

Can I ask who won the world cup if I only missed the finals?

Paving the way for a precise pragmatics of questions

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Some ideas about the pragmatics of questions

- Questions play an important role in pragmatics via QUD:
 - QUD: an (often implicit) question that the speaker is addressing with their utterance.
 - Affects information structure, implicatures, focus structure, negation processing. . .
 - When explicit questions are discussed in pragmatics, it is often just as a way to fix the QUD.
- On the other hand, much less regarding the pragmatics of questions themselves:
 - How do we select a specific question given a certain goal?
 - What can we infer from someone asking a specific question?
- More specifically: It is weird to ask a question to which we already know the answer, but how much ignorance is needed?

Previous work on pragmatic aspects of questions (definitely not exhaustive):

- Ginzburg (1995), Aloni (2005): How do resolution conditions depend on context?
- Rich literature on specific forms of questions and their pragmatic effect: Negative questions (Romero & Han 2004, a.o.), NAQ (Biezma 2009, Biezma&Rawlins 2012, Beltrama et al. 2018), discourse particles in questions (Theiler, a.o.).
- van Rooij (2003): NPIs in questions, building on Krifka's idea that *general* questions are preferred (cf. Biezma&Rawlins's Bundling principle as well).
- Groenendijk & Roelofsen (Inquisitive Pragmatics, 2009): questions that are easier to answer should be preferred.

Groenendijk & Roelofsen (2009):

- Inquisitive Semantics defines entailment between questions.
A question Q entails another question Q' if any proposition that answers Q also answers Q' .
- Inquisitive pragmatics covers assertions and questions.
- Main idea: ask the least inquisitive question in order to maximize the chance that your interlocutor can answer it.
- Still not a general pragmatic theory of questions: questions as possible moves towards the resolution of an overarching QUD.

Imagine I want to know who won the soccer world cup in 2018.

- I can simply ask “Who won the world cup?”
- If I know that the finals was between France and Croatia, I can also ask “Did Croatia win?” or “Did France or Croatia win?”.
- Who-question asymmetrically entails polar and alternative questions, so it should be dispreferred in this case.
- ☞ Ignorance implicature from the who-question: the questioner does not know which countries played the finals.

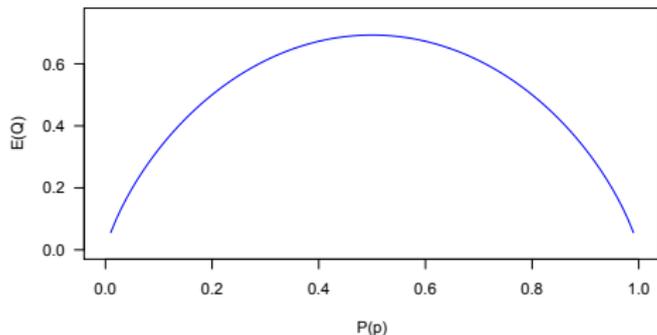
- Contextual vs. Logical entailment.
- Theory of alternatives:
 - The who-question is structurally unrelated to the polar and alternative questions. Do they still compete with each other?
 - Polar might be structurally simpler than alternative questions. Does this asymmetry affect the implicatures they give rise to?
- Questioner goal: A Croatian may ask “Did Croatia win?” even though they don’t know that Croatia was in the finals.

Van Rooij (2003):

- Criterion for selecting a question: maximum expected informativity of its answer.
- Polar question $\{p, \neg p\}$:

$$\begin{aligned}U(Q) &= P(p) \times \text{Inf}(p) + P(\neg p) \times \text{Inf}(\neg p) \\ &= -P(p) \times \log(P(p)) - P(\neg p) \times \log(P(\neg p)) \\ &= E(Q)\end{aligned}$$

- Unbiased questions are preferred:



I want to know who won the world cup:

- Situation 1: I have no idea which of the 32 teams were in the final, and I think they're all equally likely to win.

Did France win? $E \approx 0.2$

Which country won? $E = 5$

- Situation 2: I know that the final was between France and Croatia:

Did France win? $E = 1$

Which country won? $E = 1$

- wh-question should be strongly preferred in ignorance situations,
- no clear preference in knowledge situations, unless other factors come into play (e.g., cost/length of utterance, type of answers)
- Van Rooij includes contextual information in the calculation of entropy (this is important for NPIs), but we could in principle imagine a version of the theory where context plays no role.

Experimental investigation

joint work with Zhuoye Zhao

Goal:

- Test ignorance inferences of various questions
- Compare the predictions of theories based on contextual vs. global inquisitiveness

Experiment 1: Example item

Dave wants to get an exotic pet. He went to an exotic pet store and there were only snakes and iguanas. Afterwards he called his friend Barbara, and Barbara asked him...

Barbara: “What animal did you get?”

Would you conclude that Barbara knows that there were only snakes and iguanas in the exotic pet store?

