Objectives

Explore the role of Questions Under Discussion (QUDs) in explaining scalar diversity.

Background

Listeners reason about what is not said: the stronger alternative—all and brilliant.

1) Mary ate some of the cookies. → SI: Mary ate some, but not all, of the cookies.
2) The student is intelligent. → SI: The student is intelligent, but not brilliant.
3) Scalar inference (SI) calculation.

Scalar diversity

Considerable variation across different scales in SI calculation rates; e.g., the SI in (1) arises much more robustly than the one in (2) (van Tiel et al. 2016; see also Floran et al. 2012; Beltram & Xiang 2013).

What properties of scales can explain this variation?

- Distinctness of the stronger scalar term (van Tiel et al. 2016).
- Local enrichability (Sun et al. 2018).
- Negative strengthening, polarity, extremeness (Gotzn et al. 2018).
- But: still a lot of variance unaccounted for in the empirical results.

The role of context

QUDs have an effect on rate of SI calculation: Did Mary eat all of the cookies? leads to higher SI rate than Did Mary eat any/some of the cookies? (i.a. Degen & Tannenhaus 2014; Ronai & Xiang 2020; Yang et al. 2018; Zondervan et al. 2008).

Previous work on scalar diversity: stimulus sentences presented without any context.

Open question: is there variation across scalar terms in what kind of QUD they most naturally bring to mind?

Hypothesis

Scalar diversity, in the absence of an explicit QUD, arises (in part) due to the differential availability of a polar question containing the stronger scalar term from the scale.

Intuition: the more likely a question such as Is the student brilliant? is, the higher the rate of SI calculation from the corresponding statement She is intelligent.

Experiments

Experiment 1: replication of van Tiel et al. (2016)

- 37 native speakers of American English; MTurk; IbexFarm.
- Inference task to investigate the likelihood of deriving an SI (from 43 scales).
- Participants saw Mary: The student is intelligent.” + asked the question “Would you conclude from this that, according to Mary, the student is not brilliant?”.
- “Yes” response = SI was calculated.
- “No” response = SI was not calculated.

Experiment 2: inference task with Question manipulation

- 40 native speakers of American English; MTurk; IbexFarm.
- Basic inference task identical to Experiment 1.
- Two-condition Question manipulation: Mary’s statement in a dialogue context.
- Strong-scalar question: Sue: Is the student brilliant? Mary: She is intelligent.
- Weak-scalar question: Sue: Is the student intelligent? Mary: She is intelligent.
- Predictions: 1) Strong-scalar questions lead to higher SI rates
2) Scalar diversity reduced

Experiment 3: question availability

- 35 native speakers of American English; MTurk; IbexFarm.
- Forced choice task: “Compare the following two questions about a student. Which one are you more likely to ask?”
- Choice between: Is the student brilliant? vs. Is the student intelligent?
- Prediction: forced choice results (henceforth Question Availability) should predict scalar diversity.
- The more preferred the strong-scalar question in Exp. 3, the higher the SI rate for that scale in Exp. 1.

Results

Exp. 2: more SIs derived with strong-scalar than weak-scalar question (p < 0.01).
- Explicit QUD influences SI calculation rates for a large number of scales (later replicated on 60 scales).
- Scalar diversity effect is still present (quantifiable using relative entropy).

Exp. 1 (y axis) replicated the scalar diversity effect.
Exp. 3 (x axis) Question Availability not an overall predictor of SI rates.

Boundingness (van Tiel et al. 2016)

Bound scale: stronger scalar denotes an endpoint, e.g., <some, all> is bounded.
- Bound scales led to higher SI rates than unbounded ones (p < 0.001; replicates van Tiel et al. 2016).

Interaction of Question Availability with Boundedness (p < 0.05):

- Unbounded scales: Question Availability showed a strong trend (p < 0.08) in predicting SI calculation.
- The more likely participants were to choose the strong-scalar question (Is the student brilliant?), the higher the relevant SI rate (intelligent—not brilliant).
- Unbounded scales: no effect of Question Availability (p = 0.14).

Discussion

Bound scales: the stronger scalar term is not vague, but denotes a fixed point.
- Stronger scalar term is very salient as stronger alternative to vague, weaker term.
- → High rates of SI calculation; Question Availability makes no difference.

Unbounded scales: both scalar terms are vague, they denote intervals whose values vary according to context.
- Stronger scalar is less salient as an alternative → can get boost from context.
- The more available a QUD based on the stronger term is, the more likely hearers will be to reason about that term as the stronger alternative.
- → More likely to derive the SI.
- Some of the stronger terms on unbounded scales are also extreme (Morzycki, 2012): “off the scale” scalar terms not generally salient alternatives.

Ongoing and future work

1) Exp. 2: QUDs that set up biasing contexts without mentioning the scalar terms.
- Right now, effects may be due to relevance implicature.

Question elicitation (Ronai & Xiang, 2020):
- Mary: student intelligent?
- Sue: The student is intelligent.
- Mary: Can I take that to mean she is not brilliant? OR Can I take that to mean she might be brilliant? OR Oh, I see.
- Sue: Yes, that’s right. (not after Oh, I see.)
- Manipulation doesn’t seem to have effect, completions mostly based on second line.

2) Different empirical measures of Question Availability?
- Question Availability may itself be context-dependent.

3) Is it boundedness or extremeness that matters? (Not all unbounded are extreme.)
4) Final puzzle: Exp. 2: effect for all scales vs. Exp. 3: effect only for unbounded scales.

Conclusions

- Explicit questions robustly affect SI calculation rates for a large number of scales.
- Yet there still remained substantial variation in SI rates across scales.
- Likelihood of a question based on the stronger scalar contributes to scalar diversity, but only for unbounded scales.

References

Beltrame & Xiang (2020). To your bitter taste, “intelligent” is an experimental ploy — or a practical lesson from my muddled mind. Proceedings of XPRAG 2019.


Degen & Tannenhaus (2014). The role of context in propagation of scalar implicature. Journal of Experimental Psychology: Human Perception and Performance. 1083-1091. The role of context in the processing of scalar implicature:

