Oddness and probability-sensitivity of number-marked indefinites in negation and questions[1]

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Abstract. We first present an approach based on presuppositional exhaustification (Pex) and a ban on post-accommodation triviality to the oddness of indefinites under negation and in polar questions and explore its extension to probability-sensitivity. However, we show that this approach struggles to account for probability-sensitivity in polar questions. To address this challenge, we propose a novel account that captures both the oddness and probability-sensitivity of indefinites under negation and in questions, drawing on Partition by Exhaustification.

Keywords: partition by exhaustification, presuppositional exhaustification, post-accommodation informativity, probabilities, bare plurals, multiplicity inference, negation, polar question

1. Introduction

Oddness arises from negated indefinites when their strengthened or exhaustified positive counterparts depict anomalous scenarios (Spector, 2007; Farkas and de Swart, 2010):

(1) Negated SG indefinites
  a. Mary doesn't have blue eyes.
  b. #Mary doesn't have a blue eye.

(2) Negated PL indefinites
  a. #Frank doesn't have Roman noses.
  b. Frank doesn't have a Roman nose.

Such oddness has been described as a kind of *modal presupposition* failure (Spector, 2007):

(3) #Frank doesn't have Roman noses.
  $\rightsquigarrow$ Frank could have had multiple Roman noses.

(4) #Frank doesn't have a blue eye.
  $\rightsquigarrow$ Frank could have had exactly one blue eye.

These modal presuppositions cannot be supported by contexts compatible with common sense. There is an intuitive connection between the oddness under negation and the inferences drawn from positive PL and SG sentences, i.e., *multiplicity* and *anti-multiplicity* inferences.

(5) Multiplicity
  Frank has cars.
  $\rightsquigarrow$ Frank has multiple cars.

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(6) Anti-multiplicity
Frank has a car.
$\rightsquigarrow$ Frank has exactly one car.

It is widely accepted that these inferences are scalar implicatures (Spector, 2007; Zweig, 2009; Ivlieva, 2013; Mayr, 2015; Sudo, 2023; Doron, 2024, 2025). The puzzle is that scalar implicatures usually disappear under negation, but oddness persists.

(7) a. Frank doesn't have cars. $\rightsquigarrow$ Frank has zero cars.
b. Frank doesn't have a car. $\rightsquigarrow$ Frank has zero cars.

(8) a. #Frank doesn't have Roman noses.
b. #Frank doesn't have a blue eye.

In this paper, we will introduce an approach based on presuppositional exhaustification + post-accommodation informativity (Pex + PAI). We will present an alternative analysis based on partition by exhaustification (PbE); We will then argue that present another phenomenon, the probability-sensitive preference of sg and pl indefinites in negation and questions. Finally, we will show that PbE can be extended to fully account for probability-sensitivity, while Pex + PAI cannot.

2. The presuppositional exhaustification approach

A recent approach to scalar implicatures derives them as presuppositions rather than assertions (Bassi et al., 2021). Bassi et al. (2021) replace Exh used in previous grammatical approaches to scalar implicatures with a presuppositional operator Pex. Exh negates innocently excludable (IE) alternatives as part of the assertion:

(9) a. $[\![\textsc{Exh}\,\varphi]\!] \coloneqq [\![\varphi]\!] = 1 \wedge \bigwedge\{[\![\psi]\!] = 0 : \psi \in \mathrm{IE}(\varphi)\}$
b. $\mathrm{IE}(\varphi) \coloneqq \bigcap\{Q : Q \text{ is a maximal subset of } \textsc{Alt}(\varphi)\text{, s.t. } [\![\varphi]\!] = 1 \wedge \bigwedge\{[\![\psi]\!] = 0 : \psi \in Q\} \text{ is consistent}\}$

In contrast, Pex negates alternatives as part of the presupposition. Pex can be defined either in a trivalent manner, as in (10), or, equivalently, in a way that specifies the presuppositional and assertive contents, as in (11).

