbracket >_c A \quad \text{if and only if} \quad P^c(\llbracket \varphi \rrbracket) > P^c(A)$$

This standard way to compare propositions in terms of a contextual probability distribution works well when $\llbracket \varphi \rrbracket$ and its alternatives are propositions, which can be assumed if we restrict our attention to statements. But what if φ is a question? Then its semantic value is not a single proposition, but rather (at least in inquisitive semantics as well as many other semantic theories of questions) a set of propositions. In order to compare two such proposition sets in terms of a contextual probability distribution, the standard approach given above needs to be generalized.

Roelofsen (2018) describes one natural way to do this: when comparing $\llbracket \varphi \rrbracket$ to an alternative A , where both are sets of propositions, we simply check whether the sum of all the probabilities assigned by P^c to worlds in $\bigcup \llbracket \varphi \rrbracket$ exceeds the sum of all the probabilities assigned by P^c to worlds in $\bigcup A$. That is, we assess whether the *cumulative likelihood* of $\llbracket \varphi \rrbracket$ exceeds that of A :

$$(73) \quad \llbracket \varphi \rrbracket >_c A \quad \text{if and only if} \quad P^c(\bigcup \llbracket \varphi \rrbracket) > P^c(\bigcup A)$$

Given the uniform treatment of statements and questions in inquisitive semantics, the definition in (73) applies not only when φ is a question, but also when it is a statement. In both cases, $\llbracket \varphi \rrbracket$ is a set of propositions. Still, in the case of statements, the generalized definition yields precisely the same results as the standard definition, because when φ is a statement, $\bigcup \llbracket \varphi \rrbracket$ amounts to the unique maximal element of $\llbracket \varphi \rrbracket$, which is just the set of all worlds in which φ is true, i.e., the proposition that φ is classically taken to express.

4.3.4 Main predictions for statements

We now briefly summarize the predictions of the account for statements (and below we do the same for questions). We refer to Crnič (2014a,b, 2019) for much more extensive discussion.

First consider the positive statement in (74) and its presumed logical form in (75):

$$(74) \quad \text{*Bill saw anything.}$$

$$(75) \quad [\text{EVEN } [\varphi \text{ Bill saw anything}]]$$

The semantic value of the constituent labeled as φ , the prejacent of EVEN, was given in (66) above, and the alternatives it generates in (67). $\bigcup \llbracket \varphi \rrbracket$ is the set of worlds in which Bill saw at least one element of D_e^c . $\llbracket \text{EVEN } \varphi \rrbracket$ is defined only if $\bigcup \llbracket \varphi \rrbracket \cap \text{info}(c) \neq \emptyset$. This means that there must be at least one element x of D_e^c which is such that P^c assigns non-zero probability to the proposition that Bill saw x .

Now, let D' be the set $D_e^c \setminus \{x\}$, and let $A_{D'}$ be the subdomain alternative of φ corresponding to D' . Then it must be the case that $\llbracket \varphi \rrbracket >_c A_{D'}$. This means that the second definedness condition of EVEN is not satisfied. Thus, the prediction is that the semantic value of (75) is undefined in any context. A similar prediction is made for NPIs in other upward entailing environments.

Now consider the negative statement in (76) and its presumed logical form in (77):

$$(76) \quad \text{Bill didn't see anything.}$$

$$(77) \quad [\text{EVEN } [\varphi \text{ NEG Bill saw anything}]]$$

We have that:

$$(78) \quad \llbracket \varphi \rrbracket = \{ \{w \mid \neg \exists x \in D_e^c. \text{saw}(\text{Bill})(x)(w)\} \}^\downarrow$$

$$(79) \quad \llbracket \varphi \rrbracket_{\text{alt}} = \{ \{ \{w \mid \neg \exists x \in D'. \text{saw}(\text{Bill})(x)(w)\} \}^\downarrow \mid D' \subset D_e^c \}$$

$\bigcup \llbracket \varphi \rrbracket$ is the set of worlds in which Bill didn't see any element of D_e^c . For any alternative A , $\bigcup A$ is the set of worlds in which Bill didn't see any element of D' , where $D' \subset D_e^c$. This means that for

every alternative A , it must be the case that $\bigcup \llbracket \varphi \rrbracket \subseteq \bigcup A$. But then it cannot be the case for any alternative A that $\llbracket \varphi \rrbracket >_c A$. This means that the second definedness condition posed by EVEN is guaranteed to be satisfied. The first is also satisfied in any context in which the available information is consistent with the possibility that Bill saw something, i.e., in any context in which it would not be redundant to utter (76). So it is predicted that NPIs are licensed under negation, and a similar prediction is made for other downward entailing environments.

These basic predictions are not unique to EVEN-based theories of NPIs. Indeed, they are shared by virtually all approaches to NPIs, though derived in different ways. However, when it comes to *non-monotonic* environments, i.e., environments that are neither upward nor downward entailing, EVEN-based theories have a distinct advantage (Crnič, 2014b). In such environments, NPIs are sometimes licensed, but not always (Linebarger, 1980, 1987; Rothschild, 2006; Gajewski, 2008). This is illustrated in (80):

- (80) There were twenty guests at the potluck.
 a. Exactly two of them brought any food.
 b. *Exactly eighteen of them brought any food.

(80a) is predicted to be acceptable in a context c if the proposition that exactly two of the twenty guests brought any kind of food is at most as likely as the proposition that exactly two of the twenty guests brought a starter / a main dish / a desert, etc. This contextual assumption is easy to accommodate given our general expectations about potlucks.

On the other hand, (80b) is predicted to be acceptable in a context c if the possibility that exactly eighteen of the twenty guests brought any kind of food is at most as likely as the possibility that exactly eighteen of the twenty guests brought a starter / a main dish / a desert, etc. This contextual assumption is very difficult to accommodate.

Presumably, the harder it is to accommodate the presuppositions of a sentence, the lower its acceptability rate will be (Crnič, 2014b). This gives the EVEN-based approach an interesting handle on the variable acceptability of non-emphatic NPIs in non-monotonic environments, a phenomenon that is problematic for other approaches to NPIs.

4.3.5 Main predictions for questions

We now summarize the main predictions of the account for polar questions and wh-questions, referring to Roelofsen (2018) for more extensive discussion.

First consider the polar question in (81) and its presumed logical form in (82):

- (81) Did Bill see anything?

- (82) $[\text{EVEN } [\varphi \text{ INT did Bill see anything}]]$

We have that:

$$(83) \quad \llbracket \varphi \rrbracket = \left\{ \begin{array}{l} \{w \mid \exists x \in D_e^c. \text{saw}(\text{Bill})(x)(w)\}, \\ \{w \mid \neg \exists x \in D_e^c. \text{saw}(\text{Bill})(x)(w)\} \end{array} \right\}^\downarrow$$

$$(84) \quad \llbracket \varphi \rrbracket_{\text{alt}} = \left\{ \left\{ \begin{array}{l} \{w \mid \exists x \in D'. \text{saw}(\text{Bill})(x)(w)\}, \\ \{w \mid \neg \exists x \in D'. \text{saw}(\text{Bill})(x)(w)\} \end{array} \right\}^\downarrow \mid D' \subset D_e^c \right\}$$

Now note that $\bigcup \llbracket \varphi \rrbracket = W$, the set of all possible worlds. For every alternative A , $\bigcup A = W$ as well. This means that $\text{P}^c(\bigcup \llbracket \varphi \rrbracket) = 1$, and that $\text{P}^c(\bigcup A) = 1$ as well, for every alternative A . As a consequence, the requirements posed by EVEN are guaranteed to be satisfied, and therefore it is predicted that NPIs are licensed in polar questions like (81).

Next, consider the wh-question in (85) and its presumed logical form in (86):

- (85) Who saw anything?

(86) [EVEN [φ INT who saw anything]]

For simplicity, let's assume that *who* ranges over just two individuals, Ann and Bill. Recall that we have to consider four possible readings: plus or minus exhaustive, and plus or minus presuppositional. On any of the two non-presuppositional readings (either exhaustive or non-exhaustive), we have that $\bigcup \llbracket \varphi \rrbracket = W$, which means that the cumulative likelihood of $\llbracket \varphi \rrbracket$ amounts to 1, and the same holds for each subdomain alternative A . The requirements posed by EVEN are satisfied in this case. So it is predicted that the NPI is licensed on these readings.

On a presuppositional reading, the cumulative likelihood of $\llbracket \varphi \rrbracket$ is the likelihood that the presupposition of the question is satisfied, i.e., the presupposition that someone saw something in D_e^c . The cumulative likelihood for the subdomain alternatives is the likelihood that someone saw something in D' , where $D' \subset D_e^c$. In order for the first requirement posed by EVEN to be satisfied, $\bigcup \llbracket \varphi \rrbracket$ must be compatible with the contextually available information. This means that there must be at least one object x such that the likelihood that someone saw x is non-zero. Let D' be the domain $D_e^c \setminus \{x\}$, and let $A_{D'}$ be the corresponding subdomain alternative. Then the cumulative likelihood of A will be strictly lower than the cumulative likelihood of $\llbracket \varphi \rrbracket$. This means that the second requirement posed by EVEN is not satisfied. So it is predicted that NPIs are not licensed in *wh*-questions under a presuppositional reading, no matter whether the question is interpreted exhaustively or non-exhaustively.

The account thus predicts that NPIs can be licensed in *wh*-questions, but only if a non-presuppositional reading is possible. If such a reading is blocked, NPIs are predicted to be unacceptable. This prediction can be tested in a number of ways. For instance, singular *which* questions like (87) are usually taken to carry an obligatory existential presupposition.

(87) Which boy left? \rightsquigarrow presupposes that some boy left

To the extent that the existential presupposition is indeed obligatory in such questions, it is predicted that the NPI in (88) is not licensed:

(88) *Which boy saw anything?

While this prediction has not been tested systematically yet, Schwarz (2017b) reports that some of his informants indeed find cases like (88) unacceptable, but others don't. He further suggests, based on his informants' reports, that the existential presupposition of singular *which* questions like (88) can in fact be suspended, and that it is exactly in these cases that the NPI becomes acceptable. This finding is in line with the above account, though more empirical work is needed to further corroborate it.

Another way to test the prediction of the account, suggested in Roelofsen (2018), is to look at *embedded* *wh*-questions in environments where non-presuppositional readings are blocked. For instance, it has been argued in the literature that emotive factive predicates like *surprise* can only embed *wh*-questions that carry an existential presupposition (d'Avis, 2002; Roelofsen et al., 2019; Roelofsen, 2019). This is illustrated by the unacceptability of (90), in which the embedded question is explicitly non-presuppositional.

(89) It surprised Bill which Dutch mountaineers climbed Mount Everest this year.

(90) *It surprised Bill which Dutch mountaineers, if any, climbed Mount Everest this year.

Therefore it is predicted that NPIs are not licensed in *wh*-questions embedded under *surprise* and other emotive factives. This is indeed the case, as has been observed by Guerzoni and Sharvit (2007) and is illustrated in (91):

(91) *It surprised Bill who ever climbed Mount Everest.

This concludes our summary of the EVEN-based account of non-emphatic NPIs in statements and questions that serves as our starting point. We now turn to emphatic NPIs.

5 Proposal for emphatic NPIs

The basic idea underlying our proposal is that the *EVEN* operator, just like the particle *even*, not only contributes a **comparative** requirement (the cumulative likelihood of the prejacent should not exceed that of its subdomain alternatives), but also an **additive** requirement. In the case of the overt particle *even*, this additive component is traditionally taken to require, roughly, that some contextually salient focus alternative of the prejacent be true (Karttunen and Peters, 1979, among others).¹⁵ The work of Crnić (2014a,b, 2019) and Roelofsen (2018) reviewed above does not associate such an additive requirement with the covert operator *EVEN* involved in NPIs. Rather, it focuses exclusively on the comparative requirement.¹⁶

We will reinstall the additive requirement and, furthermore, building on van Rooij (2003), generalize the formulation of this requirement in such a way that it applies uniformly to cases in which *EVEN* occurs in statements as well as cases in which it occurs in questions. Such a generalization is needed because if the prejacent of *EVEN* is a question, the focus alternatives of that question are also questions, and these cannot be required to be true—after all, questions are not naturally thought of as being either true or false. We therefore do not formulate the additive requirement in terms of truth, but rather in terms of *settledness*,¹⁷ the counterpart of truth in inquisitive semantics (see Section 4.1). Using this notion, we will argue that the additive component of *EVEN* is the main source of the inferences associated with emphatic NPIs, including domain widening inferences in statements and negative biases in questions.

This approach will deliver a unified treatment of emphatic and non-emphatic weak NPIs as involving the same *EVEN* operator. At the same time, however, it will be able to derive the core empirical differences between emphatic and non-emphatic uses of weak NPIs from two assumptions: (i) only emphatic NPIs involve focus, and (ii) the additive component of *EVEN* operates on focus alternatives. As a consequence, when *EVEN* associates with a non-emphatic NPI, its additive component is vacuous because the NPI does not generate focus alternatives. From this, it will follow that non-emphatic NPIs do not semantically trigger domain widening effects in statements or negative biases in questions.

Since focus alternatives play a key role in the account, we start in Section 5.1 by making our general assumptions about focus semantics explicit. After that, Section 5.2 spells out our treatment of *EVEN*, and Section 5.3 discusses the lexical semantics of emphatic NPIs and the focus alternatives they give rise to in more detail.

5.1 General assumptions about focus semantics

Consider the following sentence:

(92) John only introduced SUE to Fred.

The standard way to derive the interpretation of this sentence, first proposed by Rooth (1985), is as follows. The particle *only* is focus sensitive: it operates not only on the ordinary semantic value of its prejacent *John introduced SUE to Fred*, but also on its focus alternatives. The focus alternatives of *John introduced SUE to Fred* are the propositions expressed by sentences of the form *John introduced x to Fred*, for some individual *x*. The particle *only* (roughly) says that its prejacent is true and all focus alternatives of the prejacent which are not entailed by the prejacent itself are false. In the case of (92), this means that John introduced Sue to Fred, and that he did not introduce anyone else to Fred.

¹⁵Wilkinson (1996) and Francis (2018) explicitly argue in favour of this additive component of *even*, and address possible objections to it.

¹⁶Crnić (2014a) does briefly mention that the additive requirement might play a role in deriving correct exhausted readings, but does not use it to capture the range of inferences that characterize emphatic NPIs, as we will do here.

¹⁷It is perhaps worth noting that in the literature on inquisitive semantics the term ‘support’ is used interchangeably with the term ‘settledness’. Indeed, ‘support’ is the more commonly used term. We use ‘settledness’ here because we feel that it is particularly intuitive in the present setting.

While this treatment of focus-sensitive operators like *only* is commonplace, and indeed often suffices for the purposes at hand, it is known to run into trouble when applied to sentences with multiple focus-sensitive operators (Jacobs, 1983; Krifka, 1991). To see this, consider (93b) in the context of (93a):

- (93) a. John only introduced SUE to Fred.
 b. He also only introduced SUE to BILL.

Intuitively, in (93b) *only* associates with the focus alternatives generated by SUE, while *also* associates with the focus alternatives generated by BILL. This cannot be captured on a Roothian account, because only one set of focus alternatives is generated, namely the set of propositions expressed by sentences of the form *John introduced x to y*, where *x* and *y* range over individuals. The focus-sensitive operators can only be applied to this set as a whole, rather than to subsets of it where *x* or *y* is kept fixed. In short, the problem is that focus-sensitive operators can only associate *unselectively* with all foci in their scope.

A solution to this problem has been developed by Wold (1996). On his approach, a focus-sensitive operator only associates with focus alternatives generated by focused constituents that are co-indexed with the operator. As will become clear below, this is needed to suitably formulate the additive requirement contributed by EVEN. Before turning to EVEN, however, we briefly review the two main ingredients of Wold’s general approach. The first ingredient concerns the syntactic representation and the semantic interpretation of focused constituents. Following Kratzer (1991), Wold assumes that focused constituents carry an *indexed* focus feature F_i , where $i \in \{1, 2, \dots\}$. They are interpreted relative to an assignment function g , as follows:

$$(94) \quad \llbracket \alpha_{F_i} \rrbracket^g = \begin{cases} \llbracket \alpha \rrbracket^g & \text{if } i \notin \text{Dom}(g) \\ g(i) & \text{if } i \in \text{Dom}(g) \end{cases}$$

If the focus index i is not in the domain of the assignment function g , then $\llbracket \alpha_{F_i} \rrbracket^g$ amounts to the ordinary semantic value of α , $\llbracket \alpha \rrbracket^g$. On the other hand, if the focus index i is in the domain of g , then $\llbracket \alpha_{F_i} \rrbracket^g$ gets the value that g assigns to i . This value, $g(i)$, is a focus alternative for α . The set of all focus alternatives for α can be obtained by considering all assignment functions that have i in their domain.

The second main ingredient of Wold’s theory concerns the interpretation of focus-sensitive operators. A possible entry for *only* is given in (95), where we write $g'[i]g$ to mean that g' is just like g except that i is added to its domain.

$$(95) \quad \llbracket \text{only}_i \varphi \rrbracket^g = \begin{cases} \text{undefined} & \text{if } i \in \text{Dom}(g) \\ \{w \mid \forall g'[i]g. (\{w \in \llbracket \varphi \rrbracket^{g'} \leftrightarrow \llbracket \varphi \rrbracket^g \subseteq \llbracket \varphi \rrbracket^{g'}\})\} & \text{if } i \notin \text{Dom}(g) \end{cases}$$

This entry captures exactly the semantic analysis of *only* informally characterized above: the prejacent should be true, and all focus alternatives that are not entailed by the ordinary semantic value of the prejacent should be false. The details of this particular treatment of *only* are not important here. What matters is that we can now treat focus-sensitive operators like *only* as associating *selectively* with focus alternatives generated by co-indexed focused constituents. This approach allows us, among other things, to derive adequate interpretations of sentences with multiple focus-sensitive operators like (93), repeated in (96).

- (96) a. John only_i introduced SUE_{F_i} to Fred.
 b. He also only_j introduced SUE_{F_i} to BILL_{F_j} .

For instance, the denotation of BILL_{F_j} is correctly predicted to remain fixed across the alternatives that *only* quantifies over. For $\llbracket (96b) \rrbracket^g$ to be defined, we must have that $i, j \notin \text{Dom}(g)$. This also means that for any g' such that $g'[i]g$, we must have that $j \notin \text{Dom}(g')$, and thus for any such g' it holds that $\llbracket \text{BILL}_{F_j} \rrbracket^{g'} = \llbracket \text{BILL} \rrbracket^{g'} = \text{BILL}$.

With this in place, we can now turn to the additive component of EVEN.¹⁸ Analogous to the index-sensitivity displayed in (96), the additive component of EVEN will associate on our account with a co-indexed focus feature, and will only make a non-trivial semantic contribution in the presence of such a feature.

5.2 EVEN

First recall the entry for EVEN in (70) above, repeated in (97):

- (97) a. $\llbracket \text{EVEN } \varphi \rrbracket^c$ is defined only if:
- (i) $\bigcup \llbracket \varphi \rrbracket^c \cap \text{info}(c) \neq \emptyset$
 - (ii) no $A \in \llbracket \varphi \rrbracket_{\text{alt}}^c$ is such that $\llbracket \varphi \rrbracket^c >_c A$
- b. If defined, $\llbracket \text{EVEN } \varphi \rrbracket^c = \llbracket \varphi \rrbracket^c$

This entry only captures the comparative requirement that EVEN contributes: the likelihood of $\llbracket \varphi \rrbracket^c$ is compared to that of its alternatives. More specifically, it is required that the cumulative likelihood of $\llbracket \varphi \rrbracket^c$ is not greater than that of any of its alternatives.

Let us highlight two aspects of this comparative requirement. First, it is *presuppositional* in nature. That is, if the requirement is not met, $\llbracket \text{EVEN } \varphi \rrbracket^c$ is undefined. Second, as discussed above, the alternatives involved are ones that are generated by the NPI that EVEN associates with as part of its *lexical semantics*. In particular, they are not focus alternatives; they are generated both in the presence and in the absence of focus on the NPI.

We propose that the additive requirement of EVEN differs from the comparative requirement in these two respects. First, as we argued on the basis of example (52) above, the additive requirement is *not presuppositional*, i.e., it does not require that certain information is already present in the common ground, but rather involves a non-at-issue implication about the speaker’s doxastic state. More specifically, we argued that it implies that some contextually salient alternative is already settled in the speaker’s doxastic state.

Second, we propose that the alternatives that the additive requirement of EVEN targets are not the alternatives that the associated NPI generates as part of its lexical semantics, but rather its *focus alternatives*. As a consequence, it only manifests itself when such focus alternatives are present.¹⁹

This leads to the entry in (98) below, where we write $\llbracket \cdot \rrbracket_{\uparrow}^g$ for at-issue semantic content, $\llbracket \cdot \rrbracket_{\downarrow}^g$ for non-at-issue semantic content (both are determined relative to a context c , but as before this is kept implicit to simplify notation). Furthermore, we write DOX_w^{Sp} for the speaker’s doxastic state in world w , and \top for the tautological sentence meaning, which in inquisitive semantics is the set of all propositions.

¹⁸Readers familiar with theories of focus interpretation will have noted that on the theory of focus summarized here, focus association is ‘direct’ in the sense that it is not mediated by a general focus interpretation operator (also known as the ‘squiggle’ operator), as is the case in Rooth (1992) and much subsequent work. We have disregarded this in our discussion for simplicity. Wold (1996) shows how a mediating squiggle operator can be added to his analysis in a natural way. Doing so has advantages for dealing with focus in the absence of explicit focus-sensitive operators, but this is orthogonal to our purposes here.

¹⁹This aspect of our proposal is inspired by Lahiri (1998), who analyses NPIs in Hindi consisting of indefinite expressions in combination with the particle *bhii*. Lahiri proposes that the semantics of *bhii* is very close to that of English *even*, with both a comparative and an additive component. Moreover, Lahiri suggests that only one of these components is focus sensitive, just like we are proposing for EVEN. However, Lahiri proposes that in the case of *bhii* it is the additive component that is always active, no matter whether the associated element is focused, while the comparative component is only active if the associated element is focused. We propose exactly the opposite for the EVEN operator. Lahiri assumes that in the case of ‘*bhii*-indefinite’ NPIs the indefinite is always focused, so both meaning components of *bhii* are always active in this case. Our proposal, for now, is restricted to English. Extensions to capture cross-linguistic variation are left for future work.

(98) a. **At-issue content**

$$\llbracket \text{EVEN}_i \varphi \rrbracket_+^g = \begin{cases} \llbracket \varphi \rrbracket_+^g & \text{if } \begin{cases} \text{(i) } \cup \llbracket \varphi \rrbracket^g \cap \text{info}(c) \neq \emptyset \\ \text{(ii) } \forall A \in \llbracket \varphi \rrbracket_{\text{alt}}^g : A \geq_c \llbracket \varphi \rrbracket_+^g \\ \text{(iii) } i \notin \text{Dom}(g) \end{cases} \\ \text{undefined} & \text{otherwise} \end{cases}$$

b. **Non-at-issue content**

$$\llbracket \text{EVEN}_i \varphi \rrbracket_-^g = \begin{cases} \top & \text{if } \forall g'[i]g. \llbracket \varphi \rrbracket_+^{g'} = \llbracket \varphi \rrbracket_+^g \\ \left\{ \left\{ \left\{ w \mid \begin{array}{l} \forall g'[i]g. ((\llbracket \varphi \rrbracket_+^{g'} \not\subseteq \llbracket \varphi \rrbracket_+^g) \wedge \llbracket \varphi \rrbracket_+^{g'} \text{ is salient in } c) \rightarrow \text{DOX}_w^{Sp} \in \llbracket \varphi \rrbracket_+^{g'}) \end{array} \right\} \right\} \right\}^\downarrow & \text{if } \begin{cases} \exists g'[i]g. ((\llbracket \varphi \rrbracket_+^{g'} \not\subseteq \llbracket \varphi \rrbracket_+^g) \\ \wedge \llbracket \varphi \rrbracket_+^{g'} \text{ is salient in } c) \end{cases} \\ \text{undefined} & \text{otherwise} \end{cases}$$

The entry can be informally paraphrased as follows:

(99) a. **At-issue content**

$$\llbracket \text{EVEN}_i \varphi \rrbracket_+^g = \begin{cases} \llbracket \varphi \rrbracket_+^g & \text{if the contextual cumulative likelihood of } \varphi \\ & \text{does not exceed that of any of its alternatives} \\ \text{undefined} & \text{otherwise} \end{cases}$$

b. **Non-at-issue content**

$$\llbracket \text{EVEN}_i \varphi \rrbracket_-^g = \begin{cases} \text{trivial} & \text{if the NPI is **not focused**} \\ \text{all salient focus alternatives are} & \text{if the NPI is focused and there} \\ \text{settled in the speaker's doxastic state} & \text{are **salient focus alternatives**} \\ \text{undefined} & \text{if the NPI is focused but there} \\ & \text{are **no salient focus alternatives**} \end{cases}$$

Let us go through the formal entry in (98) step by step. First, in the (a) part, which specifies the at-issue content of $\text{EVEN}_i \varphi$, there are three definedness conditions. The ones in (i) and (ii) reflect the presuppositional comparative requirement of EVEN_i , which is just as before. The one in (iii) reflects the fact that we treat EVEN_i as a selective focus-sensitive operator—it parallels the definedness condition in the entry for *only*_{*i*} in (95). When defined, the at-issue content of $\text{EVEN}_i \varphi$ is simply that of φ itself.

The (b) part specifies the non-at-issue content of $\text{EVEN}_i \varphi$. In this case, there are three possibilities. The first obtains when for every assignment g' such that $g'[i]g$ we have that $\llbracket \varphi \rrbracket_+^{g'} = \llbracket \varphi \rrbracket_+^g$. This condition is satisfied if and only if the NPI that EVEN_i associates with is *not* focused. After all, if the NPI is not focused, it does not carry an i -indexed focus feature, and interpreting φ relative to any g' such that $g'[i]g$ will yield exactly the same result as interpreting it relative to g itself. In this case, the non-at-issue content of $\text{EVEN}_i \varphi$ amounts to \top , the set of all propositions. That is, if the NPI is not focused, the non-at-issue content of $\text{EVEN}_i \varphi$ is trivial.²⁰

²⁰Recall that an EVEN operator is always initially merged with an NPI, and then moves to the left periphery of a

The second possibility obtains when there is at least one assignment $g'[i]g$ such that $\llbracket \varphi \rrbracket_+^{g'} \not\subseteq \llbracket \varphi \rrbracket_+^g$ and $\llbracket \varphi \rrbracket_+^{g'}$ is salient in the context of utterance c . This condition is satisfied if and only if the NPI that EVEN_i associates with is focused, and at least one of the focus alternatives of φ does not entail the ordinary semantic value of φ and is contextually salient. If the condition is met, the non-at-issue content of $\text{EVEN}_i \varphi$ relative to g is the set of all propositions consisting of worlds w such that the speaker's doxastic state in w settles every focus alternative generated by φ which does not entail the ordinary semantic value of φ and is contextually salient, i.e., such that $\forall g'[i]g. (\llbracket \varphi \rrbracket_+^{g'} \not\subseteq \llbracket \varphi \rrbracket_+^g) \wedge (\llbracket \varphi \rrbracket_+^{g'}$ is salient in $c) \rightarrow (\text{DOX}_w^{Sp} \in \llbracket \varphi \rrbracket_+^{g'})$.

This, we propose, is the additive requirement contributed by $\text{EVEN}_i \varphi$. Let us discuss two aspects of it in some more detail. First, while we do not take the additive requirement of EVEN to *presuppose* that certain information is already established in the common ground, note that we do take it to be *anaphoric*, in the sense that it requires one of the focus alternatives of φ to be salient in the given context. This is a property that is commonly ascribed to additive particles, motivated by examples like (100) from Kripke (2009).

(100) SAM is having dinner in New York tonight, too.

As Kripke notes, this sentence is not felicitous if uttered without any preceding discourse, despite the fact that on any given night, many people besides Sam will be having dinner in New York, and this fact can be assumed to be common ground in any typical conversation. This shows that for the additive requirement of *too* to be satisfied it does not suffice that one of its prejacent's focus alternatives be common ground—it is crucial that such a focus alternative be contextually *salient*. We assume that EVEN imposes this requirement on the context as well.

Second, we assume that the salient focus alternative in question should not be one that *entails* the ordinary semantic value of φ . This requirement has also already been discussed in previous work on additive particles (Beaver and Clark, 2008; Theiler, 2019). To see why it is needed for additive particles like *too* and *even*, observe that *too* is infelicitous in (101) and the same holds for *even* in (102).

(101) Sam ate an apple. *He ate some FRUIT too.

(102) Sam ate an apple. *He even ate some FRUIT.

In fact, it has been argued for additive particles like *too* and *also* that entailment in the other direction is not allowed either (Beaver and Clark, 2008; Theiler, 2019). In this respect, however, *even* behaves differently, as illustrated in (103) and (104).

(103) Sam ate some fruit. *He ate an APPLE too.

(104) Sam ate some fruit. He even ate an APPLE.

Based on this, we assume that the additive component of EVEN only requires that the relevant salient focus alternative does not entail the ordinary semantic value of its prejacent, while in principle allowing for entailment in the other direction.

Finally, the third possibility in (99b) obtains when neither of the first two do. This happens when the NPI is focused but no focus alternative is contextually salient, or the salient focus alternatives are all entailed by φ . In this case, the non-at-issue content of $\text{EVEN}_i \varphi$ is undefined.

5.3 Lexical semantics and focus alternatives of emphatic NPIs

To complete the proposal we will now specify in more detail what we take to be the lexical semantics of emphatic NPIs (both contingently emphatic ones and minimizers) and the focus alternatives that they generate. As discussed in Section 4.3, under the approach that we are

clausal constituent to take sentential scope. We assume an EVEN operator can only be co-indexed with the NPI that it is initially merged with. Further details on indexed F-features on NPIs are given in Section 5.3 below.

pursuing here (as well as many other approaches to NPIs) it is assumed that NPIs are existential quantifiers over a certain domain, which is in part lexically specified and in part contextually determined. It is further assumed that such quantifiers, as part of their lexical semantics, generate two types of alternatives, quantity alternatives and subdomain alternatives. The former are obtained by replacing the existential quantifier by other quantifiers belonging to the same scale, and the latter by replacing the lexically specified domain by more narrow domains. Such lexical alternatives are generated both in the presence and in the absence of focus, and are targeted by the comparative component of EVEN.

We provided a concrete lexical entry for *any* in Section 4.3 based on Roelofsen (2018), which is repeated in (105) below. Recall that in the case of *any* the lexically specified domain is assumed to be the set of all entities, D_e , that the domain of discourse is denoted as D^c , and that we use D_e^c as shorthand for the intersection of these two, $D_e \cap D^c$.

$$(105) \quad \llbracket \text{any} \rrbracket^c = \llbracket \exists D \rrbracket^c = \lambda P_{e(st)}. \lambda P'_{e(st)}. \lambda p_{st}. \forall w \in p. \exists x \in D_e^c. P(x)(w) \wedge P'(x)(w)$$

Now, what does it mean exactly for *any* to be focused? This means, we propose, that either its quantificational parameter \exists or its domain parameter D carries a focus feature. In the first case, we speak of *quantity focus* and in the second case of *domain focus*. Thus, a focused occurrence of *any* is represented in one of the following two ways:

$$(106) \quad \begin{array}{l} \text{a. Quantity focus: } [\exists_{F_i} D] \\ \text{b. Domain focus: } [\exists D_{F_i}] \end{array}$$

Focus features are interpreted as specified in (94) above, which means that:

$$(107) \quad \llbracket \exists_{F_i} \rrbracket^g = \begin{cases} \llbracket \exists \rrbracket^g & \text{if } i \notin \text{Dom}(g) \\ g(i) & \text{if } i \in \text{Dom}(g) \end{cases}$$

In this case, focus alternatives $g(i)$ will be semantic objects of the same type as \exists , i.e., other quantifiers. Similarly:

$$(108) \quad \llbracket D_{F_i} \rrbracket^g = \begin{cases} \llbracket D \rrbracket^g & \text{if } i \notin \text{Dom}(g) \\ g(i) & \text{if } i \in \text{Dom}(g) \end{cases}$$

In this case, focus alternatives $g(i)$ will be semantic objects of the same type as D , i.e., other domains.

The focus alternatives of a focused occurrence of *any*, then, are very similar to the alternatives that *any* generates as part of its lexical semantics. There are two differences, however. First, lexical quantity alternatives are more constrained than focus quantity alternatives. Namely, lexical quantity alternatives involve quantifiers that form a scale with the existential quantifier expressed by *any*, while focus quantity alternatives can involve quantifiers that do not form a scale with the existential quantifier. A second important difference is that lexical alternatives are always generated, while focus alternatives are only generated in the presence of focus.

Let us now turn from contingently emphatic NPIs to minimizers like *lift a finger* and *sleep a wink*, which we have called *inherently* emphatic. What is their lexical semantics? What kind of alternatives do they generate? And why are they inherently emphatic?

For concreteness, let us concentrate on a particular minimizer, *lift a finger*. We will say that the ‘neutral counterpart’ of this minimizer is *help*, which we take to be a gradable predicate. Help can be provided to various degrees, and in each particular context there is a certain threshold $d_{min}^c \geq 0$ such that providing help to a degree $d > d_{min}^c$ counts as proper helping, but only providing help to a degree $d \leq d_{min}^c$ does not count as such. We propose that *lift a finger* is similar to *help*, but with a threshold d_0 which, in any context, gets the minimal value 0. One way of implementing this is to assume that *help* involves a threshold parameter d_{min} , which gets assigned some value greater than 0 in any context, whereas *lift a finger* has a threshold parameter d_0 , which always gets assigned the minimal value 0.

$$(109) \quad \llbracket \text{help } d_{min} \rrbracket^c = \lambda x_e . \lambda p_{st} . \forall w \in p . \exists d > d_{min}^c . \text{help}(x)(d)(w)$$

$$(110) \quad \begin{aligned} \llbracket \text{lift a finger} \rrbracket^c &= \llbracket \text{help } d_0 \rrbracket^c \\ &= \lambda x_e . \lambda p_{st} . \forall w \in p . \exists d > d_0^c . \text{help}(x)(d)(w) \\ &= \lambda x_e . \lambda p_{st} . \forall w \in p . \exists d > 0 . \text{help}(x)(d)(w) \end{aligned}$$

On this account, then, both *help* and *lift a finger* are existential quantifiers over a given domain, just like *any*. However, in this case the domain does not consist of individuals but rather of degrees of helpfulness. In the case of *help*, the domain is $\langle d_{min}^c, \infty \rangle$, while in the case of *lift a finger* it is $\langle 0, \infty \rangle$. Note that, since d_{min}^c is always greater than 0, the domain of *help* is always a subdomain of the domain of *lift a finger*.

We assume that *lift a finger*, just like *any* and *ever*, generates subdomain alternatives as part of its lexical semantics, each involving a subset of the domain $\langle 0, \infty \rangle$. These subdomain alternatives serve as input for the comparative component of the associated EVEN operator.

However, when it comes to focus alternatives, we propose that there is an important difference between minimizers like *lift a finger* on the one hand and non-minimizer NPIs like *any* and *ever* on the other. This difference is rooted in the fact that *lift a finger* always contrasts with its neutral counterpart *help*. We assume that it obligatorily receives focus in order to mark this contrast. More precisely, we assume that its threshold parameter d_0 always carries a focus feature.

The marking of contrast by means of focus is a well-known and widespread phenomenon (see Rooth, 1992, and many others). To illustrate this outside the domain of minimizers, consider the following dialogue between A and B.

- (111) A: Mary is quite tall.
B: No, she is VERY tall.

In B's response, the modifier *very* must be prosodically emphasised. The reason for this is that the phrase [very tall] contrasts with the phrase [quite tall] in A's preceding utterance. Giving a precise formal definition of contrast and spelling out a concrete theory of when contrast should be marked by means of focus would take us too far afield here (see, e.g., Rooth, 1992; Kratzer and Selkirk, 2018). Informally, two constituents contrast with each other when they have common elements but differ in one or more parts as well. In (111), what the two phrases have in common is the predicate *tall*, and the part that differs is the modifier, *quite* versus *very*. If an utterance contains a phrase that contrasts in this sense with another contextually salient phrase, focus needs to be placed on the part in which the two phrases differ, here the preposition *very*.

Now let us return to minimizers like *lift a finger*. What is crucial is that *lift a finger* always contrasts in the above sense with its neutral counterpart *help*: the two share the same core predicate, but differ in their threshold parameter. We assume that the use of *lift a finger* automatically makes its neutral counterpart contextually salient. As a consequence, the contrast between the two needs to be marked by placing focus on the threshold parameter.

This is why, we propose, minimizers are inherently emphatic: they always involve focus on the threshold parameter in order to mark the contrast with their neutral counterpart. For *lift a finger*, this means that we get the following interpretation:

$$(112) \quad \begin{aligned} \llbracket \text{lift a finger} \rrbracket^g &= \llbracket \text{help } d_{0, F_i} \rrbracket^g \\ &= \begin{cases} \lambda x_e . \lambda p_{st} . \forall w \in p . \exists d > d_0^c . \text{help}(x)(d)(w) & \text{if } i \notin \text{Dom}(g) \\ \lambda x_e . \lambda p_{st} . \forall w \in p . \exists d > g(i) . \text{help}(x)(d)(w) & \text{if } i \in \text{Dom}(g) \end{cases} \end{aligned}$$

where for any g that has i in its domain, $g(i)$ is some degree of helpfulness, just like d_0^c . This means that (i) the focus alternatives of *lift a finger* are exactly the same as its subdomain alternatives, and (ii) in every context, the ordinary semantic value of *help* is one of the focus

alternatives of *lift a finger*.

An important repercussion of the proposal that minimizers always involve focus on their threshold parameter is that the additive requirement of the associated EVEN operator always comes into play in this case. Minimizers differ in this respect from NPIs like *any*, which are not always focused and therefore do not always activate the additive component of EVEN.

We have laid out an account that uniformly treats inherently and contingently focused NPIs as generating alternatives that serve as input for an associated EVEN operator. The empirical differences between the two classes of NPIs should all follow from differences in the types of alternatives that they generate. In the next section, we examine the predictions of the account.

6 Predictions

Depending on whether a given NPI is focused or not, the additive requirement of the associated EVEN operator is activated, in addition to the comparative requirement which is always in force. This additive requirement, we argue, is responsible for all the empirical properties that are characteristic for emphatic NPIs (as opposed to non-emphatic ones), both in statements and in questions. We start with a brief preview of the main predictions. Those concerning NPIs in statements are then discussed in detail in Section 6.1, those concerning polar questions in Section 6.2, and those concerning wh-questions in Section 6.3.

In statements, the additive requirement of EVEN imposes certain constraints on the input context and can give rise to domain widening effects. In the case of contingently emphatic NPIs, the context needs to be such that a salient alternative is present, as the NPI by itself does not make any particular alternative salient enough to fulfil the additive requirement. Furthermore, when contingently emphatic NPIs occur in a DE environment and receive domain focus, the domain targeted by the actual statement must be wider than the domain targeted by the salient focus alternative, since the latter is required not to entail the former. This amounts to a domain widening effect.

In polar questions, the same additive requirement of EVEN gives rise to an inference of negative bias, namely, that an alternative issue has been settled negatively in the speaker's doxastic state. While the semantics of EVEN in principle only requires that the alternative issue be settled either positively or negatively, the structure of the alternatives evoked by NPIs is such that a polar question containing an emphatic NPI can only be sincerely asked (i.e., without already knowing the answer) if the relevant alternative issue is settled negatively in the speaker's doxastic state.

In wh-questions, by contrast, an inference of negative bias does not always arise from the additive requirement of EVEN. What does always arise is the basic additive inference that the salient alternative issues must be *settled* in the speaker's doxastic state. But the derivation of the strengthened inference that the alternative issues must be settled *negatively* will be shown to depend crucially on whether the question is interpreted exhaustively or non-exhaustively.

We now discuss these and further predictions of the account in more detail.

6.1 Emphatic NPIs in statements

6.1.1 Inherently emphatic NPIs in statements

Consider the statement in (113), which contains an inherently emphatic minimizer under negation.

(113) Bill didn't lift a finger.

The EVEN operator contributed by *lift a finger* can in principle take scope over any clausal constituent of type $\langle\langle s, t \rangle, t\rangle$, denoting a set of propositions. That is, we do not stipulate any constraints on the position of EVEN relative to other operators. However, it follows from the

semantics of EVEN (in particular its comparative requirement) and the kind of lexical alternatives generated by NPIs that EVEN must always take scope over a downward entailing or non-monotonic operator—otherwise, it would result in undefinedness.

Let us illustrate this based on (113). The sentence has two possible LFs: one in which EVEN scopes below negation (114a), and one in which it scopes over negation (114b).

- (114) a. $[\chi \text{ NEG } [\psi \text{ EVEN}_i [\varphi \text{ Bill helped } d_{0,F_i}]]]$
 b. $[\chi \text{ EVEN}_i [\psi \text{ NEG } [\varphi \text{ Bill helped } d_{0,F_i}]]]$

The semantic value of the LF in (114a) is undefined. To see this, consider the prejacent of EVEN in this LF, the constituent labeled as φ . The at-issue semantic value of this constituent relative to an assignment function g is given in (115) and the subdomain alternatives that it generates are specified in (116).

$$(115) \quad \llbracket \varphi \rrbracket_+^g = \begin{cases} \{ \{w \mid \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow & \text{if } i \notin \text{Dom}(g) \\ \{ \{w \mid \exists d \in \langle g(i), \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow & \text{if } i \in \text{Dom}(g) \end{cases}$$

$$(116) \quad \llbracket \varphi \rrbracket_{\text{alt}}^g = \{ \{ \{w \mid \exists d \in D'. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow \mid D' \subset \langle 0, \infty \rangle \}$$

In words: if $i \notin \text{Dom}(g)$ then $\llbracket \varphi \rrbracket_+^g$ is the set of propositions p consisting only of worlds w in which Bill helped to some degree $d \in \langle 0, \infty \rangle$. This is the ordinary semantic value of φ . On the other hand, if $i \in \text{Dom}(g)$, then $\llbracket \varphi \rrbracket_+^g$ is the set of propositions p consisting only of worlds w in which Bill helped to some degree $d \in \langle g(i), \infty \rangle$. This is one of the focus alternatives generated by φ (for every g such that $i \in \text{Dom}(g)$ we get one focus alternative). Finally, for each subdomain D' of $\langle 0, \infty \rangle$ there is a subdomain alternative: the set of propositions p consisting only of worlds w in which Bill helped to some degree $d \in D'$.

Now let us turn to the constituent in (114a) labeled as ψ , which consists of EVEN_i and its prejacent φ . Recall from the entry in (98) that the at-issue component of $\llbracket \text{EVEN}_i \varphi \rrbracket^g$ has three definedness conditions:

- (117) Definedness conditions of the at-issue component of $\llbracket \text{EVEN}_i \varphi \rrbracket^g$:
- $\bigcup \llbracket \varphi \rrbracket^g \cap \text{info}(c) \neq \emptyset$
 - $\forall A \in \llbracket \varphi \rrbracket_{\text{alt}}^g : A \geq_c \llbracket \varphi \rrbracket_+^g$
 - $i \notin \text{Dom}(g)$

Suppose that condition (c) is satisfied. Then $\llbracket \varphi \rrbracket_+^g = \{ \{w \mid \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow$ while the subdomain alternatives are of the form $\{ \{w \mid \exists d \in D'. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow$, where $D' \subseteq \langle 0, \infty \rangle$. Suppose moreover that condition (a) is satisfied, which means that the context of utterance, c , does not completely rule out the possibility that Bill helped to some degree. Now, let us show that condition (b) cannot be satisfied in c . Since condition (a) is satisfied, there must be a degree d^* such that the likelihood that Bill helped to degree d^* and not to any higher degree is non-zero in c . Let d' be some degree higher than d^* , D' the domain $\langle d', \infty \rangle$, and $A_{D'}$ the corresponding subdomain alternative. Then the cumulative likelihood of $A_{D'}$ in c will be strictly lower than that of $\llbracket \varphi \rrbracket_+^g$. But this means that condition (b) in (117) is not satisfied. Thus, the LF in (114a) is ruled out on semantic grounds.

Let us now turn to the LF in (114b). Consider the prejacent of EVEN in this LF, the constituent labeled as ψ . The at-issue semantic value of this constituent relative to an assignment function g is given in (118) and the subdomain alternatives that it generates are specified in (119).

$$(118) \quad \llbracket \psi \rrbracket_+^g = \begin{cases} \{ \{w \mid \neg \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow & \text{if } i \notin \text{Dom}(g) \\ \{ \{w \mid \neg \exists d \in \langle g(i), \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow & \text{if } i \in \text{Dom}(g) \end{cases}$$

$$(119) \quad \llbracket \psi \rrbracket_{\text{alt}}^g = \{ \{ \{ w \mid \neg \exists d \in D'. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow \mid D' \subset \langle 0, \infty \rangle \}$$

In words: if $i \notin \text{Dom}(g)$ then $\llbracket \psi \rrbracket_{\text{alt}}^g$ is the set of propositions p consisting only of worlds w in which Bill did not help to any degree $d \in \langle 0, \infty \rangle$. This is the ordinary semantic value of ψ . On the other hand, if $i \in \text{Dom}(g)$, then $\llbracket \psi \rrbracket_{\text{alt}}^g$ is the set of propositions p consisting only of worlds w in which Bill did not help to any degree $d \in \langle g(i), \infty \rangle$. This is one of the focus alternatives generated by ψ (for every g such that $i \in \text{Dom}(g)$ we get one focus alternative). Finally, for each subdomain D' of $\langle 0, \infty \rangle$ there is a subdomain alternative: the set of propositions p consisting only of worlds w in which Bill did not help to any degree $d \in D'$.

Now consider the constituent in (114b) labeled as χ , which consists of EVEN_i and its prejacent ψ . In this case, the definedness conditions of EVEN_i can be satisfied. The first condition is satisfied as long as $\bigcup \llbracket \psi \rrbracket^g \cap \text{info}(c) \neq \emptyset$ which means that the information available in the context of utterance c should be compatible with the possibility that Bill did not help at all. The third condition is satisfied as long as $i \notin \text{Dom}(g)$. And finally, given that $i \notin \text{Dom}(g)$, the second condition will automatically be satisfied in any context because the ordinary semantic value of ψ entails all its subdomain alternatives and can therefore never be more likely than any of these alternatives.

So the at-issue semantic content of χ is well-defined, and is the same as that of its prejacent ψ , i.e., the set of propositions p consisting only of worlds w in which Bill did not help to any degree $d \in \langle 0, \infty \rangle$. Thus, the sentence conveys the at-issue information that Bill did not help at all.

What about the non-at-issue content of χ ? Since the NPI is focused, the additive component of EVEN is in force, and requires that the prejacent ψ has a contextually salient focus alternative which does not entail its ordinary semantic value. This requirement is clearly satisfied if the preceding discourse makes a suitable alternative salient, as in (120).

- (120) A: I heard that Bill didn't help a lot with the cooking.
 B: Indeed, he didn't lift a finger to help with the cooking.

Importantly, however, the requirement is also satisfied if the preceding discourse does not explicitly make such an alternative salient. This is because *lift a finger* is assumed to always make its neutral counterpart *help* salient. Therefore, the focus alternative of ψ corresponding to 'Bill didn't help', i.e., $\{ \{ w \mid \neg \exists d \in \langle d_{\min}^c, \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow$ will be contextually salient. Moreover, this focus alternative does not entail the ordinary semantic value of ψ , $\{ \{ w \mid \neg \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Bill})(d)(w) \} \}^\downarrow$, because even if Bill did not help to any degree in $\langle d_{\min}^c, \infty \rangle$ he may still have helped to some degree in $\langle 0, \infty \rangle$. Thus, (121) is correctly predicted to be felicitous.

- (121) A: I heard that Bill was at the dinner.
 B: Yes, but he didn't lift a finger to help with the cooking.

The non-at-issue implication of χ is that the salient, non-entailing focus alternatives are already settled in the speaker's doxastic state, i.e., that the speaker believes that Bill did not help to any degree in $\langle d_{\min}^c, \infty \rangle$ (and possibly other salient subdomains of $\langle 0, \infty \rangle$). Note that this implication is weaker than the Quality implicature that (113) gives rise to, which is that the speaker believes that Bill did not help to any degree in $\langle 0, \infty \rangle$. So the non-at-issue implication generated by the additive component of EVEN does not convey anything about the speaker's doxastic state beyond what can already be derived pragmatically in this case. In this sense, it is vacuous here. We will see below that in the case of questions it is not vacuous, but rather plays a crucial role in the derivation of biases.

