Free Choice Questions

Hans Kamp (1973) observed that speakers accept inferences like (1) contrarily to the predictions of classical logic. The aim of this paper is to determine whether various theories explaining this *free choice* inference generalise to its inquisitive version (2), which we will call *Free Choice Questions* (*FCQ*).

(1) You may keep a dog or a cat in this apartment. $\Diamond(\alpha \vee \beta)$

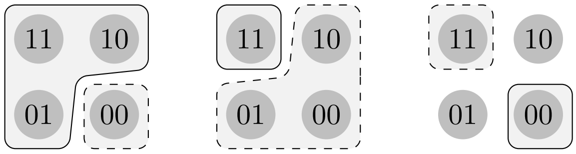
$\rightsquigarrow$ You may keep a dog and you may keep a cat (but maybe not both). $\Diamond\alpha \wedge \Diamond\beta$

(2) A: May I keep a dog or a cat in this apartment? $?\Diamond(\alpha \vee \beta)$

B: Yes $\overset{?}{\rightsquigarrow}$ You may keep a dog and you may keep a cat. $\Diamond\alpha \wedge \Diamond\beta$

B: No $\overset{?}{\rightsquigarrow}$ You may not keep a dog and you may not keep a cat. $\neg\Diamond\alpha \wedge \neg\Diamond\beta$

Background Possible meanings of response particles (*Yes*/*No*), as answers to an *FCQ*, are represented in Figure 1. Theories of free choice extended with a theory of questions make the following predictions:



(a) (b) (c)

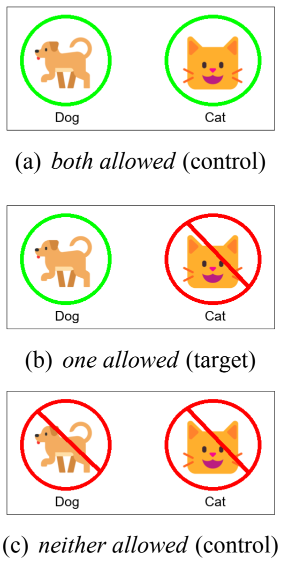
Figure 1: Possible patterns for response particles. The labels indicate which disjuncts are allowed (1) and not allowed (0). Solid lines correspond to the "Yes" answer and dashed lines to the "No" answer.

Classical logic predicts pattern 1(a), where *Yes* means that at least one choice is allowed and *No* that neither is allowed. Semantic theories like Aloni (2007)'s predict pattern 1(b), where *Yes* means that both are allowed and *No* that at most one is. Scalar theories (e.g., Fox (2007); Bar-Lev and Fox (2020)), extended in a straightforward way, predict 1(a), if exhaustification is applied under the question operator and 1(b) if it is not. The non-Gricean pragmatic approaches of Goldstein (2019) and Aloni (2022) predict pattern 1(c) where *Yes* means that both are allowed and *No* that neither.[1] The other patterns violate the high-level principles that these latter approaches postulate (resp. homogeneity and neglect-zero). We carried out an experiment to test these predictions.

Experimental design Our experiment addresses the following research questions: What do response particles (*Yes* and *No*) correspond to as replies to an *FCQ*? What is the source (semantic/pragmatic) of the inferences triggered by the response particles?

We tested the judgments of 60 native speakers of English, who were presented with scenarios in which an *FCQ* like (2) was answered by a response particle (Yes/No) and a context in which *both* (Figure 2(a)), *one* (Figure 2(b)) or *neither* (Figure 2(c)) of the two choices mentioned in the *FCQ* were allowed. Therefore our design is 2×3 (*response particles* $\times$ *contexts*). The participants were asked to evaluate if the response particle was an accurate answer in the given context.

To answer the second research question, we analysed the processing difficulty of the six conditions by measuring reaction times. If the processing of *target* contexts involves only the literal meaning inferences, we would expect the acceptance rates and reaction times to be similar to the controls. If the inference for the *Yes target* (*one allowed*) condition is a scalar implicature, as proposed by Fox (2007), we would expect a *delay effect*, i.e., rejecting the presented conversation (computing the implicature) should take longer than accepting it (accessing the literal meaning) (Bott and Noveck, 2004). If the inferences occur due to a high-level pragmatic principle, such as Goldstein (2019)'s homogeneity or Aloni (2022)'s neglect-zero, we would expect that the *target* contexts will take longer to evaluate, as they violate these principles. Moreover accepting the conversation (suspending the principles) should take longer than rejecting it: *reversed delay effect*.



(a) *both allowed* (control)

(b) *one allowed* (target)

(c) *neither allowed* (control)

Figure 2: Contexts tested in the experiment.

Results Acceptance rates are displayed in Figure 4(a), all relevant differences are significant. The *target* context for both *Yes* and *No* was significantly closer to the false controls, than to the true controls

[1] Presuppositional exhaustification by Del Pinal et al. (2023) could yield similar predictions.