(10) $$[\![\textsc{Pex}\,\varphi]\!] \coloneqq \begin{cases} 1 & \text{if } [\![\varphi]\!] = 1 \wedge \bigwedge\{[\![\psi]\!] = 0 : \psi \in \mathrm{IE}(\varphi)\} \\ 0 & \text{if } [\![\varphi]\!] = 0 \\ \# & \text{otherwise} \end{cases}$$

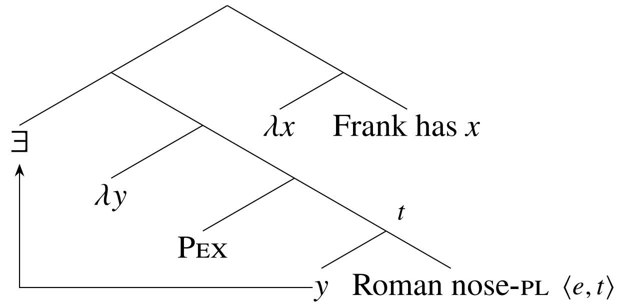
(11) $$[\![\textsc{Pex}\,\varphi]\!] \coloneqq \begin{cases} \textsc{presupposes} & [\![\varphi]\!] = 0 \vee \bigwedge\{[\![\psi]\!] = 0 : \psi \in \mathrm{IE}(\varphi)\} \\ \textsc{asserts} & [\![\varphi]\!] = 1 \end{cases}$$

Doron (2024, 2025) applies the Pex mechanism to derive (anti-)multiplicity inferences. This approach can predict oddness under negation, because Pex allows scalar implicatures as presuppositions to project from under negation. Doron (2024, 2025) employ the DP-internal embedded approach pioneered by Mayr (2015), where the exhaustivity operator responsible for scalar implicatures is inserted in a position inside the DP. This way, plural NPs can be assumed to be number neutral, while singular NPs can be assumed to contain only atomic individuals, and they can serve as each other's alternative.

(12) a. $[\![\text{Roman nose-}\textsc{pl}]\!] = \lambda X.\, \forall x \sqsubseteq X.\, \text{Atom}(x) \rightarrow x \text{ is a Roman nose}$
b. $[\![\text{Roman nose-}\textsc{sg}]\!] = \lambda x.\, x \text{ is a(n atomic) Roman nose}$

The covert existential quantifier ∃ moves DP-internally leaving a type e trace in its base position, creating a type t node for Pex to attach to.[2]

(13)



Then, it is at that level that the multiplicity is derived:

(14) $[\![\textsc{Pex}\ [y \text{ Roman nose-}\textsc{pl}]]\!]$

$$= \begin{cases} 1 & [\![y \text{ Roman nose-}\textsc{pl}]\!] = 1 \wedge [\![y \text{ Roman nose-}\textsc{sg}]\!] = 0 \\ 0 & [\![y \text{ Roman nose-}\textsc{pl}]\!] = 0 \\ \# & \text{otherwise} \end{cases}$$

$$= \begin{cases} 1 & y \text{ is a strict plurality of Roman noses} \\ 0 & y \text{ is not a Roman nose individual} \\ \# & \text{otherwise } (y \text{ is an atomic Roman nose}) \end{cases}$$

Doron (2024) also follows Magri (2009) in assuming that exhaustivity operators can be inserted at every scope site. The mechanism for presupposition projection from the restrictors and scopes of quantifiers is assumed to be Strong Kleene. For the existential quantifier ∃, it is the following (P and Q are trivalent predicates):

(15) $$[\![\exists]\!](P)(Q) = \begin{cases} 1 & \exists x.\, P(x) = 1 \wedge Q(x) = 1 \\ 0 & \forall x.\, P(x) = 1 \wedge Q(x) = 0 \\ \# & \text{otherwise} \end{cases}$$

Examples (16) and (17) illustrate multiplicity inferences in positive and negative sentences under the Pex approach.

(16) Frank has **Roman noses**.

[2] It is also possible to define a predicate-level Pex, just as Mayr (2015) does for Exh. This approach will avoid the need for DP-internal movement.

a. $\text{Pex}\ [[\exists\ [\lambda y\ [\text{Pex}\ [y \text{ Roman nose-}\textsc{pl}]]]]\ \lambda x\ [\mathbf{f} \text{ has } x]]$

b. $\begin{cases} 1 & \text{if Frank has mutiple Roman noses} \\ 0 & \text{if Frank has zero Roman noses} \\ \# & \text{otherwise (Frank has exactly one Roman nose)} \end{cases}$

c. $\begin{cases} \textsc{presupposes} & \text{Frank has zero or multiple Roman noses} \\ \textsc{asserts} & \text{Frank has multiple Roman noses} \end{cases}$

(17) Frank doesn't have **Roman noses**.

a. $\text{Pex}\ [\neg\ [\text{Pex}\ [[\exists\ [\lambda y\ [\text{Pex}\ [y \text{ Roman nose-}\textsc{pl}]]]]\ \lambda x\ [\mathbf{f} \text{ has } x]]]]$

b. $\begin{cases} 1 & \text{if Frank has zero Roman noses} \\ 0 & \text{if Frank has mutiple Roman noses} \\ \# & \text{otherwise (Frank has exactly one Roman nose)} \end{cases}$

c. $\begin{cases} \textsc{presupposes} & \text{Frank has zero or multiple Roman noses} \\ \textsc{asserts} & \text{Frank has zero Roman noses} \end{cases}$

It should be noted that in (17), while the assertion is simply 'Frank has zero Roman noses,' where no implicatures can be detected, the presupposition, i.e., 'Frank has zero or multiple Roman noses,' bears the effect of a multiplicity inference. It is just that after the context is updated with the assertion, this effect in the presupposition is no longer visible.

To derive anti-multiplicity inferences, a local accommodation operator A is needed.

(18) $[\![\text{A}\ \varphi]\!] := \begin{cases} 1 & [\![\varphi]\!] = 1 \\ 0 & \text{otherwise } ([\![\varphi]\!] = 0 \text{ or } [\![\varphi]\!] = \#) \end{cases}$

The A-operator should be attached right under the topmost Pex in the positive case, and right under the second topmost Pex in the negative case. The A-operator essentially makes the multiplicity inference drawn from the plural alternative purely assertive content, and thus we are able to obtain the anti-multiplicity inference as the negation of the multiplicity inference.

(19) Frank has **a Roman nose**.

a. $\text{Pex}\ [\text{A}\ [[\exists\ [\lambda y\ [\text{Pex}\ [y \text{ Roman nose-}\textsc{sg}]]]]\ \lambda x\ [\mathbf{f} \text{ has } x]]\ ]$

b. $\begin{cases} 1 & \text{if Frank has exactly one Roman nose} \\ 0 & \text{if Frank has zero Roman nose} \\ \# & \text{otherwise (Frank has multiple Roman noses)} \end{cases}$

c. $\begin{cases} \textsc{presupposes} & \text{Frank has zero or exactly one Roman nose} \\ \textsc{asserts} & \text{Frank has exactly one Roman nose} \end{cases}$

(20) Frank doesn't have **a Roman nose**.

a. $\text{Pex}\ [\neg\ [\text{Pex}\ [\text{A}\ [[\exists\ [\lambda y\ [\text{Pex}\ [y \text{ Roman nose-}\textsc{sg}]]]]\ \lambda x\ [\mathbf{f} \text{ has } x]]]]]$

b. $\begin{cases} 1 & \text{if Frank has zero Roman nose} \\ 0 & \text{if Frank has exactly one Roman nose} \\ \# & \text{otherwise (Frank has multiple Roman noses)} \end{cases}$

c. $\begin{cases} \text{PRESUPPOSES} & \text{Frank has zero or exactly one Roman nose} \\ \text{ASSERTS} & \text{Frank has zero Roman noses} \end{cases}$

With Pex, *Frank doesn't have Roman noses* and *Frank doesn't have a Roman nose* are not equivalent. While they assert the same thing, they have different presuppositions and implicatures projected from under negation.

The next step is to take advantage of the difference in presupposition and derive oddness or infelicity for one but not the other. A Stalnakerian principle that constraints presupposition accommodation (Doron and Wehbe, 2022):

(21) **Post-Accommodation Informativity (PAI)**
S_p can be uttered felicitously in C only if S is not trivial with respect to C after accommodating p.

The PAI requires that presupposition accommodation can do some but not all of the work of modifying the context. Assuming that common sense constrains the context set, i.e., worlds incompatible with common sense are not in the context, PAI immediately predicts the infelicity of *Frank doesn't have Roman noses*. Because it is common sense that people do not have multiple noses, there are no worlds in the context where Frank has multiple Roman noses.

After accommodating the presupposition that Frank has zero or multiple Roman noses for *Frank doesn't have Roman noses*, all of the worlds in the updated context are worlds where Frank has zero Roman noses. Then the assertion, i.e., that Frank has zero Roman noses, is redundant/trivial. This violates PAI and renders *Frank doesn't have Roman noses* infelicitous. The situation is analogous with *Frank doesn't have a blue eye*.

The Pex + PAI approach to oddness of indefinites under negation derives the modal presupposition, if we understand the presupposition to be the felicity condition. PAI restated with quantification over worlds in the context:

(22) S_p is felicitous in C only if $\exists w \in C \cap p.\, S(w) = 0$.

There must be worlds in the context where the positive strengthened counterpart is true, if p is generated via Pex, which derives the intuitive statement of the presupposition 'Frank could have had multiple Roman noses.'

2.1. Partition by exhaustification

There is an alternative to the Pex + PAI theory for the oddness and modal presupposition of negated indefinites based on Partition by Exhaustification (PbE; see Fox 2018, 2020b; Katzir 2024). We adopt the formulation of felicity constraints in Katzir (2024), which most importantly consist of the following for our present purposes:

(23) **F-to-Question**
A suitably chosen $Q \subseteq \text{Alt}_\text{F}(S)$ corresponds to a question.

(24) **Q-A-Felicity**
Said Q is a good question in C; S is a good answer to Q.

(25) **Partition-by-Exh**
Q is good in C if its elements, when exhaustified (with Exh), partition C.

Note that in PbE, exhaustification is performed via the non-presuppositional Exh, rather than Pex. Now for illustrative purposes, consider the example (26).

(26) John$_F$ read the book.

We will derive the constraints on contexts in which this sentence is felicitous via (23)–(25). Suppose for simplicity that $\text{Alt}_F(\text{John}) = \{\text{John}, \text{Mary}, \text{Bill}\}$. F-to-Question, Q-A-Felicity, Partition-by-Exh demand (27) partition C:

(27) $$\left\{\begin{array}{l}\text{Exh John read the book}\\ \text{Exh Mary read the book}\\ \text{Exh Bill read the book}\end{array}\right\}$$

The definitional properties of a partition, which we should be reminded of, are the following (suppose that $Q = \{q_1, q_2, \ldots\}$ partitions C):

(28) a. The cells do not overlap: $\forall q, q' \in Q.\, q \cap q' \cap C = \emptyset$
b. The cells cover the set partitioned: $\bigcup\{C \cap q : q \in Q\} = C$
c. **No cell is empty**: $\forall q \in Q.\, C \cap q \neq \emptyset$

This means that in contexts where (26) is felicitous, the following must hold:

(29) a. **There are worlds** where **just John** read the book.
b. **There are worlds** where **just Bill** read the book.
c. **There are worlds** where **just Mary** read the book.
d. There are no other people who read the book.

The conditions in (29a-c) are clearly reminiscent of *modal presuppositions* discussed earlier, in that existential quantification over worlds in the context is involved. Switching to the data on negated indefinites, we assume that negated sentences *not* φ should have φ as a focus alternative; this follows from a Katzirian view of alternatives, as a negative sentence usually has the item *not* under focus, which can then be either deleted or replaced with the phonetically null affirmative counterpart, giving rise to the positive alternative. Then the set to partition the context is (30):

(30) $\{\text{Exh}\,\varphi, \text{Exh not}\,\varphi\}$

For *Frank doesn't have Roman noses*, the partition should be (31):

(31) $$\left\{\begin{array}{l}\text{Exh Frank has Roman noses}\\ \text{Exh Frank doesn't have Roman noses}\end{array}\right\}$$

Assuming that Exh φ in the partition has whatever implicatures present as if directly asserted, (31) is in effect (32):

(32) $\begin{Bmatrix} \text{Frank has multiple Roman noses} \\ \text{Frank has zero Roman noses} \end{Bmatrix}$

By definition, cells in a partition must be non-empty. However, for C following common sense, $C \cap [\![\text{Frank has multiple Roman noses}]\!] = \emptyset$, because people do not have more than one nose. Thus, the set produced via Partition-by-Exh for *Frank doesn't have Roman noses* fail to partition common sense contexts. Thus, PbE predicts infelicity for *Frank doesn't have Roman noses*.