6.1.2 Contingently emphatic NPIs in statements

Now consider the statement in (122), which contains a contingently emphatic NPI under negation.

(122) Prue didn't buy ANY apples.

Just like in the case of (113), the EVEN operator contributed by the NPI can in principle take scope either above or below negation, but due to its comparative requirement, the LF in which it scopes below negation is ruled out on semantic grounds. Thus, the only viable LF is the one in (123).

(123) $[\chi \text{ EVEN}_i [\psi \text{ NEG } [\varphi \text{ Prue bought ANY apples}]]]$

Recall that the lexical specification of *any* consists of an existential quantifier \exists and a lexical domain parameter D . Either of these may carry a focus feature. We will mainly concentrate on the case of domain focus, highlighting along the way points at which the predictions arising from quantity focus differ from those arising from domain focus. In the case of domain focus, the at-issue semantic value of ψ , the prejacent of EVEN, relative to an assignment function g is as specified in (124) and the subdomain alternatives that it generates are as given in (125).

$$(124) \quad \llbracket \psi \rrbracket_+^g = \begin{cases} \{ \{w \mid \neg \exists x \in D_e \cap D^c. \text{apples}(x)(w) \wedge \text{bought}(\text{Prue})(x)(w)\} \}^\downarrow & \text{if } i \notin \text{Dom}(g) \\ \{ \{w \mid \neg \exists x \in g(i) \cap D^c. \text{apples}(x)(w) \wedge \text{bought}(\text{Prue})(x)(w)\} \}^\downarrow & \text{if } i \in \text{Dom}(g) \end{cases}$$

$$(125) \quad \llbracket \psi \rrbracket_{\text{alt}}^g = \{ \{ \{w \mid \neg \exists x \in D' \cap D^c. \text{apples}(x)(w) \wedge \text{bought}(\text{Prue})(x)(w)\} \}^\downarrow \mid D' \subset D_e \}$$

In words: if $i \notin \text{Dom}(g)$ then $\llbracket \psi \rrbracket_+^g$ is the set of propositions p consisting only of worlds w in which Prue did not buy any apples in $D_e \cap D^c$. This is the ordinary semantic value of ψ . On the other hand, if $i \in \text{Dom}(g)$, then $\llbracket \psi \rrbracket_+^g$ is the set of propositions p consisting only of worlds w in which Prue did not buy any apples in $g(i) \cap D^c$ (where $g(i)$ is of the same type as D_e , i.e., a set of entities). This is one of the focus alternatives generated by ψ (for every g such that $i \in \text{Dom}(g)$ we get one focus alternative). Finally, for each subdomain D' of D_e there is a subdomain alternative: the set of propositions p consisting only of worlds w in which Prue did not buy any apples in $D' \cap D^c$.

Now consider the root constituent in (123), labeled as χ , which consists of EVEN_i and its prejacent ψ . It can be verified that the definedness conditions in the at-issue component of EVEN_i can be satisfied in this case, just as in the parallel case involving *lift a finger* discussed above. So the at-issue semantic content of χ is well-defined, and is the same as that of its prejacent ψ , namely the set of propositions p consisting only of worlds w in which Prue did not buy any apples in D_e^c . Thus, the sentence is correctly predicted to convey the at-issue information that Prue did not buy any apples in the contextually restricted domain D_e^c .

What about non-at-issue content? Since the NPI is focused, the additive component of EVEN is in force, and requires that the prejacent ψ has a contextually salient focus alternative which does not entail its ordinary semantic value. This requirement is satisfied if the preceding discourse makes a suitable alternative salient, as in (126).

(126) A: It appears that Prue didn't buy organic apples.
B: She didn't buy ANY apples.

Similarly, in the case of quantity focus rather than domain focus, the context needs to make suitable quantity alternatives salient, as in (127).

(127) A: It appears that Prue didn't buy a lot of apples.
B: She didn't buy ANY apples.

However, if the context does not make any suitable domain/quantity alternatives salient, then

the additive requirement of EVEN is not satisfied and the sentence is predicted to be infelicitous. This prediction is borne out, as illustrated in (128).²¹

- (128) A: It appears that Prue didn't buy all the ingredients for the cake.
B: #She didn't buy ANY apples.

Note that the infelicity here is due to the emphasis on ANY; without such emphasis the sentence is fine.

- (129) A: It appears that Prue didn't buy all the ingredients for the cake.
B: That's right, she didn't buy any apples.

Also note that ANY differs in this respect from *lift a finger*, which does not require the preceding discourse to make a specific alternative salient. This was exemplified in (121), repeated in (130).

- (130) A: I heard that Bill was at the dinner.
B: Yes, but he didn't lift a finger to help with the cooking.

This difference between ANY and *lift a finger* is explained on our account by the fact that the use of *lift a finger* automatically makes its neutral counterpart *help* contextually salient, while the use of ANY does not in itself make any focus alternative particularly salient. As a consequence, the salience requirement of *lift a finger* does not impose any constraint on the input context, while that of ANY does.

Domain widening effects Let us now zoom in on how the analysis accounts for domain widening effects. Recall that ψ in (123) conveys the at-issue information that Prue did not buy any apples in $D_e \cap D^c$. Its focus alternatives convey the information that Prue did not buy any apples in $g(i) \cap D^c$, where $g(i)$ can be anything of the same type as D_e . This means that $g(i)$ must be a subdomain of D_e . So what is required is that there is at least one salient focus alternative which involves a subdomain of D_e . Compared to this salient focus alternative, then, ψ widens the domain of quantification. This is the domain widening effect.

Note that we only predict domain widening effects to occur in cases of domain focus. In cases of quantity focus, such as (127), the focus alternatives involve different quantifiers rather than different domains, so in this case domain widening effects are correctly predicted not to arise.

Also note that in the case of minimizers, there is always domain widening w.r.t. the neutral counterpart. For instance, *lift a finger* quantifies over a larger domain than *help*. However, in cases where this alternative is not already salient in the input context but *made* salient by the minimizer itself, the domain widening effect is qualitatively different in that it does not involve a contrast with an explicit, pre-existing alternative rather than an induced one. As such, it may be perceived as a weaker contrast.

Under our account, domain widening effects arise as a by-product of the additive requirement of emphatic NPIs. This approach has more explanatory value than ones that directly build domain widening into the semantics of NPIs (most notably, that of Kadmon and Landman 1993).

²¹Note however, that a salient focus alternative need not have been explicitly *mentioned* in the prior discourse, as long as it is easily recoverable. This is exemplified in (i).

- (i) [Context: In a hospital, all personnel is aware that they need to be very cautious when screening patients for symptoms of rosacea. A nurse just checked patient B and then reports to the doctor, without any previous discourse:]
Patient B does not show ANY symptoms of rosacea.

In such scenarios, we predict that the use of a contingently emphatic NPI is felicitous, as a relevant alternative (in this case, 'Patient B does not show significant/noticeable symptoms of rosacea' is easily recoverable, i.e., can be assumed to be sufficiently salient given the particular scenario).

As we have argued, following Krifka (1995), van Rooij (2003) and others, only *emphatic* NPIs persistently give rise to domain widening effects. This cannot be captured if domain widening is built into the semantics of NPIs, disconnected from focus. On the other hand, on our analysis, only emphatic NPIs contribute a non-trivial additive requirement, and this can give rise to domain widening effects. Furthermore, our analysis predicts that even in the case of emphatic NPIs, domain widening effects do not always arise. Specifically, this happens only in cases involving domain focus; not in ones involving quantity focus.

We have discussed at some length what the context must be like in order for the non-at-issue content of (122) to be well-defined. If it *is* well-defined, then the non-at-issue implication is that all the salient, non-entailing focus alternatives are already settled in the speaker's doxastic state, i.e., the speaker believes that Prue did not buy any apples in salient subdomains of D_e^c . Just as we saw in the case of *lift a finger*, this implication is weaker than the Quality implicature that (122) gives rise to, which is that the speaker believes that Prue did not buy any apples in D_e^c . So, again, the non-at-issue implication generated by the additive component of EVEN does not convey anything about the speaker's doxastic state beyond what can already be derived pragmatically in this case. As mentioned above, we will see below that in the case of questions it is not vacuous, but plays a crucial role in the derivation of biases.

Before moving on, let us briefly comment on the fact that the additive component of EVEN requires its prejacent ψ to have a contextually salient focus alternative which *does not entail* ψ itself, but may be entailed by ψ , or logically independent of ψ . This aspect of the semantics of EVEN was motivated by observations concerning the English particle *even*, repeated below. This particle also requires that its prejacent ψ has a contextually salient focus alternative which does not entail ψ but may be entailed by ψ or be logically independent of it (in contrast with particles like *too* which strictly require logical independence, i.e., non-entailment in both directions).

- (131) a. Sam ate an apple. *He even ate some FRUIT.
 b. Sam ate an apple. *He ate some FRUIT too.

- (132) a. Sam ate some fruit. He even ate an APPLE.
 b. Sam ate some fruit. *He ate an APPLE too.

Note that in (122), as well as in all other cases where the NPI occurs in a downward entailing environment, all domain focus alternatives are necessarily *entailed* by the prejacent of EVEN. So we see here that it is a good feature of our semantics for EVEN that it allows for entailment in this direction. In this sense, EVEN indeed patterns with *even*, and contrasts with other additive particles in English such as *too*.

One may wonder whether there are also cases where the prejacent of EVEN, ψ , and its focus alternatives are logically independent. Indeed, such cases exist, as exemplified in (133), where the NPI occurs in the scope of a non-monotonic operator.

- (133) [Context: A and B are two librarians. A shows B a book in their collection.]
 A: This book is not particularly well-read.
 Exactly two people took it out over the last five years.
 B: It's even worse. Exactly two people EVER took it out.

This shows that, as predicted by the account, entailment between the prejacent of EVEN and its salient focus alternatives in either direction is not necessary.

6.1.3 Commonalities and differences: Inherently vs. contingently emphatic NPIs in statements

Let us summarize the main commonalities and differences between inherently and contingently emphatic NPIs in statements. What the two types of emphatic NPIs have in common with each other, as well as with non-emphatic weak NPIs, is that they express existential quantification

	Contingently emphatic NPIs	Inherently emphatic NPIs
Salience requirement	Must be satisfied by input context	Satisfied by salient neutral counterpart, so need not be satisfied by input context
Domain widening	Must be w.r.t. a contextually salient focus alternative; only arises with domain focus, not with quantity focus	Can be w.r.t. neutral counterpart; always arises because domain focus is obligatory

Table 1: Differences between inherently and contingently emphatic NPIs in statements

over a certain domain (of individuals, degrees of helpfulness, time-intervals, etc.). The most important difference between them is that inherently emphatic NPIs like *lift a finger*, unlike contingently emphatic NPIs like *ANY*, always make their neutral counterpart salient. Other differences follow from this basic contrast. In particular, this explains why inherently emphatic NPIs are inherently emphatic: their degree parameter obligatorily carries a focus feature in order to mark the contrast with the neutral counterpart. A further consequence of this is that the focus alternatives of inherently emphatic NPIs are always domain alternatives, while those of contingently emphatic NPIs can be either quantity alternatives or domain alternatives.

What are the repercussions of these differences in terms of empirical predictions? First, contingently emphatic NPIs impose a **salience requirement** on the context of utterance: at least one non-entailing focus alternative must already be salient in the input context. Inherently emphatic NPIs do not impose this requirement on the input context, because they themselves always make one of their focus alternatives particularly salient.

A second difference concerns **domain widening effects**. In the case of contingently emphatic NPIs domain widening effects arise with domain focus but not with quantity focus. With domain focus, such NPIs always widen the domain of quantification w.r.t. a focus alternative that is already salient in the input context. By contrast, inherently emphatic NPIs always come with domain focus and therefore always involve domain widening. In this sense, domain widening is more persistently tied to inherently emphatic NPIs than to contingently emphatic NPIs. However, inherently emphatic NPIs do not necessarily widen the domain of quantification w.r.t. a focus alternative that is already salient in the input context. They may only do so w.r.t. their neutral counterpart, which they themselves make salient. In this sense, the domain widening effect induced by inherently emphatic NPIs is qualitatively different, and may be perceived as ‘weaker’, than that induced by contingently emphatic NPIs with domain focus. A summary of these differences is given in Table 1.

6.2 Emphatic NPIs in polar questions

6.2.1 Inherently emphatic NPIs in polar questions

Consider the polar question in (134), which contains an inherently emphatic minimizer.

(134) Did Charles lift a finger?

We maintain the assumption that the EVEN operator contributed by *lift a finger* can in principle scope over any constituent of type $\langle\langle s, t \rangle, t\rangle$, denoting a set of propositions. This allows for two possible LFs, one in which EVEN scopes below INT (135a), and one in which EVEN scopes over it (135b). Given our semantics, both φ in (135a) and ψ in (135b) denote sets of propositions, and can function as prejacent of EVEN, though the former is informative and the latter is inquisitive.

- (135) a. $[\chi \text{ INT } [\psi \text{ EVEN}_i [\varphi \text{ Charles helped } d_{0,F_i}]]]$
 b. $[\chi \text{ EVEN}_i [\psi \text{ INT } [\varphi \text{ Charles helped } d_{0,F_i}]]]$

However, we already saw in Section 6.1.1 (in particular, (114a)) that LFs in which *EVEN* scopes over non-DE, informative prejacent like φ in (135a) are effectively ruled out: in such cases, the comparative requirement of *EVEN*_{*i*}, repeated in (136b), cannot be satisfied, resulting in undefinedness.

- (136) Definedness conditions of the at-issue component of $[[\text{EVEN}_i \varphi]]^g$:
- a. $\bigcup [[\varphi]]^g \cap \text{info}(c) \neq \emptyset$
 b. $\forall A \in [[\varphi]]_{\text{alt}}^g : A \geq_c [[\varphi]]_+$
 c. $i \notin \text{Dom}(g)$

How about the LF in (135b), where *EVEN* scopes over a prejacent ψ that denotes an inquisitive issue? Can it satisfy the definedness conditions of *EVEN*_{*i*}? To probe this, the at-issue value of ψ relative to an assignment function g is given in (137), and the subdomain alternatives that it generates are provided in (138). To facilitate exposition, we now only consider cases where (136c) is satisfied, i.e., $i \notin \text{Dom}(g)$.

$$(137) \quad [[\psi]]_+^g = \left\{ \begin{array}{l} \{w \mid \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Charles})(d)(w)\}, \\ \{w \mid \neg \exists d \in \langle 0, \infty \rangle. \text{help}(\text{Charles})(d)(w)\} \end{array} \right\}^\downarrow \quad (\text{if } i \notin \text{Dom}(g))$$

$$(138) \quad [[\psi]]_{\text{alt}}^g = \left\{ \left\{ \begin{array}{l} \{w \mid \exists d \in D'. \text{help}(\text{Charles})(d)(w)\}, \\ \{w \mid \neg \exists d \in D'. \text{help}(\text{Charles})(d)(w)\} \end{array} \right\}^\downarrow \mid D' \subset \langle 0, \infty \rangle \right\}$$

In prose, if $i \notin \text{Dom}(g)$, then $[[\psi]]_+^g$ is a set of propositions containing two maximal elements (the ‘elementary resolutions’ of the issue): (i) the proposition consisting of all worlds w in which Charles helped to some degree $d \in \langle 0, \infty \rangle$, and (ii) the proposition consisting of all worlds w in which Charles did not help to any degree $d \in \langle 0, \infty \rangle$. This is the ordinary semantic value of ψ . The associated subdomain alternatives, which exist for each subdomain D' of $\langle 0, \infty \rangle$, are also sets of propositions, each again with two maximal elements: (i) the proposition consisting of all worlds w in which Charles helped to some degree $d \in D'$, and (ii) the proposition consisting of all worlds w in which Charles did not help to any degree $d \in D'$.