($p < 0.001$), which corresponds to the pattern Figure 1(c). However, in the data, we found some participants who consistently accepted *Yes* as an answer in the target contexts (*non-FC participants*). The answer patterns of those participants are represented in Figure 1(a).

In the collected reaction times, we observed two main effects: 1. Trials where the *No* particle was used as the response to an *FCQ*, took significantly longer to evaluate than those with *Yes* ($\beta \approx 0.38$sec, $p < 0.001$). 2. The *target* contexts took significantly longer to evaluate ($\beta \approx 1.3$sec, $p < 0.001$) than the controls. These effects are displayed in Figure 4(b). To ensure that the target effect is not due to the visual difference between targets and controls, we performed the same analysis on the filler items. They are visually the same as the tests but contain only one item in the question instead of the disjunction (e.g. "May I keep a dog?"). We found a similar negation effect ($\beta \approx 0.2$sec, $p < 0.001$), but the target effect ($\beta \approx 0.3$sec, $p < 0.001$) was significantly smaller (see Figure 3).

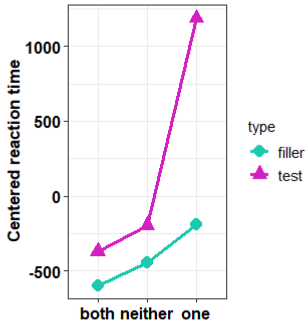


Figure 3: Interaction of contexts and filler/test.

Moreover, we did not observe any delay effect: in the *target* context, and the response particle *Yes*, it took participants as long to accept as to reject. The analysis of the particle *No* was inconclusive, as there is little acceptance data (only 9%), but we observed an insignificant tendency that accepting takes longer.

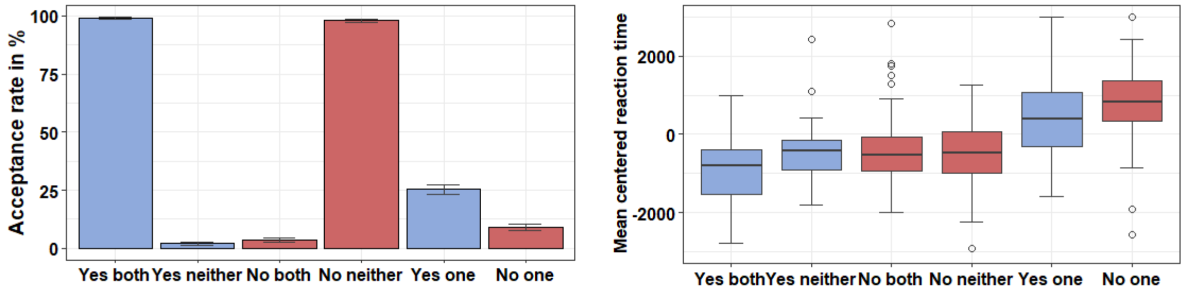


Figure 4: Acceptence rates and reaction times plots.

Discussion In the experiment, we established that the response particle *Yes* as an answer to *FCQ* corresponds to *both allowed* and the response particle *No* to *neither allowed*. Therefore, the correct pattern of responses is represented by Figure 1(c) which is predicted by Goldstein (2019) and Aloni (2022). Moreover, we observed that the acceptance rates for the *target* conditions are lower than for the (literal meaning) controls, which suggests that they are weaker, more difficult, or have a pragmatic source.

Furthermore, the non-Gricean theories correctly predict longer reaction times for *target* contexts, which violate the homogeneity presupposition, and are zero models. Since scalar reasoning is needed in *one allowed* context only with the *Yes* response particle, this prediction is unavailable for Fox (2007).

Moreover, Aloni (2022) can explain the behaviour of the non-FC participants and (partially) the difference between *Yes* and *No* on target items, through global suspension of neglect-zero. We would expect that the homogeneity presupposition cannot be globally "suspended". Global suspension of neglect-zero should not cause any difference in reaction times, which is confirmed in the data. The scalar theories could explain the non-FC participants, as those who do not compute implicatures. However, we would expect them to be quicker, than those who compute them, which is not what we found.

The collected data poses a challenge to the semantic and scalar approaches to free choice and supports non-Gricean pragmatics as a uniform solution to the free choice puzzle.

Selected references Aloni, M. (2007). *Natural Language Semantics*, 15:65–94. Aloni, M. (2022). *Semantics and Pragmatics*, 15:5–EA. Bar-Lev, M. E. and Fox, D. (2020). *Natural Language Semantics*, 28(3):175–223. Bott, L. and Noveck, I. A. (2004). *Journal of memory and language*, 51(3):437–457. Del Pinal, G., Bassi, I., Sauerland, U. (2023). *unpublished manuscript lingbuzz/006122*. Fox, D. (2007). *Presupposition and implicature in compositional semantics*, pages 71–120. Goldstein, S. (2019). *Semantics and Pragmatics*, 12:23–EA. Kamp, H. (1973). *Proceedings of the Aristotelian Society*, 74:57–74.