The non-emptiness of the positive cell under PbE directly translates to the modal presupposition. The positive alternative, when exhaustified and therefore strengthened, becomes a cell that must be non-empty in the context:

(33) For not φ to be felicitous,
$\exists w \in C. [\![\text{Exh}\, \varphi]\!] = 1$

The condition in (33) corresponds to the intuitive presupposition 'Frank could have had multiple Roman noses' of *Frank doesn't have Roman noses*. *Frank doesn't have a Roman nose* is not predicted to be infelicitous, because the set (34) produced via Partition-by-Exh can partition common sense contexts.

(34) $\begin{Bmatrix} \text{Frank has exactly one Roman nose} \\ \text{Frank has zero Roman noses} \end{Bmatrix}$

The oddness of indefinites when the strengthened positive answer is anomalous in common sense contexts persists in polar questions:

(35) a. #Does Frank have Roman noses?
b. #Does Frank have a blue eye?

Both Pex + PAI and PbE can extend to this case. On the Pex + PAI side, one can claim that both answers to the question should be felicitous. However, *Frank has Roman noses* is post-accommodation contradictory, and *Frank doesn't have Roman noses* is post-accommodation trivial. For PbE, the questions are odd because the exhaustified alternatives, identical to those in the negative case, fail to partition common sense contexts.

3. Interim summary

Both Pex + PAI and PbE can account for the oddness and modal presupposition of indefinites in negation and in questions. Additionally, both of them have independent motivations outside of the phenomenon at hand (Bassi et al., 2021; Del Pinal et al., 2024; Fox, 2018, 2020a; Katzir, 2024). We believe a gradient and probabilistic phenomenon related to modal presupposition can be the testing ground for the two theories.

4. Probability-sensitivity

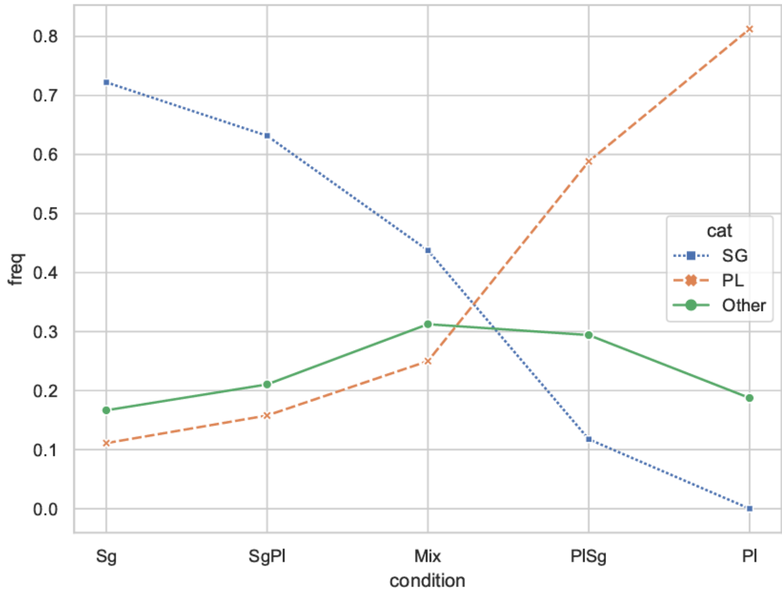


Figure 1: Proportion of participants producing negated SG or PL indefinites in the experiment in Enguehard (2024)

4.1. The phenomenon

Sudo (2023) observes that even when there is no categorical oddness, there is still a preference of SG or PL indefinites over the other if there is difference in contextual probability.

(36) a. The grad student won't submit abstracts to SUB.
b. The grad student won't submit an abstract to SUB.

(36a) should be preferred when it is *more likely* for the grad student to submit *multiple* abstracts to SUB. (36b) should be preferred when it is *more likely* for the grad student to submit *exactly one* abstract to SUB. This probability-sensitive preference is also experimentally established in Enguehard (2024). Enguehard (2024) exposes participants to conditions with differing ratios between occurrences of objects appearing in multiples or in singles. Conditions are ordered by increasing the frequency of stimuli containing multiple symbols of the same kind ranging from 0%, 10%, 50%, 90%, to 100% in order. The participants are then asked to describe a situation of non-existence. The type of response is recorded (negated SG indefinite, negated PL indefinite, and other), and the results are shown in figure 1. Figure 1 clearly shows that there a correlation between the more probable number and the more frequently produced number under negation.

While there is no experimental data, we think the probability-sensitive preference between the SG and PL indefinites persists in polar questions.