In this case, the definedness conditions of *EVEN*_{*i*} can be satisfied. (136c) is satisfied as long as $i \notin \text{Dom}(g)$, which we have already taken for granted. (136a) is trivially satisfied as long as there’s some information available in the context of utterance, since $\bigcup [[\psi]]^g = W$. Finally, the comparative component (136b) is automatically satisfied in any context. This is because $\bigcup [[\psi]]^g = W$, and for every alternative A , $\bigcup A = W$ as well. Consequently, the cumulative likelihood of ψ , $P^c(\bigcup [[\psi]]^g)$, is not greater than the cumulative likelihood of A , as both are 1.

In sum, the LF in which *EVEN*_{*i*} scopes over *INT* as in (135b) satisfies the comparative requirement. The at-issue content of χ in (135b) is the same as that of its prejacent ψ , namely the issue of whether or not Charles helped at all.

Let us now turn to the non-at-issue content of χ in (135b), which plays a central role in deriving the characteristic negative bias. Since the NPI is inherently focused, the additive component of *EVEN*_{*i*} is activated, and requires that the prejacent ψ has a contextually salient focus alternative. As we saw in the case of statements, this requirement is guaranteed to be satisfied irrespective of context, because *lift a finger* always makes its neutral counterpart *help* salient. Therefore, the focus alternative of ψ given in (139), which corresponds intuitively to the issue of ‘Did Charles help?’, will automatically become contextually salient.

$$(139) \quad [[\psi]]_+^{g'} = \left\{ \begin{array}{l} \{w \mid \exists d \in \langle d_{\min}^c, \infty \rangle. \text{help}(\text{Charles})(d)(w)\}, \\ \{w \mid \neg \exists d \in \langle d_{\min}^c, \infty \rangle. \text{help}(\text{Charles})(d)(w)\} \end{array} \right\}^\downarrow$$

Examples like (140) are thus correctly predicted to be felicitous, even though the unmarked

alternative issue, ‘Did Charles help?’ was not explicitly broached prior to the target utterance.

- (140) A: A lot of people stayed after the party for the cleanup.
 B: Did Charles lift a finger?

The non-at-issue implication of χ in (135b) is that the salient alternative issue (139) is settled in the speaker’s doxastic state. This in principle allows for two possible scenarios. First, the speaker could believe the positive answer: *Charles helped to some degree* $d \in \langle d_{min}^c, \infty \rangle$; i.e., the alternative issue is settled positively. Second, the speaker could believe the negative answer: *Charles did not help to any degree* $d \in \langle d_{min}^c, \infty \rangle$; i.e., the alternative issue is settled negatively. However, pragmatic reasoning leads to the inference that the speaker must in fact believe the negative answer.

Namely, if the speaker believed the positive answer *Charles helped to some degree* $d \in \langle d_{min}^c, \infty \rangle$, then she would not be in a position to sincerely raise the issue of *whether Charles helped to some degree* $d \in \langle 0, \infty \rangle$. This is because the domain of *help*, $\langle d_{min}^c, \infty \rangle$, is a subdomain of the domain of *lift a finger*, $\langle 0, \infty \rangle$. Therefore, if Charles helped, then it follows that he lifted a finger, as the former entails the latter. Consequently, if the speaker believed the positive answer to the alternative issue, she would inevitably also believe the positive answer to the issue she actually raised, in which case there would be no point in raising it. Therefore, it can be inferred that the alternative issue must be settled negatively in the speaker’s doxastic state. The main insight outlined here is in line with the analysis proposed by van Rooij (2003).

6.2.2 Contingently emphatic NPIs in polar questions

Consider the polar question in (141), which contains a contingently emphatic NPI, namely, a prosodically stressed occurrence of ANY.

- (141) Did Prue buy ANY apples?

As we saw in (134), while the EVEN operator contributed by the NPI can in principle scope over or below the INT operator, the only LF that can satisfy the comparative requirement of EVEN is the one in which EVEN scopes over INT and thus takes an inquisitive prejacent, as in (142).

- (142) $[\chi \text{ EVEN}_i [\psi \text{ INT } [\varphi \text{ Prue bought ANY apples}]]]$

Since there are two components of ANY that can carry a focus feature, \exists (the existential quantifier) and D (the domain parameter), the case in (142) may again involve either domain focus or quantity focus. As before, we concentrate primarily on domain focus, while also highlighting points of divergence between domain and quantity focus.

The at-issue semantic value of the prejacent ψ of EVEN in the case of domain focus is provided in (143); focusing on the case where $i \notin \text{Dom}(g)$. The subdomain alternatives that it generates are presented in (144).

$$(143) \quad \llbracket \psi \rrbracket_+^g = \left\{ \begin{array}{l} \{w \mid \exists x \in D_e^c. \text{apples}(x)(w) \wedge \text{buy}(\text{Prue})(x)(w)\}, \\ \{w \mid \neg \exists x \in D_e^c. \text{apples}(x)(w) \wedge \text{buy}(\text{Prue})(x)(w)\} \end{array} \right\}^\downarrow \quad (\text{if } i \notin \text{Dom}(g))$$

$$(144) \quad \llbracket \psi \rrbracket_{\text{alt}}^g = \left\{ \left\{ \begin{array}{l} \{w \mid \exists x \in D'. \text{apples}(x)(w) \wedge \text{buy}(\text{Prue})(x)(w)\}, \\ \{w \mid \neg \exists x \in D'. \text{apples}(x)(w) \wedge \text{buy}(\text{Prue})(x)(w)\} \end{array} \right\}^\downarrow \mid D' \subset D_e^c \right\}$$

In prose, if $i \notin \text{Dom}(g)$, then $\llbracket \psi \rrbracket_+^g$ is a set of propositions containing two maximal elements (the ‘elementary resolutions’ of the issue): (i) the proposition consisting of all worlds w in which Prue bought some apple(s) in D_e^c , and (ii) the proposition consisting of all worlds w in which Prue did not buy any apple(s) in D_e^c . This is the ordinary semantic value of ψ . For each subdomain D' of D_e^c , there is a corresponding subdomain alternative, which is also a set of propositions containing two elementary resolutions: (i) the proposition consisting of all worlds w in which

Prue bought some apple(s) in D' , and (ii) the proposition consisting of all worlds w in which Prue did not buy any apple(s) in D' . As in the case of *lift a finger*, the definedness condition is satisfied, because the cumulative likelihood of $\llbracket\psi\rrbracket_+^g$ is necessarily 1, and that of any given subdomain alternative is also necessarily 1. Therefore, the at-issue semantic content of χ in (142) is well-defined, and identical to that of its prejacent ψ . The sentence is therefore correctly predicted to express the issue of whether Prue bought any apples in D_e^c .

Let us now turn to the non-at-issue content. As ANY is focused, the additive component of EVEN_i comes into play, and requires that the prejacent ψ has a contextually salient focus alternative. This requirement would be satisfied in contexts like the one in (145) below, repeated with slight adjustments from (51), where a suitable alternative, in this case multiple of them, have been made salient.

- (145) [Context: A plans to bake an apple pie with some friends; Prue was in charge of buying the ingredients]
 A: Did Prue buy tart apples?
 B: No, she didn't.
 A: Did she buy gala apples?
 B: No.
 A: Did she buy ANY apples?

In contrast, it would not be satisfied in contexts like (146), where a suitable alternative is not readily recoverable. Cases like (146) are thus correctly predicted to be infelicitous.

- (146) (B saunters into a fruit stand and asks out of the blue):
 B: #Do you have ANY apples?

Note again that the infelicity arises from the prosodic emphasis on ANY, as the sentence would be felicitous without the emphasis. This is predicted by the analysis: without prosodic emphasis, $\llbracket\psi\rrbracket_+^g = \llbracket\psi\rrbracket_+^{g'}$ for all g' such that $g'[i]g$ (because a focus feature co-indexed with EVEN is absent), and the additive component only generates a trivial implication (T) without imposing any contextual requirement.

The non-at-issue implication that arises in (145), where the contextual requirement is satisfied, is that the salient focus alternatives are settled in the speaker's doxastic state, i.e., the speaker believes that Prue did not buy any tart apples or gala apples. This implication is what gives rise to the intuition of negative epistemic bias. In the case of statements like (126), additive inferences like *the speaker believes that Prue didn't buy organic apples* are not only contextually salient, but also entailed by the at-issue utterance (e.g., Prue didn't buy ANY apples entails that Prue didn't buy organic ones). The additive implications are therefore predicted to be active, but trivial in their effects. In contrast, in the case of questions like (145), inferences like *the speaker believes that Prue did not buy tart or gala apples* are not entailed by the question that is asked. The additive implications are therefore not trivial: by choosing to utter a question containing a contingently emphatic NPI in (145), the speaker is effectively highlighting/publicizing her updated belief that Prue did not buy tart or gala apples. The fact that the speaker chose to actively publicize this updated belief as a non-at-issue implication, and chose to jump from posing specific questions to the most general one, may give rise to enriched affective inferences like indignation or disbelief via pragmatic reasoning (e.g., the speaker could have asked 'Did Prue buy Fuji apples?', etc.; perhaps she didn't because she is beginning to suspect that Prue might not even have bought any apples in the first place).

Importantly, the inference of negative bias that arises from polar questions with contingently emphatic NPIs is predicted to be heavily context-dependent and in many cases, much weaker than the bias derived from polar questions with inherently emphatic NPIs. This follows naturally from the fact that the former implicate that the speaker believes the negative resolutions of contextually salient alternative issues, whereas the latter necessarily implicate that the speaker believes the negative resolution of their neutral counterpart.

6.2.3 Commonalities and differences: Inherently vs. contingently emphatic NPIs in polar questions

Let us recapitulate the main commonalities and differences between inherently and contingently emphatic NPIs in polar questions. Recall that both types of emphatic NPIs are analyzed as expressing existential quantification over certain objects, be they individuals (*any*), degrees of helpfulness (*lift a finger*), time-intervals (*ever / sleep a wink*), etc. Much like in the case of statements, the observed differences between the two can all be derived from the core difference in the types of salient alternatives that can be associated with them: inherently emphatic NPIs like *lift a finger* always make their neutral counterpart salient, whereas contingently emphatic NPIs like *ANY* require context to provide appropriate focus alternative(s). In the case of statements, the repercussions of this contrast manifested as (a) differences in contextual salience requirements, as well as (b) differences w.r.t. domain widening effects. In the case of polar questions, they manifest as (a) again, differences in contextual **salience requirements**, and (b) differences w.r.t. the nature and strength of the **negative bias** that is conveyed.

The differences in contextual salience requirements is derived in the same way as in the case of statements. Differences w.r.t. the negative bias is predicted in the following way.

In the case of polar questions with inherently emphatic NPIs, such as (147), the NPI automatically makes its neutral counterpart *help* salient. The additive component of *EVEN* therefore requires that the issue ‘Did Paul help when Minta was ill?’ is already settled for the speaker—and furthermore, settled negatively, given pragmatic considerations. This inexorably derives a very strong negative bias: The speaker is effectively signaling that she believes that Paul did not do anything that is considered as properly ‘helping’; the only open issue is whether he did anything that falls short of helping (i.e., below the critical threshold). This method of inquiring about degrees of helpfulness that are usually deemed negligible, in addition to implicating negative speaker belief w.r.t. degrees above the critical threshold, constitutes a natural way of posing a rhetorical question. The account thus predicts that follow-ups which appears to leave the general issue open, such as *He must have helped her in SOME way* are infelicitous.

- (147) Did Paul lift a finger when Minta was ill?
#He must have helped her in SOME way, he’s her husband!

In contrast, in the case of polar questions with contingently emphatic NPIs, such as (148), repeated from (53), a salient focus alternative is determined by the context. Therefore, the perceived strength of the negative bias is heavily context-dependent, and oftentimes relatively weak. In particular, the perceived strength of the negative bias is predicted to depend on how wide the domain associated with the contextually salient alternative is (or in the case of quantity alternatives, how small the quantity denoted by the salient alternative is). In the case of (148) for instance, the resulting additive implication is merely that the speaker believes that the addressee does not have some specialty apples like tart apples or gala apples.

- (148) A: Do you have tart apples or gala apples?
B: No, I’m sorry.
A: Do you have ANY kind of apples?
You must have SOME varieties, you’re a fruit stand!

Therefore, the issue of whether the addressee has any other kinds of apples, perhaps less specialized ones, is correctly predicted to remain open. This in turn predicts that follow-ups like *You must have SOME varieties* can be felicitous. A summary of these differences is given in Table 2.

6.3 Emphatic NPIs in wh-questions

6.3.1 Contingently emphatic NPIs in wh-questions

Consider the wh-question in (149), which contains a contingently emphatic NPI.

	Contingently emphatic NPIs	Inherently emphatic NPIs
Salience requirement	Must be satisfied by input context	Satisfied by neutral counterpart, so need not be satisfied by input context
Settledness implication	Implicates speaker belief in the negative resolution of context-dependent salient alternative(s); often results in weak negative bias	Implicates speaker belief in the negative resolution of the neutral counterpart issue, which results in a strong negative bias

Table 2: Differences between inherently and contingently emphatic NPIs in polar questions

(149) Who showed ANY symptoms of rosacea?

Following the same reasoning as the one adopted in the case of polar questions (Section 6.2), we arrive at the conclusion that the only viable LF for (149) is one in which EVEN scopes over INT, as in (150). The inverse ordering is predicted to violate the comparative requirement of EVEN, resulting in undefinedness.²²

(150) $[\chi \text{ EVEN}_i [\psi \text{ INT } [\varphi \text{ who showed ANY symptoms of rosacea}]]]$

Consider any g such that $i \notin \text{Dom}(g)$, which is required for $[\chi]_+^g$ to be defined. For any such g , $[\psi]_+^g$ is the set of propositions that resolve the question who has symptoms of rosacea in the contextually restricted domain D . For each subdomain D' of D there is a subdomain alternative, namely the set of propositions resolving the question who has symptoms of rosacea in D' .

Which propositions count as resolutions depends (i) on whether the question is taken to carry an existential presupposition or not, i.e., whether it is taken to presuppose that at least one person showed symptoms of rosacea, and (ii) on whether the question receives an exhaustive interpretation (mention-all) or a non-exhaustive interpretation (mention-some). We will consider all four possibilities.

We will first consider the at-issue content of the question under all four readings, turning to non-at-issue content in a moment. We predict that the at-issue content of (150) is only well-defined under non-presuppositional readings, since under presuppositional readings the emphatic NPI is not licensed. As discussed in Section 4.3.5, this is because the comparative requirement of EVEN is satisfied only in under non-presuppositional readings. In this case, much as in the case of polar questions, the cumulative likelihood of $[\psi]_+^g$ is necessarily 1, and that of any subdomain alternative A is also necessarily 1 (because $\bigcup [\psi]_+^g = W$ and $\bigcup A = W$ as well). On the other hand, under a presuppositional reading, the cumulative likelihood of $[\psi]_+^g$ amounts to the likelihood that the existential presupposition is true, i.e., the likelihood that someone showed symptoms of rosacea in D , and likewise the cumulative likelihood of a given subdomain alternative is the likelihood that someone showed symptoms of rosacea in $D' \subset D$). Inevitably then, the comparative requirement will be violated under such readings.

Assuming that (150) has non-presuppositional readings, either because the existential presupposition only arises optionally in the first place, or because it can be contextually suspended, our account predicts that the at-issue content of χ is well defined. As in the case of statements and polar questions, it is the same as that of its prejacent ψ , and the sentence is correctly predicted to express the issue of who showed symptoms of rosacea in the contextually restricted domain D , leaving open the possibility that nobody did.

²²We assume a division of labor between INT and the wh-element in deriving the question interpretation; see Roelofsen (2018) for more details.

We now turn to non-at-issue content. Since ANY bears prosodic focus, the additive component of EVEN is activated, and requires that its prejacent ψ has a contextually salient focus alternative, just like in the case of statements and polar questions. When this contextual requirement is satisfied, the non-at-issue implication that arises from wh-questions like (149) is predicted to be the same core additive implication we have discussed with regards to statements and polar questions, namely, the implication that the salient focus alternatives are settled in the speaker's doxastic state. However, the inferences that ultimately result from this core implication depend on whether the wh-question is interpreted exhaustively or non-exhaustively.