Definitely not

Definitely yes

Experiment 1: Design

- Context = $P(a) \vee P(b)$ (e.g., France or Croatia won).
- Character asks one of the following questions:
 - WH: “Who won the finals?”
 - POLAR: “Did France win the finals?”
 - NAQ: “Did France win the finals or not?”
 - ALTERNATIVE: “Did France or Croatia win the finals?”
 - IRRELEVANT polar: “Did Belgium win the finals?”
 - UNRELATED: “Was any player wounded during the finals?”
- Prompt always asks whether participants would conclude that the questioner is aware of the disjunctive situation.

Experiment 1: Predictions

Alternative presupposes disjunction: Ceiling baseline

Irrelevant only makes sense if questioner ignorant: Floor baseline

Unrelated question: baseline for default assumption

Global inquisitiveness: who-question \rightarrow polar question.

- ☞ who-question has an ignorance inference

- ☞ polar question implies either knowledge or specific goal

Contextual inquisitiveness: who-question \equiv polar question.

- ☞ no more ignorance inference for who-question

- ☞ polar question implies either knowledge or specific goal

Maximize Entropy: $E(\text{who}) > E(\text{polar})$ if ignorance.

- ☞ polar conveys knowledge

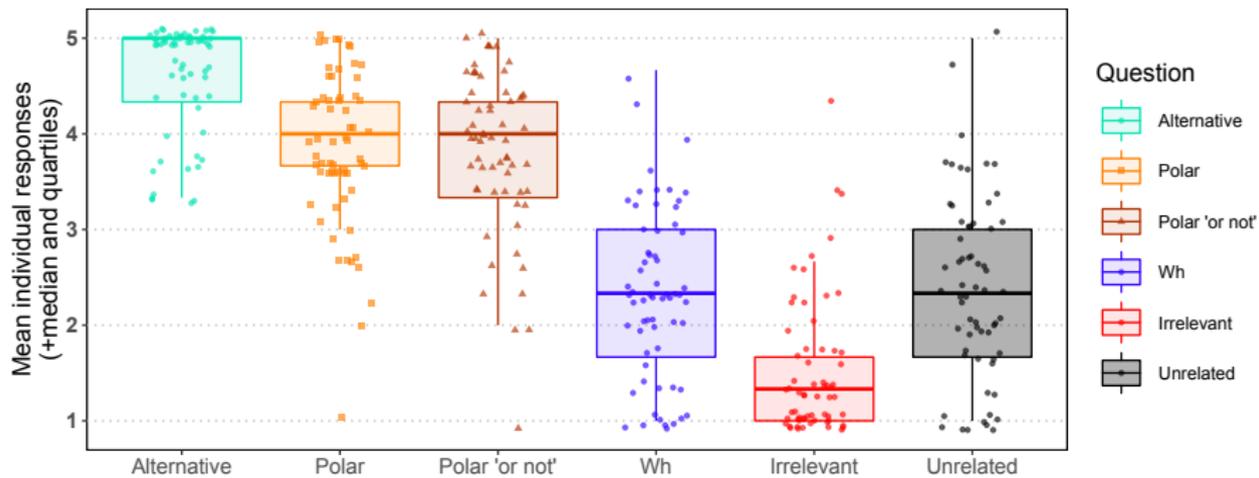
- ☞ who-question does not convey knowledge nor ignorance

NAQ: equivalent to plain polar with added “cornering effect”
(Bolinger 1978, Biezma 2009, Beltrama et al, 2018)

Experiment 1: Methods

- Question types: 6 levels, within-item & within-subject
- \times 3 repetitions per subject (18 contexts, latin-square design)
- + 2 training items with feedback + 4 fillers
- 71 participants recruited on MTurk
(about 10min, paid \$1.40, age range: 23–62)
- 1 non-native English speaker removed
- 7 participants removed due to errors on fillers
(Threshold: $M+SD = 53\%$).

Experiment 1: Results



Experiment 1: Results

- Cumulative logit-link mixed-effects model (`ordinal:clmm`)
- Fixed-effects: Question type (baseline: UNRELATED)
- Maximal random-effects structure (Barr et al, 2013)

Parameter	β	95% CI
IRRELEVANT	-2.1	[-3.1, -1.2]
WH	-0.1	[-0.8, 0.6]
POLAR	2.8	[2.0, 3.5]
NAQ	2.8	[2.0, 3.6]
ALTERNATIVE	5.9	[4.5, 7.3]

IRR. \ll UNREL. \approx WH \ll POLAR \approx NAQ \ll ALT.

Main result:

- Wh-question does not convey ignorance (nor knowledge)
- Polar question conveys knowledge
- ☞ In line with the predictions of Maximize Entropy.
- ☞ Asymmetric competition?
- ☞ Task effect?
 - Inference task taxing for participants
 - Switch to acceptability judgments?
 - ☞ Same setup but we indicate what the questioner knows and asks whether her question is acceptable.

Goal: Repeat Experiment 1 but using an acceptability judgment task instead of inference task (more sensitive, in particular to competition between items).