(37) a. Will the grad student submit abstracts to SUB?
b. Will the grad student submit an abstract to SUB?

(37a) is preferred when the speaker believes that it is more likely for the grad student to submit multiple abstracts to SUB, while (37b) is preferred when the speaker believes that it is more likely for the grad student to submit exactly one abstract to SUB. This will in fact be the critical case deciding between the two theories.

Both PEx + PAI and PBE are categorical theories. When both 'exactly one' and 'multiple' are contextual possibilities, neither theory predicts a distinction between the SG and PL versions of the sentence. Both the SG and PL versions are simply felicitous under both theories. Both theories need to be made sensitive to probability and give gradient felicity values to derive the preference of one over the other. In the next sections, we set out to make probabilistic extensions for both theories and see whether they can account for the data in negation and in questions.

4.2. Making PAI probabilistic: PPAI

For the PEx + PAI approach, we can take a probabilistic view of informativity. We understand informativity to be surprisal, which is negatively correlated with contextual probability. We also accordingly take felicity also to be gradient, allowing (38) to be stated:

(38) **Probabilistic Post-Accommodation Informativity (PPAI)**
felicity$(S_{p'}, C)$ > felicity(S_p, C) if $0 < P(S \mid C \cap p') < P(S \mid C \cap p)$.

Of two sentences with the same assertion S, PPAI says that the sentence with the lower non-zero post-accommodation contextual probability is more felicitous, because it is **more informative**. The original categorical PAI can be subsumed if we require that felicity$(S_p, C) = 0$ if $P(S \mid C \cap p) = 1$. Then, to facilitate the illustration, we adopt the following shorthand for the assertions and presuppositions of the competing sentences to examine:

(39) The grad student won't submit an abstract to SUB.
☛ $\mathbf{0}_{\mathbf{0}\cup\mathbf{1}}$ $\begin{cases} \text{PRS} & \text{G.S. will submit zero } (\mathbf{0}) \text{ or exactly one } (\mathbf{1}) \text{ abstract to SUB} \\ \text{ASR} & \text{G.S. will submit zero } (\mathbf{0}) \text{ abstracts to SUB} \end{cases}$

(40) The grad student won't submit abstracts to SUB.
☛ $\mathbf{0}_{\mathbf{0}\cup\mathbf{2}^+}$ $\begin{cases} \text{PRS} & \text{G.S. will submit zero } (\mathbf{0}) \text{ or multiple } (\mathbf{2}^+) \text{ abstracts to SUB} \\ \text{ASR} & \text{G.S. will submit zero } (\mathbf{0}) \text{ abstracts to SUB} \end{cases}$

Post-accommodation contextual probability negatively correlates with contextual probability of the strengthened positive counterpart. Then by PPAI, felicity positively correlates with contextual probability of the strengthened positive counterpart.

(41)

$$\text{felicity}(\mathbf{0}_{\mathbf{0}\cup\mathbf{1}}, C)\uparrow \Rightarrow P(\mathbf{0} \mid C \cap (\mathbf{0} \cup \mathbf{1}))\downarrow \; = \frac{P(C \cap \mathbf{0})}{P(C \cap \mathbf{0}) + P(C \cap \mathbf{1})\uparrow}$$
$$\text{felicity}(\mathbf{0}_{\mathbf{0}\cup\mathbf{2}^+}, C)\uparrow \Rightarrow P(\mathbf{0} \mid C \cap (\mathbf{0} \cup \mathbf{2}^+))\downarrow = \frac{P(C \cap \mathbf{0})}{P(C \cap \mathbf{0}) + P(C \cap \mathbf{2}^+)\uparrow}$$

This has derived the probability-sensitivity in negative sentences containing indefinites. *The grad student won't submit abstracts to SUB* will be preferred if it is contextually more likely that they submit multiple abstracts.

However, this approach fails with probability-sensitivity in polar questions. Consider (42) again:

(42) a. Will the grad student submit abstracts to SUB?
b. Will the grad student submit an abstract to SUB?

An immediate observation is that the post-accommodation probabilities of the two answers **sum up to 1** for both the SG and PL indefinites.