Let us consider **non-exhaustive readings** first. Under such a reading, a derivation similar to the one for polar questions predicts that an inference of negative bias inevitably arises. For instance, in the case of (149), a salient alternative could be *Who showed significant symptoms of rosacea?*, interpreted non-exhaustively. The additive implication requires that this issue must be settled in the speaker's doxastic state. Now suppose that the speaker believes a proposition that resolves the alternative issue *positively*, e.g., the proposition that Bill showed significant symptoms of rosacea. This proposition also resolves the question in (149), *Who showed ANY symptoms of rosacea?*, under a non-exhaustive interpretation. So the question in (149) would not be sincerely utterable for the speaker. Therefore, we can conclude that the salient alternative issue must be settled *negatively* in the speaker's doxastic state. That is, the speaker must believe that *nobody* showed significant symptoms of rosacea.

Interestingly, the situation is different in the case of **exhaustive readings**. This is because, unlike in polar questions and in wh-questions under a non-exhaustive reading, a non-negative answer to a salient alternative issue no longer automatically resolves the question that was actually asked. For instance, consider a variant of (149) below, which favors an exhaustive interpretation.

(151) Which of our patients showed ANY symptoms of rosacea?

Suppose that the contextually salient alternative issue is *Which of our patients showed significant symptoms of rosacea?*, interpreted exhaustively (and still without existential presupposition). Let us refer to the proposition that *none* of our patients showed significant symptoms of rosacea as the *negative* answer to this question, and to resolutions implying that some patients did show symptoms as *non-negative* answers. Suppose that the speaker believes a non-negative answer to the alternative issue, namely, that Ann and Bill showed significant symptoms of rosacea and nobody else did. In this situation, the speaker may very well still be curious about who exactly showed *any* symptoms of rosacea, including insignificant ones. After all, it may be that Ann and Bill were the only patients who showed any symptoms, but it may also be that patients besides Ann and Bill showed symptoms as well. So, the question in (151), under an exhaustive interpretation, need not be settled yet in the speaker's doxastic state.

Thus, under an exhaustive interpretation, questions like (151) can be sincerely uttered even if the contextually salient alternative issues are settled *non-negatively* in the speaker's doxastic state. Since the additive requirement for EVEN merely dictates that the salient alternative issues be settled (not that they be settled negatively), we predict that questions like (151) are perfectly compatible with situations in which the salient alternative issues are non-negatively settled. Furthermore, we predict that in such cases, no inference of negative bias arises. This prediction is borne out in examples like (152), as well as in (153), a parallel example involving EVER rather than ANY.

(152) [Context: A researcher is screening patients for a clinical trial and needs to rule out all patients with rosacea. A nurse reports that A and B demonstrated multiple symptoms of rosacea. The researcher responds:]

Thank you, but I need to be very careful here. . .
Which patients have shown ANY symptoms of rosacea?

- (153) [Context: An official is doing a background check of applicants for a certain benefit and needs to know which of them ever failed to pay a bill. An assistant has acquired data from electricity providers and reports on the basis of these data that applicants A and B both failed to pay their electricity bill once. The official says:]

Good to know, but we need to dig deeper. . .
Which applicants have EVER failed to pay a bill?

To our knowledge, examples like these, where emphatic NPIs are used in questions without giving rise to any inference of negative bias, have not been actively discussed in previous work. While their existence is unexpected from the perspective of accounts that directly tie emphatic NPIs in questions to negative bias, it follows naturally from our settledness-based account.

6.3.2 Inherently emphatic NPIs in wh-questions

Consider the wh-question in (154), which contains an inherently emphatic minimizer.

- (154) Who lifted a finger to help when Mary was in trouble?

As already established in Section 4.3.5 and reiterated in Section 6.3.1, the only viable LF for (154) is the one in (155).

- (155) $[_X \text{ EVEN}_i [_\psi \text{ INT } [_\varphi \text{ who helped } d_{0,F_i}]]]$

Consider again some assignment g such that $i \notin \text{Dom}(g)$, which is needed for the at-issue content of $[_X]_+^g$ to be well-defined. For any such g , $[_\psi]_+^g$ is the set of propositions resolving the question who helped to some degree $d \in \langle 0, \infty \rangle$. And for every subdomain D' of $\langle 0, \infty \rangle$, the associated subdomain alternative is the set of propositions resolving the question who helped to some degree $d \in D'$.

As before, what counts as a resolution of a question depends on whether the question is taken to carry an existential presupposition and on whether it is interpreted exhaustively or not. Extrapolating from the discussion in Section 6.3.1, we again predict that presuppositional readings are ruled out because under such readings the comparative requirement of *EVER* is violated. Assuming that a question like (154) allows for non-presuppositional readings, we predict that its at-issue content is well-defined, and is the same as that of the constituent ψ in (155), namely, the issue of who helped to some degree $d \in \langle 0, \infty \rangle$.

What about non-at-issue content? Since the NPI in (154) is focused, the additive component of *EVER* comes in to play, and requires that there be a contextually salient focus alternative of ψ . As in the case of statements and polar questions, this requirement is guaranteed to be satisfied because inherently emphatic NPIs always render their neutral counterpart, in this case, *help*, salient.

The non-at-issue content of (154) is thus predicted to be well-defined in any context. What is its meaning contribution then? As in the case of contingently emphatic NPIs, at a fundamental level it amounts to the implication that the salient alternative issues are already settled in the speaker's doxastic state. This holds in particular for the alternative issue which concerns the minimizer's neutral counterpart, *Who helped when Mary was in trouble?*

What it means for this issue to be settled in the speaker's doxastic state depends on whether it is interpreted exhaustively or non-exhaustively. Our proposal therefore generates distinct predictions depending on whether the question at hand is taken to be interpreted exhaustively or not, although the difference turns out to be less easily discernible than in the case of contingently emphatic NPIs. We show below that this is due to the specific relationship that holds between minimizers and their neutral counterparts.

Let us first consider **non-exhaustive readings**. Under such a reading, a derivation analogous to the one outlined for polar questions and in Section 6.3.1 yields an inference of negative bias, namely, that the speaker believes that *nobody* helped when Mary was in trouble. After all, if the alternative issue had been settled positively in the speaker's doxastic state, then the

question that was actually asked, interpreted non-exhaustively, would also already be settled in the speaker's doxastic state, which would make it insincere for her to ask the question she asked.

Now consider **exhaustive readings**. In line with the discussion in Section 6.3.1, the basic prediction of our proposal is that it would be possible for the speaker to sincerely ask the question in (154) under an exhaustive interpretation, not only when she believes the negative answer to the neutral-counterpart-focus-alternative, i.e., that *nobody* helped when Mary was in trouble, but also when she believes a non-negative answer to this question, e.g., that *Bill* helped when Mary was in trouble and nobody else did. This is because such a non-negative answer, strictly speaking, does not resolve the question asked, interpreted exhaustively. While already knowing that Bill was the only person who helped to any significant degree when Mary was in trouble, the speaker might in principle still be interested in knowing who exactly provided non-significant but non-zero amount of help (i.e., who lifted a finger without really helping). In this case, the additive requirement would be satisfied and (154) would be sincerely utterable despite the absence of any negative speaker bias.

However, in practice, it is unlikely that a speaker would find any sort of utility in figuring out who exactly provided non-significant amounts of help when she already knows exactly who provided significant amounts of help. This applies more generally to other minimizers as well: for instance, when would it ever become useful for a speaker to inquire about who exactly experienced some negligible amount of sleep (i.e., who slept a wink), if she already knows that A and B, and nobody else, experienced non-negligible amounts of sleep? Such situations are difficult to imagine. Moreover, if such a scenario were to occur, it would be more cooperative for the speaker to formulate her question as in (156) or (157).

(156) Who, except for A and B, lifted a finger to help when Mary was in trouble?

(157) Who, except for A and B, slept a wink?

These formulations make clear that the speaker is already very close to having a complete answer to the questions at hand, since the possibility that some people provided non-significant but non-zero amounts of help, or experienced non-negligible but non-zero amounts of sleep is unlikely. Thus, these formulations would be preferred over ones like (154), if it is indeed the case that the speaker believes an exhaustive, non-negative answer to the neutral-counterpart-focus-alternative (*Who helped when Mary was in trouble?* and *Who slept?*, respectively). In sum, while exhaustively interpreted wh-questions with minimizers may in principle allow for interpretations lacking negative bias, likelihood considerations make it more natural for them to be interpreted as signalling that the neutral-counterpart-alternative has been settled negatively.

Nevertheless, the unlikely scenarios mentioned above may in fact be devised with careful manipulations of the context. One example that comes close to achieving the desired effect is the following.

(158) [Context: A researcher is screening hospital patients for a very important clinical trial and needs to rule out anyone who dozed off, even just a little bit, during their overnight stay in an observation room. Patients were observed with very sensitive sleep detection equipment, as well as two nurses. In the morning, without having checked the sleep detection data yet, the nurses report that they saw patients A and B sleep for a couple of minutes during the night. The researcher responds:]

Thank you, but please check the sleep detection data as well. I need to know...
Which patients slept a wink?

As predicted, example (158) demonstrates that in principle, under exhaustive interpretations, wh-questions with inherently emphatic NPIs may be asked in the absence of a negative bias. Just like the parallel examples we saw in (153)–(152) with contingently emphatic NPIs, examples like (158) have to our knowledge not been discussed in previous work. Their existence is unexpected from the standpoint of theories directly tying minimizers in questions to negative bias, but again

	Contingently emphatic NPis	Inherently emphatic NPis
Saliency requirement	Must be satisfied by input context	Satisfied by salient neutral counterpart, so need not be satisfied by input context
Settledness implication under a non-exhaustive reading of the question	Implicates the negative resolution of context-dependent salient alternatives(s), which results in weak negative bias	Implicates the negative resolution of the neutral counterpart, which results in strong negative bias
Settledness implication under an exhaustive reading of the question	Implicates either negative or non-negative resolution of salient contextual alternatives(s); in the latter case no negative bias is implied	Implicates either negative or non-negative resolution of the neutral counterpart; in the latter case no negative bias is implied, but the question asked is unlikely to have any utility

Table 3: Differences between inherently and contingently emphatic NPis in wh-questions

follow naturally from our settledness-based account.

6.3.3 Commonalities and differences: Inherent vs. contingently emphatic NPis in wh-questions

As we did in cases of statements and polar questions, we will now briefly summarize the commonalities and differences between inherently and contingently emphatic NPis in wh-questions. These are summarized in Table 3. The first two rows of the table correspond to the main commonalities and differences between the two types of NPis in polar questions, summarized in Table 2, which we will not revisit in detail here.

The third row of Table 3 concerns the ‘settledness implication’ triggered by the additive component of *EVEN* in cases where the wh-question in which the NPI appears is interpreted exhaustively. We have seen that in such cases, both contingently and inherently emphatic NPis are predicted to generate the implication that the contextually salient alternative issues are already settled, either negatively or non-negatively, in the speaker’s doxastic state. If the salient alternative issues are settled non-negatively in the speaker’s state, there is no ground for assuming that the speaker is biased towards the negative answer to the question that she asked. For contingently emphatic NPis, such cases are indeed straightforward to find, as was illustrated in examples (152) and (153). In the case of inherently emphatic NPis, the prediction is more subtle, because the neutral-counterpart-alternative is assumed to always be contextually salient. If the neutral-counterpart-alternative is settled non-negatively in the speaker’s doxastic state, then the question she asked, containing an emphatic NPI, is very unlikely to have any utility for her, because it is very likely to have exactly the same answer as its neutral-counterpart-alternative, which she already knows the exhaustive answer to. Although it is possible to construct very specific contexts in which the question asked still has some utility, as illustrated in example (158), we predict that inherently emphatic NPis in wh-questions are most likely to be interpreted as implying a negative speaker bias, more so than contingently emphatic NPis.

[+pre, -exh]	[+pre, +exh]	[-pre, -exh]	[-pre, +exh]
Not licensed		Licensed; ends up implicating that alternatives are negatively settled	Licensed; merely implicates that alternatives are settled

Table 4: Interpretations of emphatic NPIs in wh questions

6.3.4 Summary: Emphatic NPIs in wh-questions

We have seen that our proposal makes different predictions for emphatic NPIs in wh-questions depending on whether the question is interpreted as carrying an existential presupposition or not, and on whether it is interpreted exhaustively or not. Having gone through these different predictions in some detail, let us now take a moment to compare each of the four cases more directly. A summary of this comparison is provided in Table 4.

Our proposal predicts that emphatic NPIs are not licensed under presuppositional readings of wh-questions, be they exhaustive or non-exhaustive. This prediction is straightforwardly inherited from the EVEN-based account of non-emphatic NPIs in questions that we build on here (Roelofsen, 2018), as summarized in Section 4.3.5. On our account, the distribution of all weak NPIs is governed by the comparative component of the associated EVEN operator, no matter whether the NPI is focused or not. And the comparative component of EVEN is predicted to be satisfied in wh-questions only when the question is interpreted as *not* carrying an existential presupposition. This is reflected by the first two columns, [+pre, -exh] and [+pre, +exh], of Table 4.

Our proposal further predicts that the implications triggered by an emphatic NPI in a wh-question depend on whether the question is interpreted exhaustively or non-exhaustively. Under a non-exhaustive reading, we predict that an inference of negative bias is inevitable (although its strength may vary depending on whether the NPIs are inherently or contingently emphatic), just as in the case of polar questions. This is because, if the salient alternative issues were settled positively in the speaker’s doxastic state, the question that she asked would already be resolved for her as well. This is reflected by the third column, [-pre, -exh], of Table 4.

Under an exhaustive reading, we predict that that a weaker inference arises, namely that the salient alternative issues are settled either negatively or non-negatively in the speaker’s doxastic state. This is because, even if the salient alternative issues are settled non-negatively in the speaker’s state, this does *not* mean that the question she asked, interpreted exhaustively, is already resolved for her. However, we also predict that for inherently emphatic NPIs an inference of negative bias is very likely to arise, given additional utility-based considerations. This is summarized in the fourth column, [-pre, +exh], of Table 4.

6.4 Commonalities and differences: emphatic NPIs in polar questions vs. wh-questions

Before closing this section on the predictions of the proposed account, let us briefly compare the differences between polar questions and wh-questions regarding the effects of emphatic NPIs. It is well-known that questions with emphatic NPIs often convey some kind of negative bias. Our account, however, makes more fine-grained predictions. In particular, whether an inference of negative bias arises is predicted to depend on the type of question involved, and in the case of wh-questions, on whether the question is interpreted exhaustively or not.

As summarized in Table 5, in the case of polar questions we predict that some form of negative bias is always implied, though its strength will depend on the type of NPI. The same prediction is made for wh-questions under a non-exhaustive interpretation. However, for wh-

	In polar questions	In wh-questions
Commonalities	Implicate that a salient alternative is settled	
Differences	Always implicate that the salient alternative issues are settled negatively; obligatory negative bias, strength depending on type of NPI	May implicate that the salient alternative issues are settled either negatively or non-negatively; in this case no negative bias is derived

Table 5: Differences between emphatic NPIs in polar vs. wh-questions.

questions which are interpreted exhaustively we predict that an inference of negative bias need *not* necessarily arise.

7 Comparison with other approaches

We have so far outlined in some detail our analysis of emphatic NPIs, and assessed the predictions it generates across statements and questions. In this section, we discuss in more detail how our account diverges from alternative accounts, and in what respect we think it achieves better empirical and/or theoretical coverage. As many different influential analyses of NPIs have been proposed in previous literature, we cannot present a comprehensive survey of all of them. We therefore focus on two specific alternative analyses which have the most direct bearings on the current account: that of van Rooij (2003) and that of Crnić (2019). Before discussing these, however, we first consider a potential alternative, purely pragmatic account of the negative bias triggered by emphatic NPIs in polar questions.

7.1 Challenges for a purely pragmatic account of negative bias

One may attempt to derive the negative bias of polar questions with emphatic NPIs on purely pragmatical grounds, without relying on the conventionalized additive component of *EVEN* that our account postulates. In particular, one could claim that in asking a polar question involving a term that denotes a minimal amount, or the lowest endpoint of a salient scale, a speaker implicates a negative bias (Fauconnier 1980 considered an account in this vein). Let us illustrate how such an implicature may arise on the basis of (159).

(159) Did Tansley show an inkling of appreciation?

Note that (159) includes a ‘minimal amount denoting (m.a.d.) expression’, namely *inkling*, and that it tends to convey a negative bias, even though it does not contain an emphatic NPI, nor the particle *even* for that matter. One might suggest that this negative bias could be inferred pragmatically in roughly the following way: the fact that the speaker didn’t choose to ask a question involving a more neutral, less marked expression (e.g., *Did Tansley show some appreciation?*), suggests that such questions were not sincerely utterable, likely because they are already settled in the speaker’s doxastic state. And if they are indeed already settled, then they must be settled negatively, otherwise the question that the speaker did ask would not have been sincerely utterable either.