Experiment 2: Design

- Two variants of each context adapted from Experiment 1:
 - Knowledge condition: $P(a) \vee P(b)$ (e.g., France or Croatia won), and the questioner knows it.
 - Ignorance condition: the context does not provide such information, and the questioner is explicitly described as having no idea.
- Character asks one of the following questions:
 - WH: “Who won the finals?”
 - POLAR: “Did France win the finals?”
 - NAQ: “Did France win the finals or not?”
 - IRRELEVANT polar: “Did Belgium win the finals?”
 - UNRELATED: “Was any player wounded during the finals?”
- Prompt asks whether the question is natural in the given context.

Experiment 2: Example item

One day, Tony is visiting his friend Betty, who just got a fancy coffee machine. Betty doesn't know what coffee Tony likes. Before making coffee, she asks...

Betty: "Would you like an espresso?"

How natural is Betty's question in this context?

Odd

1

2

3

4

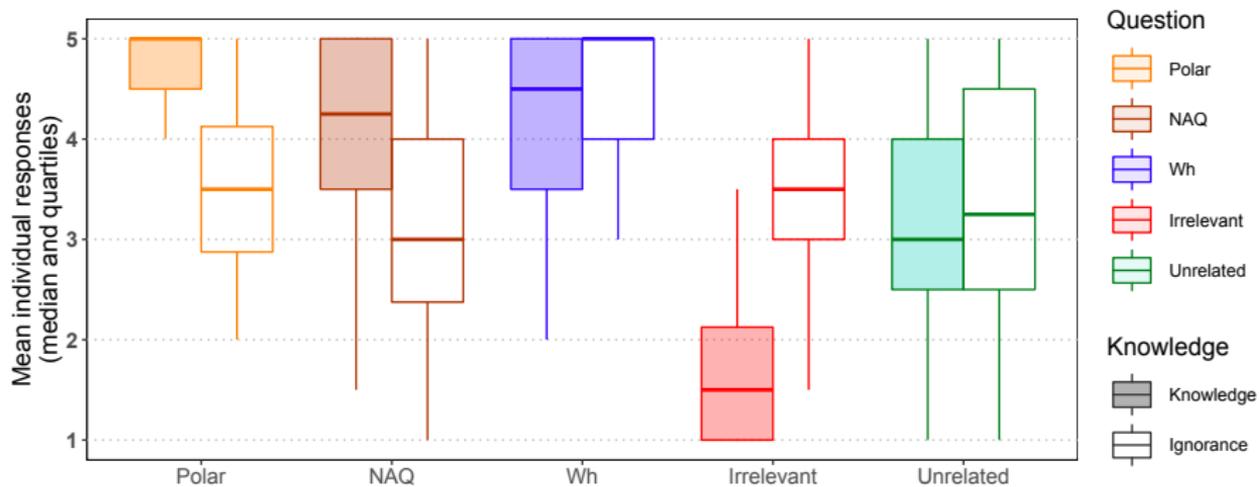
5

Natural

Experiment 2: Methods

- Question types: 5 levels, within-item & within-subject
- Knowledge: 2 levels, within-item & within-subject
- \times 2 repetitions per subject (20 contexts, latin-square design)
- + 2 training items with feedback + 3 fillers (alternative questions)
- 77 participants recruited on MTurk
(about 10min, paid \$1.40, age range: 20–65)
- 1 non-native English speaker removed
- 5 participants removed due to errors
(Threshold: $M+SD = 34\%$).

Experiment 2: Results



Experiment 2: Results

- Cumulative logit-link mixed-effects model (`ordinal:clmm`)
- Fixed-effects: Question type (baseline: UNRELATED), Knowledge (baseline: IGNORANCE), interaction.
- Random intercepts and slopes for main effects (not for interaction)

Parameter	β	95% CI
...
KNOWLEDGE	-0.2	[-0.7, 0.3]
KNOWLEDGE \times IRRELEVANT	-3.0	[-3.6, -2.3]
KNOWLEDGE \times WH	-0.5	[-1.1, 0.2]
KNOWLEDGE \times POLAR	2.0	[1.3, 2.6]
KNOWLEDGE \times NAQ	1.9	[1.2, 2.5]

IRR. \ll UNREL. \approx WH \ll POLAR \approx NAQ

- Replicate Experiment 1 with a different method
- Possibly a small preference for ignorance with wh-questions ($p = .14$)
- NAQ overall less natural than plain polar, but this is orthogonal to the ignorance effect.

Conclusion

- Polar questions do convey partial knowledge,
- Wh-questions seem to be fine with either partial knowledge or ignorance,
- NAQ are a bit off out of the blue (Biezma 2009), but behave as polar questions wrt ignorance,
- The results align quite well with van Rooij's entropy principle, which could form the basis of a more general pragmatic theory of questions.
- Some open questions: do questions compete with each other? If so, on which dimensions are they compared?

Questions?