(43)

$$\begin{aligned} & P(\mathbf{0} \mid C \cap (\mathbf{0} \cup \mathbf{1})) + P(\mathbf{1} \mid C \cap (\mathbf{0} \cup \mathbf{1})) \\ = & P(\mathbf{0} \cup \mathbf{1} \mid C \cap (\mathbf{0} \cup \mathbf{1})) = 1 \\ & P(\mathbf{0} \mid C \cap (\mathbf{0} \cup \mathbf{2}^+)) + P(\mathbf{2}^+ \mid C \cap (\mathbf{0} \cup \mathbf{2}^+)) \\ = & P(\mathbf{0} \cup \mathbf{2}^+ \mid C \cap (\mathbf{0} \cup \mathbf{2}^+)) = 1 \end{aligned}$$

PPAI also cannot apply to the question as a whole. Because by definition, a question does not make an assertion. There is no way to evaluate the post-accommodation informativity of a question.

The only way for PEX + PPAI to distinguish between (42a) and (42b) is to only consider the post-accommodation informativity of the negative answer as a correlate for the felicity of the question. As far as we know, there are no principled reasons for this move and we conclude that it is purely stipulative and therefore an undesirable strategy. If anything, prior literature on polar has always identified a bias for the positive answer but not for the negative answer in a polar question (Biezma and Rawlins, 2012; Enguehard, 2021: a.o.).

4.3. Making PARTITION-BY-EXH probabilistic: MQA

We start with the case where PPAI fails, i.e., the probability-sensitive preference in questions. We can adapt PBE so that the constraint PARTITION-BY-EXH becomes a probabilistic one. The probabilistic version of PARTITION-BY-EXH should allow some mismatch between the partition generated by the sentence and the context, but the mismatch should be minimized probabilistically. Intuitively, when we ask *Will the grad student submit abstracts/an abstract to SUB?*, we do not intend to really accommodate the presupposition that the grad student cannot submit exactly one abstract or multiple abstracts to SUB. Thus, we posit that in such cases, there is an *intended context* C, which is unchanged from the given, and an *intended partition* Q of C, which covers the entirety of C, i.e., there are no presuppositions to accommodate.

(44) a. Intended context: C the given context C unchanged,
b. Intended partition Q of C: $Q = \{\mathbf{0}, \mathbf{1}^+\} = \{\mathbf{0}, \mathbf{1} \cup \mathbf{2}^+\}$.

The results of PARTITION-BY-EXH from competing sentences can be evaluated against the intended C and Q; the candidate that minimizes the mismatch between the actual partition and the intended context is the winner. This mechanism is then formalized as the MQA in (45).

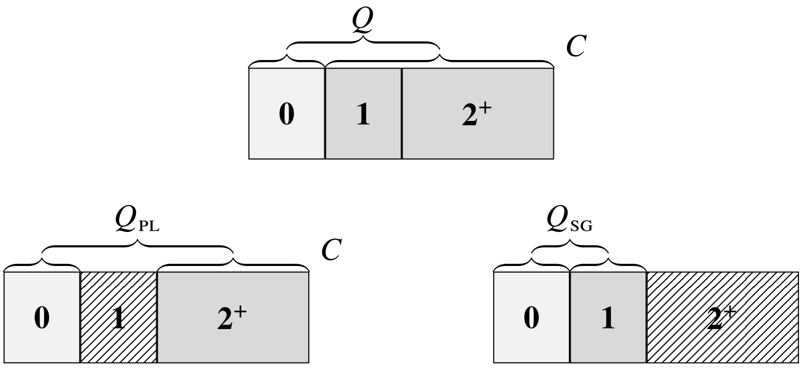


Figure 2: $P(\mathbf{2}^+ \mid C) > P(\mathbf{1} \mid C) \Longrightarrow P(\bigcup Q_{\text{PL}} \mid C) > P(\bigcup Q_{\text{SG}} \mid C)$

(45) **Minimize Question Accommodation (MQA)**
Given an intended partition Q for an intended C, and two viable[3] candidate partitions Q_1 and Q_2,
felicity$(Q_1, Q, C) >$ felicity(Q_2, Q, C) if $P(\bigcup Q_1 \mid C) > P(\bigcup Q_2 \mid C)$.