A tacit assumption needed for this type of explanation is that the alternative question would have been in some relevant sense a *better* choice than the question that was actually asked. The reason as to why this may be is not elaborated explicitly in Fauconnier, but may be found in utility-based accounts of NPIs in questions such as Krifka (1995) and van Rooij (2003). Krifka (1995) notes that more balanced polar questions (where the likelihood of each possible answer is

a priori roughly equal) generally have higher expected utility. Likewise, van Rooij (2003) shows that questions with greater entropy (a measure which keeps track of the *average* informativity of the possible answers) are generally more useful. For instance, in a 20 questions game, where nothing is known about the answer a priori, it would be a better strategy to start with general questions like *Is it alive?* than very specific questions like *Is it a long-tailed wombat?* Thus, it is generally better to frame a polar question in such a way that the positive and the negative answers have comparable a priori probability. Questions involving a m.a.d. expression like (159) however, as well as questions involving NPIs, are framed in such a way that the positive answer is easier to satisfy and thus becomes a priori more likely to hold. Therefore, if there were no negative speaker bias, polar questions involving such terms would be suboptimal, as their more balanced variants would have greater expected utility. The fact that these variants were not chosen, points towards a negative speaker bias.

This pragmatic account is compelling, and provides a natural way of accounting for the inference of negative bias in questions like (159). It may therefore be tempting to conclude that essentially the same mechanism is at play for emphatic NPIs, which also denote minimal amounts (e.g., *lift a finger*) and/or increase the a priori likelihood of the positive answer (e.g. *ANY apples*). However, as van Rooij (2003) noted, an inference of negative bias does not always arise for questions which merely contain a m.a.d. expression (in the absence of the particle *even*). The negative bias is often weak, and can be entirely absent depending on the context. For instance, in contexts like (160), when all that matters is whether the prospective patient displayed a degree of rosacea greater than zero, the inference of negative bias goes away.

(160) [Context: Anyone with rosacea (both mild and serious) can sign up for a test study; the screener for the study is asking a nurse about patient X, and has no prior expectation about his health condition.]

How about this participant? Did he show an inkling/a hint of rosacea?

Furthermore, van Rooij (2003) notes that certain m.a.d. expressions such as *a tad* do not even give rise to an inference of negative bias in neutral contexts such as (161).

(161) [Context: As part of a product development study, Susan tastes two versions of a new softdrink. After tasting the second version she asks:]

Does this one contain a tad more sugar?

Importantly, this is not the case when the question contains an overt *even* alongside the m.a.d. expression, as in (162).

(162) Does this one even contain a tad more sugar?

This question conveys that Susan believes that the second version of the drink does *not* contain significantly more sugar than the first (perhaps, after tasting the first version she had asked for a sweeter version, and now she doesn't believe that the new version is actually any sweeter). Generally, in the presence of *even*, polar questions with m.a.d. expressions convey a negative speaker bias that can no longer be canceled. Put differently, while m.a.d. expressions on their own can in some contexts give rise to negative speaker bias inferences through pragmatic enrichment, in the presence of *even* such inferences appear to be conventionalized and no longer context dependent.

Polar questions containing emphatic NPIs behave similarly to ones with m.a.d. expressions and *even*. The inference of negative speaker bias is strictly enforced, irrespective of context, as illustrated in (163).

(163) [Context: Only patients who did not sleep at all the previous day can participate in a test study; the screener for the study is asking a nurse about patient X, and has no prior expectation about this patient's sleep status the day before.]

- a. Did he take a nap?
- b. #Did he sleep a wink?

This suggests that the semantics of m.a.d. expressions in combination with the pragmatics of question utility is *not* sufficient to derive the observed negative bias of questions with emphatic NPIs, nor of questions with overt *even* for that matter. This suggests that the EVEN operator and *even* semantically contribute to this bias as well. We have argued that it is the additive component of these operators which provides precisely the required piece for deriving the bias.

At this point, one may ask whether it is possible to rely solely on the comparative semantics of EVEN and nevertheless derive the negative bias. Such an account has indeed been pursued in Guerzoni (2004). However, this proposal involves a non-standard semantics of polar questions, and wrongly predicts that the resulting negative bias is categorical, rather than formulated around alternative issues. This, as we noted in Section 3.2, is not what is observed (see Jeong, 2020, for more discussion).

Note that in a polar question with a contingently emphatic NPI (e.g., *Do you have ANY apples?*), we have argued that the *nature* of the negative bias is context-dependent, but *some* form of negative bias is always present. In contrast, negative bias in questions like (159) may be entirely absent depending on the context. Note also that non-emphatic NPIs behave more similarly to these questions (e.g., *Do you have any apples?*). Thus, the parallel between m.a.d. expressions with overt *even* on the one hand and non-emphatic NPIs on the other breaks down in this respect, which is potentially problematic for other *even* based accounts of NPIs, but not for ours (see Section 7.3 for more discussion): in the case of non-emphatic NPIs, the additive component is semantically vacuous, given its focus-sensitivity.

One final point about the purely pragmatic approach is worth making. Under Krifka (1995), the notion of question utility does double duty: it is intended to capture both the distribution of NPIs in questions (an NPI is licenced only when the resulting question has greater utility than alternative questions), as well as the negative bias of questions. Under van Rooij (2003), the analogous notion of entropy (a counterpart of strengthening in statements) is utilized to capture the distribution of NPIs (more on this in the next section), but a separate mechanism akin to our additive component derives the negative bias. This is because van Rooij was aware of the infeasible (context-independent), alternative-based nature of the negative bias generated by emphatic NPI questions. Our account utilizes the comparative component of EVEN to capture the bulk of the licensing conditions, and the additive component to capture the negative bias.

To summarize, there certainly exist independent pragmatic processes that can derive negative biases in polar questions. However, these mechanisms are geared towards deriving context-dependent, defeasible negative biases. They are not sufficient to capture the negative bias that is characteristic for polar questions with emphatic NPIs, suggesting that this needs to be derived in part from a conventional additive component contributed by EVEN.

7.2 Comparison with van Rooij (2003)

Our approach to emphatic NPIs capitalizes on a generalized formulation of the additive component of EVEN in terms of settledness in the speaker’s doxastic state. In this respect, our analysis is inspired by that of van Rooij (2003), who also posits that NPIs involve an additive EVEN operator. While he does not provide an explicit entry for this operator, his characterization of it is similar to our formulation. Namely, he proposes that EVEN, when scoping over a question Q gives rise to the presupposition that salient alternative questions Q' , Q'' , etc. have already been settled in the common ground of the conversation.

Our analysis diverges from that of van Rooij (2003) in a few respects. First, the current account assumes an explicit notion of ‘settledness’ from inquisitive semantics, which applies uniformly across statements and questions. In comparison, the account of van Rooij (2003) focuses primarily on questions with emphatic NPIs and does not explicitly discuss statements with emphatic NPIs. Without further assumptions, it thus remains unclear how his analysis would extend to statements. Our semantic framework enables a straightforward unified formulation of

the additive component, and allows the same mechanism that yields bias in questions to yield domain widening effects and pertinent contextual requirements in statements.

Second, the current account characterizes the additive component of EVEN as a not-at-issue implication about the speaker’s doxastic state. In comparison, the account of van Rooij (2003) encodes it as a presupposition. Our choice is in part motivated by the observation that emphatic NPIs do not give rise to contextual constraints that would have been triggered by a presuppositional component. In particular, examples like (52) suggest that speakers can use questions with minimizer NPIs fairly out-of-the-blue, without necessarily assuming that the relevant alternative issues are already settled in the common ground. Put differently, the additive meaning component does not appear to function as a definedness condition, but rather as new, not-at-issue information about what the speaker believes.

Third, the current account does not separately stipulate ‘domain widening’ as part of the semantics of emphatic NPIs. In comparison, the account of van Rooij (2003) does posit domain widening, in the sense of Kadmon and Landman (1993), to be a central semantic contribution of emphatic NPIs. As we saw in Section 6.1 however, domain widening effects can be derived from the basic semantics of NPIs, and arise only in the case of domain focus, and not in the case of quantity focus.

Finally, in the current approach, the licensing of NPIs (across statements and questions) and the characteristic behavior of emphatic NPIs (e.g., negative bias in questions) are explained under the unified umbrella of EVEN. The bulk of the former explananda is captured by the comparative component of EVEN, whereas the latter is captured by the additive component. In comparison, the account of van Rooij (2003) focuses solely on the additive component of EVEN, which derives the negative bias of questions with emphatic NPIs. Meanwhile, the licensing of NPIs in questions is taken care of separately by the notion of entropy, which keeps track of the average informativity of possible answers to questions, and as noted before, is a counterpart notion to strengthening in statements.

Here, we would like to point out that the additive component of our analysis can be decoupled, and can easily combine with certain alternative accounts of NPI licensing such as the entropy-based one of van Rooij (2003). We identify two main advantages to maintaining our current comparative-based account of NPI-licensing in questions: First, it is theoretically appealing to have everything in terms of the EVEN operator. This is particularly so since cross-linguistically NPIs are often noted to be morphologically derived from *even* (see, e.g., Haspelmath, 1997; Lahiri, 1998). Second, as already noted in Roelofsen (2018), the entropy-based account of NPI-licensing generates the incorrect prediction that NPIs in general are licensed only in contexts involving negative bias. This, as we saw, is not the case for questions containing non-emphatic NPIs.

7.3 Comparison with Crnić (2014a,b, 2017, 2019)

Our analysis builds on and preserves the general spirit of the account of Crnić (2014a,b, 2017, 2019). In particular, both analyses provide an inclusive EVEN-based account of NPIs. However, our analysis also diverges from that of Crnić in a few respects.

First, as summarized in Figure 2, our analysis is broader in scope and has a different empirical focus. Crnić’s main goal is to capture the behavior of weak NPIs in *statements*. The current account on the other hand, aims to capture the behavior of weak NPIs across both statements and questions. Furthermore, Crnić concentrates primarily on *non-emphatic* NPIs. While he does consider the licensing conditions of emphatic NPIs, his main concern in this regard is to explain why they appear to be infelicitous in certain DE contexts (such as the antecedent of non-lawlike conditionals). We have argued that these limitations are not due to general semantic properties of emphatic NPIs but must involve contextual/pragmatic factors. On the other hand, we have focused on pointing out and accounting for certain contextual requirements arising from emphatic NPIs in statements, and have derived their domain widening effects, both of which are beyond the scope of Crnić’s work. In addition, while the current account focuses on emphatic NPIs, it enables a unified analysis of weak NPIs which can derive the observed

differences between emphatic and non-emphatic NPIs based on the prosody-sensitive, selective activation of the additive component of EVEN.

Our analysis resolves one specific puzzle that Crnič brings up. The puzzle is described as follows: if the semantics of a weak non-emphatic NPI is essentially the same as that of a minimal amount denoting (m.a.d.) expression in combination with the particle *even* (e.g., *even a single person*), which is what Crnič assumes, why do the two constructions sometimes show different behavior? In particular, Crnič (2019) identifies the following contrast:

- (164) In questions, non-emphatic weak NPIs do not necessarily give rise to an inference of negative bias, whereas m.a.d. expressions with *even* do.

This is exemplified in (165a-b):

- (165) a. Has Peter read any biology papers? → no negative bias
 b. Has Peter read even a SINGLE biology paper? → negative bias

Our analysis provides an explanation of this contrast: Questions like (165a) with non-emphatic NPIs do not prompt the additive component of EVEN (this happens only when the NPI is focused). Consequently, only the comparative component of EVEN is active here. On the other hand, questions like (165b) involve a focused m.a.d. expression in combination with the particle *even*, such that not only the comparative component, but also the additive component of the particle make a semantic contribution. And as we saw, it is the additive component that is the source of the negative bias.

More generally, our account predicts that m.a.d. expressions in combination with the particle *even* are more similar to *emphatic* NPIs than to non-emphatic ones. For instance, (165b) is more similar to (166) than to (165a):

- (166) Has Peter read ANY biology papers? → negative bias

The problematic parallel between non-emphatic NPIs and m.a.d. expressions with *even*, as characterized by Crnič, thus stems from his assumption that only the comparative component is relevant in capturing the behavior of *even* and weak NPIs.²³ Including the additive component, as we have proposed, makes it possible not only to maintain Crnič’s insight that in most respects, non-emphatic NPIs behave similarly to m.a.d. expressions with *even* (since both share the same comparative semantics), but also to explain differences between the two (the particle *even* when combined with a focused m.a.d. expression has a non-trivial additive component, while non-emphatic NPIs don’t). Furthermore, it predicts a more direct parallel between emphatic NPIs and m.a.d. expressions with *even*, and achieves all of this under the umbrella of a unified account of weak NPIs, both emphatic and non-emphatic.

8 Conclusion

We examined the behavior of emphatic NPIs across statements and questions. On the empirical front, we demonstrated that emphatic NPIs give rise to a variety of apparently heterogeneous inferences and contextual requirements, depending on the type of clause in which they occur (statements, polar questions, wh-questions) and the type of emphatic NPI involved (inherently vs. contingently emphatic). On the theoretical front, we proposed a non-reductive, unified account of emphatic and non-emphatic NPIs which derived all of these apparently disparate effects from a single core semantic operator, EVEN.

The crux of the analysis is a particular formulation of the additive component of EVEN, intuitively paraphrased as the implication that all salient focus alternatives of the prejacent,

²³Crnič does mention that the additive component may be needed to explain why examples such as *Every student who read even ONE book passed the exam* obtains a stronger interpretation than *Every student who even read exactly one book passed the exam*, which is what his analysis positing covert exhaustification predicts.

which may either be declarative or interrogative, are settled in the doxastic state of the speaker. We demonstrated that, together with general pragmatic assumptions, this additive component of EVEN can account for all the observed inferences contributed by emphatic NPIs, including domain widening in statements and inferences of negative bias in questions.

The emerging account succeeds in capturing both similarities and differences between emphatic and non-emphatic NPIs, and resolves some outstanding puzzles regarding emphatic NPIs, maintaining a general semantic entry that applies uniformly across statements and questions.

9 Appendix

A Minimizers in DE contexts: An experimental study

In Section 3.1, we observed that minimizers may sometimes be less felicitous than non-emphatic weak NPIs in weak (i.e., *non* anti-additive) DE environments. At the same time, we also noted that minimizers are not uniformly infelicitous in such environments. Based on this variability, we argued that the explanation for the gradient acceptability of minimizers in weak DE environments should be based on pragmatic/contextual factors, rather than based solely on the interplay between the semantics of minimizers and the logical properties of weak DE contexts.

To bolster this claim, we tested one possible pragmatic/contextual predictor of infelicity in an experimental study. Below we outline our main hypothesis and the corresponding experiment.

A.1 Hypothesis and predictions

We hypothesized that a particular contextual assumption is at play in generating gradient intuitions of (in)felicity regarding minimizers in weak DE environments. The hypothesized contextual factor is inspired by, but also differs from, a putative property of minimizers posited by Eckardt and Csipak (2013). Eckardt and Csipak (2013) argue that the infelicity of minimizers in weak DE environments stems from the clash between the existential presupposition that characterizes these environments and a particular lexical semantic property of minimizers.

Specifically, weak (Strawson) DE environments such as restrictors of *every* and superlatives give rise to the following existential presuppositions, as long as they obtain non law-like interpretations.

- (167) a. Every student who helped was thanked.
 Presupposes: There exists a student x who helped.
 b. She was the smartest person who helped.
 Presupposes: There exist at least two persons x and y who helped.

These existential presuppositions tend to target exhaustified/strengthened interpretations, as exemplified below.

- (168) a. Every student who took syntax or semantics last semester is taking pragmatics this semester.
 Presupposes: There exists a student x who only took syntax. / There exists a student y who only took semantics.
 b. Every student who ate some cookies was excluded from the analysis.
 Presupposes: There exists a student x who (only) ate some but not all cookies.

By extension, minimizers in these environments, namely, restrictors of *every* and superlatives, are predicted to give rise to the presuppositions in (169).

- (169) a. ?Every student who lifted a finger to help was thanked.
 Presupposes: There exists a student x who *only* lifted a finger to help.

