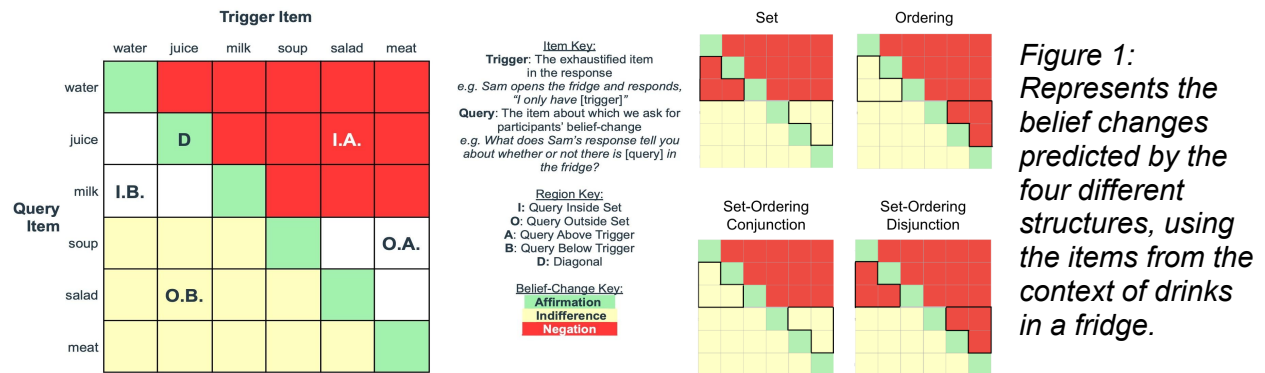


## The Structure of Ad-Hoc Alternatives

Understanding what a speaker means requires not only understanding what they said, but also considering what they could have said instead [1]. Of course, there are many things a speaker *could* have said, too many to consider them all. In every ad hoc context, listeners must consider only those alternatives they take to be relevant for informing the meaning of what the speaker actually said [2, 3]. In this study, we investigate which alternatives those are.

Imagine you are at your friend's house and you say, "I'm thirsty." Your friend opens their fridge and says, "I only have milk." As the listener, you might infer that your friend does not have water (negating this alternative), while remaining agnostic about whether they have, say, meat. How did you make these judgments? Did you generate a set of drinkable alternatives that did not include meat, such as {*water, juice, milk*}, and negate everything but milk? Or did you have some implicit ranking of alternatives, such as *water > juice > milk > ... > meat*, and negate only those that were higher ranked than milk? Existing proposals entangle these data structures – sets and orderings (Horn scales [2]). In this study, we distinguish and probe each of them and their boolean combinations.

**Design:** We investigate whether a listener's beliefs about different alternatives change in response to an utterance, given some context. In our task, we call "trigger" items the words that evoke alternatives by being in the scope of a focus particle ("only milk", above). We call "query" items the potential alternatives (*water, meat, etc.*). We test whether people change their beliefs about different queries, given contexts with each of the same words as triggers. We investigated four different alternative structures: Set, Ordering, Set-Ordering Conjunction, and Set-Ordering Disjunction. These structures make some overlapping predictions about which alternative query item gets negated [regions I.A. and O.B. in Figure 1], but diverging predictions in other cases [regions I.B. and O.A. in Figure 1]. Predictions diverge when a query item is inside the set but ranked below the trigger (does saying "I only have water" indicate not having milk?), and when a query item is outside the set of alternatives a listener would normally consider but ranked above the trigger (does saying "I only have meat" indicate not having soup?).



**Materials:** A series of stimulus creation experiments were first done to generate 6 alternatives for each of 16 contexts. The alternatives 'inside' the set were generated by replacing the trigger phrase [the 'Response' in Figure 2] with "Sure, I have \_\_\_" and asking participants to fill in the blank with 6 items that would satisfy the request. The alternatives 'outside' the set were generated by replacing the trigger phrase with "Looks like I don't have anything for that" and asking participants for 6 items that the friend could still have, which would *not* satisfy the request. Items generated in each context were aggregated across participants, and experimenters selected 6 of the most common distinct items for each context. The Orderings were then generated by asking a different group of participants to rank-order the 3 'inside' the set items or the 3 'outside' the set items, in each context, for their fit in the phrase "I have \_\_\_." Finally, another group of participants were asked to rank-order all 6 words for each

context, confirming that the items meant to be ‘inside’ were all ranked higher than those meant to be ‘outside’.

