

Processing polar questions in contexts with varying epistemic biases in English

Vinicius Macuch Silva (Osnabrück University), E Jamieson (University of Southampton)

Background: In English, there are two possible ways to form a polar question with negation (NPQ): the negation marker can be “low” (LNPQ) (1) or “high” (HNPQ) (2).

1) Is there **not** a vegetarian restaurant around here?

2) **Isn't** there a vegetarian restaurant around here?

While (1) questions the negative proposition, (2) seems to be more complex. Ladd (1981) claims there is an “ambiguity” whereby (2) *can* question the negative proposition, but it can also be used to indicate the questioner has a prior belief that the *positive* proposition is true (see also e.g. Gärtner & Gyuris, 2017; Krifka, 2015; Romero & Han, 2004; Sudo, 2013).

However, Domaneschi et al. (2017) found that in production English natives have preferences as to which question to produce, depending on their epistemic state and the evidential context surrounding the discourse (Table 1). Their results suggest no ambiguity: LNPQs question the negative proposition, and HNPQs express a belief. In this study, we report results from a self-paced reading experiment investigating whether Ladd’s hypothesized “ambiguity” holds in processing.

Design and procedure: We carried out a word-by-word self-paced reading experiment, with 120 self-reported English natives recruited through Prolific. Participants read LNPQs and HNPQs against short background discourses designed to target the effects of prior belief given negative evidence (e.g. 3-4). All vignettes were normed by an independent sample of participants for the presence or absence of a prior belief.

3) *Prior belief:* Someone told you I won the marathon at the weekend. However, I start telling you I am disappointed with my performance. You say:

HNPQ: Hold | on | a | minute. | Didn't | you | win | the | marathon?

LNPQ: Hold | on | a | minute. | Did | you | not | win | the | marathon?

4) *No belief:* We are talking about baths. I say I haven't had one in 3 years. You say:

LNPQ: I | love | a | bath. | Have | you | not | got | one | at | home?

HNPQ: I | love | a | bath. | Haven't | you | got | one | at | home?

We hypothesize that HNPQs will be facilitated in contexts where there is a prior belief about the proposition, whereas LNPQs will be facilitated in contexts where there is no prior belief about the proposition, following Domaneschi et al. (2017).

Results: As per pre-registered protocol, we compare the reading times (RTs) at each region up to the main verb (Figure 1), which serves as the spillover for the negation marker in the LNPQs. We model our RT data using Bayesian hierarchical regression models, regressing the log-transformed RTs as a function of the belief and negation type for each region of interest (Table 2).

In HNPQs, we find no evidence for an effect at the critical region nor at its immediate spillover. However, we do find strong evidence for an effect at the VERB region, such that HNPQs are read faster against contexts with a prior belief compared to contexts without a prior belief. This is in line with our original hypothesis. In the case of LNPQs, we find no evidence for an effect at the regions up to the VERB, which contradicts our hypothesis. However, the descriptive results at the region immediately following the VERB suggest that LNPQs are read more slowly against contexts with a prior belief compared to contexts without a prior belief. While we did not have predictions about regions following the verb, this result suggests difficulty in integrating the question form with information from the verb when there is a prior belief in the discourse context.

Discussion: Our results show that, at least in the case of HNPQs, comprehenders process NPQs differently depending on whether or not the prior discourse context sets them up with a belief about the truth of a proposition. This partially supports Domaneschi et al.’s (2017) results and challenges the idea of Ladd’s (1981) ambiguity in HNPQs. We discuss these findings against the results from a replication where we revised our items to re-assess the case of LNPQs.

Table 1: Production preferences from Domanechi et al. (2017). Shaded cells are not investigated in this study.

	belief: \emptyset	belief: p
evidence: \emptyset	PosQ	HighNegQ
evidence: $\neg p$	LowNegQ	HighNegQ

Negation	Region	Term	Posterior mean	95% CrI	$P(\beta < 0)^a$
High	Critical	Intercept (no belief)	5.73	[5.66; 5.80]	
	Critical	Prior belief	0.01	[-0.03; 0.06]	.29
	Critical +1	Intercept (no belief)	5.70	[5.65; 5.75]	
	Critical +1	Prior belief	-0.01	[-0.05; 0.03]	.62
	VERB	Intercept (no belief)	5.70	[5.60; 5.80]	
	VERB	Prior belief	-0.18	[-0.31; -0.05]	> .99
Low	Critical	Prior belief	0.00	[-0.07; 0.06]	.59
	Critical +1	Prior belief	0.03	[-0.02; 0.08]	.99
	Critical +2	Prior belief	0.19	[0.00; 0.37]	.75
	VERB	Prior belief	0.04	[-0.20; 0.28]	.40

Table 2: Model coefficients for Bayesian regressions.

^aIn the case of the low negation the hypothesis tested was $P(\beta > 0)$, i.e., Prior belief > No belief, as per the hypothesis indicated in the text.

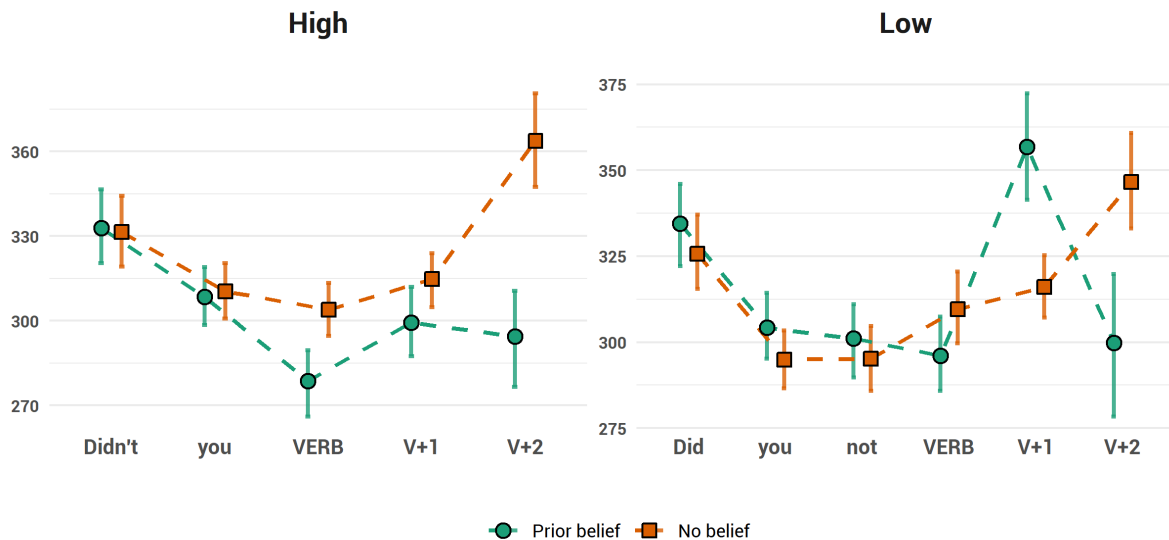


Figure 1: Reading times at the different sentence regions as a function of the negation type (*low* vs. *high*) and belief (*prior belief* vs. *no belief*).

REFERENCES: Domanechi, F., Romero, M. & Braun, B. 2017. Bias in polar questions: Evidence from English and German production experiments • Gärtner, H. & Gyuris, B. 2017. On delimiting the space of bias profiles for polar interrogatives. • Krifka, M. 2015. Bias in commitment space semantics: Declarative questions, negated questions and question tags. • Ladd, R. 1981. A first look at the semantics and pragmatics of negative questions. • Romero, M. & Han, C. 2004. On negative yes/no questions. • Sudo, Y. 2013. Biased polar questions in English and Japanese.