- b. ?She was the smartest person who slept a wink.
 Presupposes: There exist at least two persons x and y who *only* slept a wink.

According to Eckardt and Csipak (2013), by virtue of their lexical semantics, minimizers ‘denote properties which can never obtain in isolation’. For instance, in the actual world, it is impossible for someone to only lift a finger to help and stop there (i.e., do absolutely nothing more beyond this). Likewise, it is impossible for someone to sleep just a wink, and not go over beyond this snooze span. The existential presuppositions in (169) which involve exhaustified interpretations thus cannot be accommodated, resulting in judgments of infelicity.

An intuition along these lines seems promising in explaining the infelicity of minimizers in weak DE environments. However, we noted in Section 3.1, contra Eckardt and Csipak (2013), that the acceptability of minimizers in these environments seems quite variable. This variability can be captured if we posit a weaker version of Eckardt and Csipak (2013)’s hypothesis. Specifically, we may hypothesize that language users generally assume that minimizers are very unlikely to be satisfied without their neutral counterparts being satisfied as well. That is:

- (170) a. *lift a finger*
 By default, it is generally assumed that the following is very unlikely to be true in the actual world:
 $\exists x(\text{only}(\text{lift a finger}(x)))$
- b. *sleep a wink*
 By default, it is generally assumed that the following is very unlikely to be true in the actual world:
 $\exists x(\text{only}(\text{sleep a wink}(x)))$

On this hypothesis, the context-dependent (in)felicity of minimizers in weak DE environments is captured in the following way: in most contexts, the (exhaustified) existential presuppositions triggered by non law-like interpretations of these weak DE environments are difficult to accommodate, given the default assumptions in (170).

This potential explanation leads to certain testable predictions: in cases where the relevant existential presuppositions of weak DE environments are explicitly supported by the context, (thus overriding the default assumptions in (170)) minimizer NPIs are predicted to be more felicitous. The experiment outlined below tests and confirms this main prediction: Context manipulation (varying crucially as to whether the contextual information supports or denies the existential presupposition) turns out to be a significant predictor of the naturalness ratings for minimizers in weak DE environments.

Assuming that default assumptions like those in (170) are partly responsible for gradient intuitions of infelicity, a question that emerges is what the nature and the status of these assumptions is. One possibility is that they just derive from the interlocutors’ world knowledge, interacting with the lexical meaning of minimizers. In other words, there is nothing special or conventionalized about them. Another possibility is that, more in the spirit of Eckardt and Csipak (2013), minimizers conventionally encode these unlikelihood assumptions, which would be another way in which they differ from their neutral counterparts. The experiment introduces relevant stimuli and paradigms that test these contrasting possibilities, and demonstrates that the former hypothesis is more likely. Therefore, while these default assumptions may explain the gradient infelicity of minimizers in weak DE environments, they need not be stipulated as a part of the semantics of such NPIs.

A.2 Methods

Participants 400 native speakers of American English were recruited through Amazon Mechanical Turk. They were paid \$0.40 to participate. The experiment lasted an average of 4 minutes.

Stimuli The experiment focused on one particular weak DE environment, namely, the restric-

tor of *every* or free choice *any*, exemplified in (171) below. The stimuli thus involved sentences with minimizers in this particular environment, evaluated in various contexts. The contexts varied crucially as to whether they explicitly supported the existential presupposition associated with the exhaustified interpretation of the predicate in the restrictor of *every*. The core context manipulation introduced four conditions: Neutral, Supported, Inconsistent I (over), and Inconsistent II (under). In (171), we provide an example of each. The associated target sentence with the minimizer *lift a finger* is provided at the end of (171), in italics.

- (171) My friend Susan organised a party and asked everyone to help out by bringing some food.
- a. **Neutral:** ...
 - b. **Supported:** One person brought some nuts, and one person brought a small bottle of wine, but nobody brought anything substantial. Still, ...
 - c. **Inconsistent I:** Everyone brought something really delicious. ...
 - d. **Inconsistent II:** But nobody remembered to bring anything. ...

At the end of the party, Susan thanked everyone/anyone who had lifted a finger to help.

The Neutral context, (171a), did not provide any additional information other than the shared contextual set-up shown at the beginning of (171). The Supporting context, (171b), provided information which explicitly supported the relevant existential presupposition, in this case, that there exists someone who *only* lifted a finger to help. The Inconsistent contexts, (171c) and (171d), provided information which was explicitly inconsistent with the relevant presupposition. Given that the existential presupposition is presumed to target the exhaustified interpretation of the predicate, the inconsistency could manifest in two ways: either everyone did more than only lifting a finger to help (over: (171c)), or everyone did less than lifting a finger to help (under: (171d)).

In addition to testing whether likelihood inferences like (170) are the cause of the perceived infelicity of minimizers, we also wanted to examine the status of these inferences: are they lexically encoded, or based on world knowledge? To probe this question, we included stimuli involving sentences without minimizers but with contextual contrasts parallel to those in (171). These sentences varied in how easily the existential presuppositions associated with them could be accommodated given world knowledge. For instance, the target sentence (italicized) in (172) presupposes a fairly unlikely scenario, namely, that there exists someone in the speaker's class who has been to prison.

- (172) Our school recently did a survey on teacher-student relationships.
- a. **Neutral:** ...
 - b. **Supported:** I live in a very violent suburb of Detroit, where many kids are involved in serious crime. ...
 - c. **Inconsistent:** I live in a very safe neighborhood in San Francisco, where all kids are well-behaved. ...

Everyone in my class who has been to prison is treated badly by the teachers.

In contrast, the target sentence (italicized) in (173) presupposes a not unlikely scenario, namely, that there exists someone who biked to school.

- (173) The local government is trying to reduce car traffic.
- a. **Neutral:** ...
 - b. **Supported:** In our neighborhood, many kids have a bike. ...
 - c. **Inconsistent:** In our neighborhood, there are no kids who own a bike. ...

Everyone who biked to school today got a free snack.

These cases are henceforth referred to as UNLIKELY and NOT UNLIKELY, standing for restrictors without minimizers describing *a priori* unlikely scenarios and those describing *a priori* not unlikely scenarios.

As in (171), the contexts preceding the target sentences without minimizers varied as to whether they explicitly provide information that was consistent or inconsistent with the relevant existential presupposition. For these sentences, however, only one type of Inconsistent context was devised (and not two, as in (171)).

If the acceptability ratings for *every*-sentences with minimizers like (171) are comparable to the acceptability ratings for *every*-sentences *without* minimizers, especially those representing the unlikely cases (172), then this would suggest that the unlikelihood assumption that contributes to the perceived infelicity of minimizers is just a general, non-lexical assumption based on world knowledge. In contrast, if the acceptability ratings for *every*-sentences with minimizers are significantly lower than the ones observed in cases like (172), then this might suggest that the unlikelihood assumption is directly encoded in the lexical semantics of minimizers.

Procedure The experiment included 6 target sentences: 2 involving minimizers *lift a finger* and *sleep a wink* (henceforth MINIMIZER condition), 2 involving sentences with unlikely existential presuppositions (e.g., (172); henceforth UNLIKELY condition), and 2 involving sentences with likely existential presuppositions (e.g., (173); henceforth NOT UNLIKELY condition). It also included 4 control items involving established instances of presupposition failure or satisfaction.²⁴ The target sentences were paired with one of 3 contexts: neutral, inconsistent (over/under), and supported. The pairings between context-type and target sentence were counterbalanced, and across target trials, every participant encountered 2 neutral contexts, 2 inconsistent contexts, and 2 supported contexts. In each trial, the participants were asked to rate the naturalness of the target or control sentence on a likert scale from 1 to 7. A complete list of stimuli is provided in Section A.5 (to be substituted with a link to an open access repository containing the experiment codes, data, and analysis codes upon publication).

A mixed effects ordinal regression model was fitted to the data, using the `clmm` package in R, with naturalness ratings as the main dependent variable, context-type and sentence-type as independent variables, and items and subjects as random effects. The model summary is provided in Section A.6.

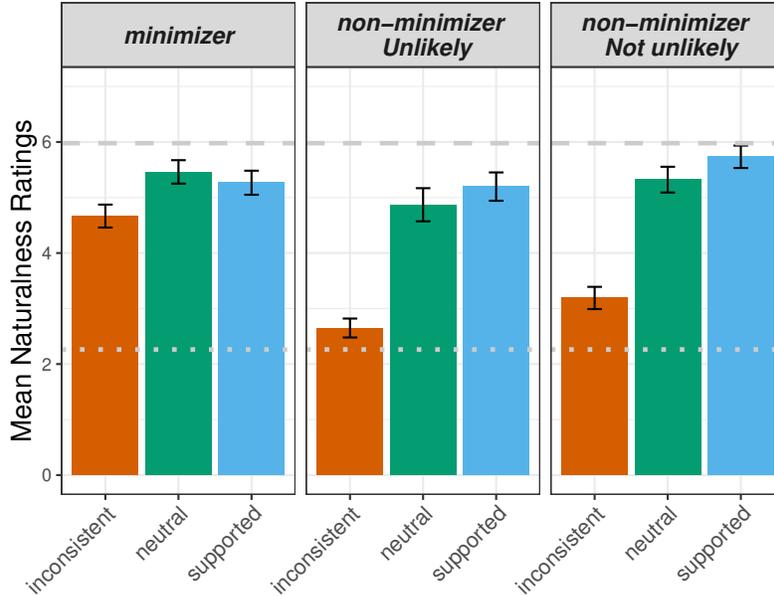
A.3 Results

Figure 5 displays the main results. The panels represent the MINIMIZER, UNLIKELY, and NOT UNLIKELY condition, from left to right. The x-axes and color codings represent the three context conditions: inconsistent, neutral, and supported, and the y-axes represent means and 95% confidence intervals of naturalness ratings (the over- and under- inconsistent contexts for minimizer sentences have been collapsed together, as they yielded broadly comparable results; likewise for the subdivision between *everyone* vs. *anyone*).

As can be seen, context is a significant predictor of naturalness ratings in the hypothesized direction: across all sentence types (i.e., regardless of whether they have minimizer NPIs in restrictors of *every* or not), the target sentences are judged to be significantly less natural when the preceding context provides information that is inconsistent with the existential presuppositions of *every* which involve exhaustified interpretations of predicates (e.g., in the case of minimizers: $\beta = -0.54$, $SE = 0.15$, $z = -3.49$, $p < .001$). Conversely, target sentences, including those containing minimizers, are judged to be significantly more acceptable when the relevant presuppositions are validated by the preceding context.

Furthermore, across all three context conditions, the naturalness ratings of the MINIMIZER sentences are *not* lower than those without minimizers, namely, NOT UNLIKELY and UNLIKELY

²⁴For instance, the stimuli for a sample trial involving a presupposition satisfaction/failure would be: We have a physics teacher and a chemistry teacher, but no math teacher at school. *The physics/math teacher is very bright.*



■: Inconsistent; ■: Neutral; ■: Supported; dashed: felicitous controls; dotted: infelicitous controls

Figure 5: Naturalness of NPI and non-NPI statements (Means & 95% CIs)

sentences.²⁵ In particular, as predicted, there is no significant difference in naturalness rating between sentences including minimizer NPIs and ones without them (nonmin-UL) in supported contexts ($\beta = -0.06$, $SE = 0.18$, $z = -0.33$, $p = .73$). This suggests that the implication of unlikelihood in (170) which contributes to the judgement of infelicity of certain *every* sentences need not be stipulated separately for minimizers, but rather emerges contextually.

While not as directly relevant to the point at hand, it is also worth noting that the UNLIKELY sentences (where the presupposition is a priori unlikely) elicit significantly lower naturalness ratings than NOT UNLIKELY sentences (where the presupposition is a priori not unlikely) across all 3 contextual conditions (reflected in shifting of the baselines of all 3 bars in the third panel compared to the second panel).

A.4 Discussion & Conclusion

The experimental results confirm that when contexts are of the right type, minimizer NPIs are judged to be felicitous in restrictors of *every*, even when they obtain non-lawlike interpretations. Furthermore, they suggest that the context-dependent judgements of infelicity regarding minimizers in restrictors of *every* stem at least partly from the difficulty in accommodating the existential presupposition of *every*. We suspect that the gradient infelicity of minimizers in other DE environments such as superlatives can also be at least partly captured by the same explanation. As was shown in (169), these also give rise to existential presuppositions involving exhausted interpretations of the minimizers, which in usual contexts are difficult to accommodate. This line of explanation also provides a natural answer to why minimizers in restrictors of *every* are judged to be felicitous (somewhat irrespective of the specifics of the context) when they obtain lawlike interpretations: these interpretations do not give rise to existential presup-

²⁵In fact, they are even significantly higher than UNLIKELY cases, which is surprising. This may be due to the fact that one of the target minimizer items, namely, the one involving *sleep a wink*, failed to completely rule out law-like interpretations. But even if we restrict the data to just the ones involving *lift a finger*, which does seem to successfully rule out such interpretations, the acceptability ratings of MINIMIZER are still not significantly lower than UNLIKELY cases.

positions.

Based on these results, we conclude that fundamentally, minimizers have a similar distribution as weak NPIs in statements, and are licensed in a variety of DE environments. The analysis provided in the current paper captures this state of affairs.

A.5 List of stimuli

A.5.1 Minimizers

1. My friend Susan organised a party and asked everyone to help out by bringing some food.
 - (a) One person brought some nuts, and one person brought a small bottle of wine, but nobody brought anything substantial.
 - (b) Everyone brought something really delicious.
 - (c) But nobody remembered to bring anything.(Still.) At the end of the party, Susan thanked anyone/everyone who had lifted a finger to help.
2. The participants of the medical study were not allowed to sleep the night before.
 - (a) Nobody fell asleep, though a few people dozed off for split seconds.
 - (b) All of them followed the instructions and stayed awake through the night.
 - (c) However, all of them forgot about it and went to bed.Anyone/Everyone who slept a wink was excluded from the test phase.

A.5.2 Non-minimizers: unlikely (nonmin-UL)

1. Our school recently did a survey on teacher-student relationships.
 - (a) I live in a very safe neighborhood in San Francisco, where all kids are well-behaved.
 - (b) I live in a very violent suburb of Detroit, where many kids are involved in serious crime.Anyone/Everyone in my class who has been to prison is treated badly by the teachers.
2. Unicef organised a fundraising campaign.
 - (a) The most generous contribution came from someone who donated two thousand dollars.
 - (b) The most generous contribution came from someone who donated twenty million dollars.Anyone/Everyone who donated more than ten million dollars got a special gift.

A.5.3 Non-minimizers: Not unlikely (nonmin-NU)

1. I took a class on biology.
 - (a) Most students managed to complete the final assignment.
 - (b) All students studied hard but no one managed to complete the final assignment.Anyone/Everyone who turned in the assignment passed the class.
2. The local government is trying to reduce car traffic.
 - (a) In our neighborhood, many kids have a bike.
 - (b) In our neighborhood, there are no kids who own a bike.Anyone/Everyone who biked to school today got a free snack.

A.5.4 Controls (Felicitous, infelicitous)

1. Susan called the library yesterday but it was closed.
 - (a) She was surprised that it was closed.
 - (b) She was surprised that it was open.
2. In my town, there is a recreation center and an art gallery, but no theater.
 - (a) The mayor wants to convert the theater into a museum.
 - (b) The mayor wants to convert the art gallery into a museum.

3. We have a physics teacher and a chemistry teacher, but no math teacher at school.
 - (a) The physics teacher is very bright.
 - (b) The math teacher is very bright.
4. The company offered Sally a job but she turned it down.
 - (a) Two weeks later, she regretted having accepted the offer.
 - (b) Two weeks later, she regretted not having accepted the offer.

A.6 Ordinal regression model summary

	Estimate	SE	z-value	<i>p</i>
Inconsistent	-0.54	0.15	-3.49	<.001
Neutral	0.23	0.17	1.33	(0.18)
Nonmin-NU	0.54	0.17	3.20	<.01
Nonmin-UL	-0.06	0.18	-0.33	(0.73)
Inconsistent:NU	-1.96	0.22	-8.90	<.001
Neutral:NU	-0.64	0.24	-2.64	<.01
Inconsistent:UL	-1.83	0.23	-7.93	<.001
Neutral:UL	-0.47	0.26	-1.79	(0.07)

Table 6: Model summary
(Consistent context and minimizer condition set as reference levels)

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