MQA prefers the candidate partition that probabilistically covers more of the intended context, defined as the conditional probability of the union of all the cells of an actual partition given C. The potential partitions to consider are in (46) and (47):

(46) Will the grad student submit an abstract to SUB?
$Q_{\text{SG}} = \{\mathbf{0}, \mathbf{1}\}$

(47) Will the grad student submit abstracts to SUB?
$Q_{\text{PL}} = \{\mathbf{0}, \mathbf{2}^+\}$

If in C it is more likely for the grad student to submit multiple abstracts than exactly one abstract, i.e., $P(\mathbf{2}^+ \mid C) > P(\mathbf{1} \mid C)$, then we have the following:

(48) $P(\bigcup Q_{\text{PL}} \mid C) = P(\mathbf{0} \cup \mathbf{2}^+ \mid C) > P(\mathbf{0} \cup \mathbf{1} \mid C) = P(\bigcup Q_{\text{SG}} \mid C)$

This relationship is also illustrated in figure 2: light gray represents the negative cell, dark gray represents the positive cell, and missing worlds are struck out with lines.

PbE with MQA thus derives the probability-sensitivity of questions with indefinites. Once questions are dealt with, negated indefinites are also explained, as soon as we assume the same intended C and Q. If it is contextually more likely that the grad student will submit multiple abstracts, then the negated pl indefinite is preferred, because the potential partition produced via Partition-by-Exh is preferred under MQA.

Here is a catch. We do not want to prefer a random partition simply because it probabilistically covers more of C. For example, *Is it raining?* should not be preferred just because it totally covers the context but *Will the grad student submit abstracts to SUB?* doesn't, because these are intuitively, unrelated questions that do not compete. The restriction on competition is encoded in the word *viable* in the statement of the MQA, whose definition is in (49):

[3]We will return to the notion of viability below shortly.

(45) **Minimize Question Accommodation (MQA)**
Given an intended partition Q for an intended C, and two **viable** candidate partitions Q_1 and Q_2,
felicity$(Q_1, Q, C) >$ felicity(Q_2, Q, C) if $P(\bigcup Q_1 \mid C) > P(\bigcup Q_2 \mid C)$.

(49) **Viability**
Q' is *viable* for Q if
a. $\forall q' \in Q'. \exists! q \in Q. q' \subseteq q$, and
b. $\forall q \in Q. \exists! q' \in Q'. q' \subseteq q$.

The Viability condition restricts the competition set to questions with the same number of cells and whose cells identify the cells of the intended question. This rules out *Is it raining?* as a competitor to *Will the grad student submit abstracts to SUB?*, but allows *Will the grad student submit an abstract to SUB?*, given the intended C and Q. This is reminiscent of the move from PAI to PPAI, where the competition set is restricted to sentences with the same assertion, and so adopting MQA is not more stipulative in this regard.

There is yet another class of competitors to rule out for the evaluation under the MQA: those involving the use of gapless (presuppositionless) but more complex structures. Consider the sentences in (50):

(50) a. Will the grad student submit **an abstract or abstracts** to SUB?
b. Will the grad student submit **at least one abstract** to SUB?

Both in (50) fully cover C and exactly match the intended Q. By MQA, they should always be preferred over either (51a) or (51b), contrary to intuition judgment.

(51) a. Will the grad student submit abstracts to SUB?
b. Will the grad student submit an abstract to SUB?

The solution to this problem comes from the following simple idea: Those in (50) are too complex; one is unwilling to say such complicated things just to minimize the unnecessary accommodation. The MQA can be augmented by requiring that candidates compared are of equal structural complexity, in the sense of Katzir (2007).[4] Again, PEX + PPAI requires this kind of restriction as well, even in the cases of probability-sensitivity under negation.[5]

5. Conclusion

In this paper, we presented data on the oddness and probability-sensitivity of indefinites under negation and in questions. We introduced an account utilizing presuppositional exhaustification and a constraint banning trivial post-accommodation results (Doron, 2024, 2025: PEX + PAI). We proposed a new account based on Partition by Exhaustification (Fox, 2018; Katzir, 2025: PBE). We showed that the probabilistic extension of PEX + PAI cannot account for the probability-sensitivity of indefinites in questions, while the probabilistic extension of PBE can.

[4]This competition logic is also reminiscent of Haslinger (2023).

[5]Due to the fact that *The grad student didn't submit an abstract or abstracts to SUB* is not typically preferable to either *The grad student didn't submit an abstract to SUB* or *The grad student didn't submit abstracts to SUB*.

This result provides evidence for the Partition by Exhaustification approach, and speaks to the relevance of gradient and probabilistic data in deciding between formal theories.

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