**Methods and Results:** We pre-registered our methods and analysis plan. 213 participants were tested through Amazon Mechanical Turk. Each participant read each context (16 trials) [Figure 2]. The combination of triggers and queries were pseudo-randomly assigned to each context to ensure the same number of responses per region per participant, and across query-trigger pairs within a region [Figure 1 shows the different regions], producing a total of 3,408 responses [Figure 3].

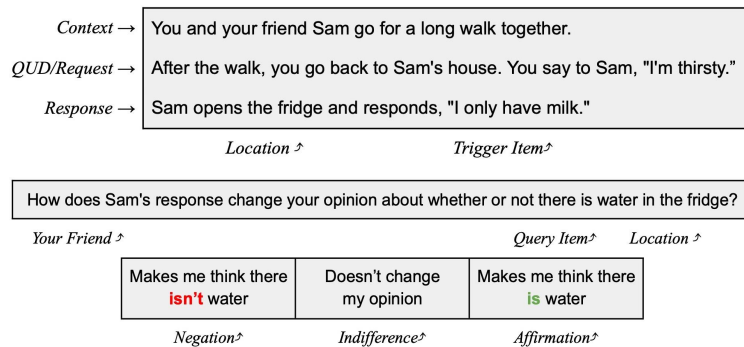


Figure 2: All trials had the same template: context, a request that defines the question under discussion (QUD), and a response to the QUD. Following each story, participants answered a multiple choice question designed to measure the direction of change in belief caused by the trigger item.

Our dependent variable is whether participants responded with a Negation. In a mixed-effects logistic model, we found significant effects of whether the query was inside vs. outside the Set ( $\chi^2 = 61.19, p < 0.001$ ) and whether the query was higher or lower than the trigger in the Ordering ( $\chi^2 = 53.15, p < 0.001$ ) but no interaction. We subsequently tested the pairwise differences between theoretically critical regions [Figure 1]. Items in regions O.A. and I.B. were each significantly more negated than in region O.B. (O.A. > O.B.;  $\beta = 0.19, p < 0.001$ ), and I.B. > O.B. ( $\beta = 0.40, p < 0.001$ ). This combination uniquely diagnoses a Set-Ordering Disjunction structure [Figure 3].

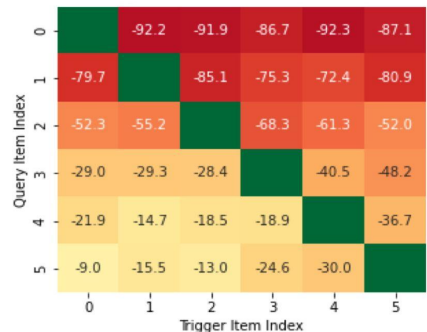


Figure 3: Aggregated Results. Represents the average negation from participants across all contexts. Larger magnitudes indicate more negation. Indexes 0-2 are inside the Set, 3-5 are outside. 0 is highest in the Ordering, 5 is lowest.

**Conclusion:** In aggregate, we find evidence for Set-Ordering Disjunction. This suggests that, at least in some contexts, people negate all plausible alternatives, even if there would not have been better responses than the focused trigger word (e.g. *only having water* implies not having milk, even though milk would have been a worse option). At the same time, they also (at least sometimes) negate higher ranked alternatives even when these are outside the set of what would normally be considered relevant responses (e.g. *only having meat* negates having even normally-irrelevant soup). Aggregate results might reflect combining more set-like structures and more ordering-like structures. This raises a further possibility: perhaps the very structure (not just the content) of how alternatives are relevant varies across contexts.

**References:** [1] Grice, H. P. (1975). Logic and conversation. *Syntax and Semantics 3: Speech Acts*. [2] Horn, L. R. (1972). On the semantic properties of logical operators in English. *University of California, Los Angeles*. [3] Gotzner, N., & Romoli, J. (2022). Meaning and alternatives. *Annual Review of Linguistics*, 8.