

Lexical Preferences, Causal Inference, and QUDs

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Asymmetric causal attribution

People reading "X is associated with Y" treat the causal relationship asymmetrically: they consistently prefer one causal direction over the other, based on priors about which word is more likely to refer to a cause.

Smoking is associated with cancer

✓ Smoking causes cancer
Cancer causes smoking

Asymmetry persists with completely novel words: without prior semantic knowledge or discourse context, readers consistently prefer the syntactic object as the cause.

Sunyup is associated with agoriv

✓ Agoriv causes sunyup
Sunyup causes agoriv

Agoriv is associated with sunyup

✓ Agoriv causes sunyup
✓ Sunyup causes agoriv

Previous Accounts

In a QUD-based account [3], listeners preferentially infer the question under discussion is "What causes [topic]?" Because the topic is typically a syntactic subject in English, participants infer the subject is the effect.

Prediction: Subject-as-cause preference when topic is in object position.

Problem: Topicality manipulations don't reverse preference.

Speaking of agoriv, sunyup is associated with it.

✓ Agoriv causes sunyup
Sunyup causes agoriv

Speaking of sunyup, agoriv is associated with it.

✓ Agoriv causes sunyup
✓ Sunyup causes agoriv

In our proposed lexical account, *associated with* may be used more often with object causes, leading to a prior about causes in object position.

Prediction: Different verbs should have different causal preferences.

Problem: Only the *associated with* predicate has been tested so far.

Experiment 1

Object-as-cause preference is robust to question phrasing.

"Causes" phrasing

Suppose you read the following piece of information:

Sunyup is connected to Agoriv.

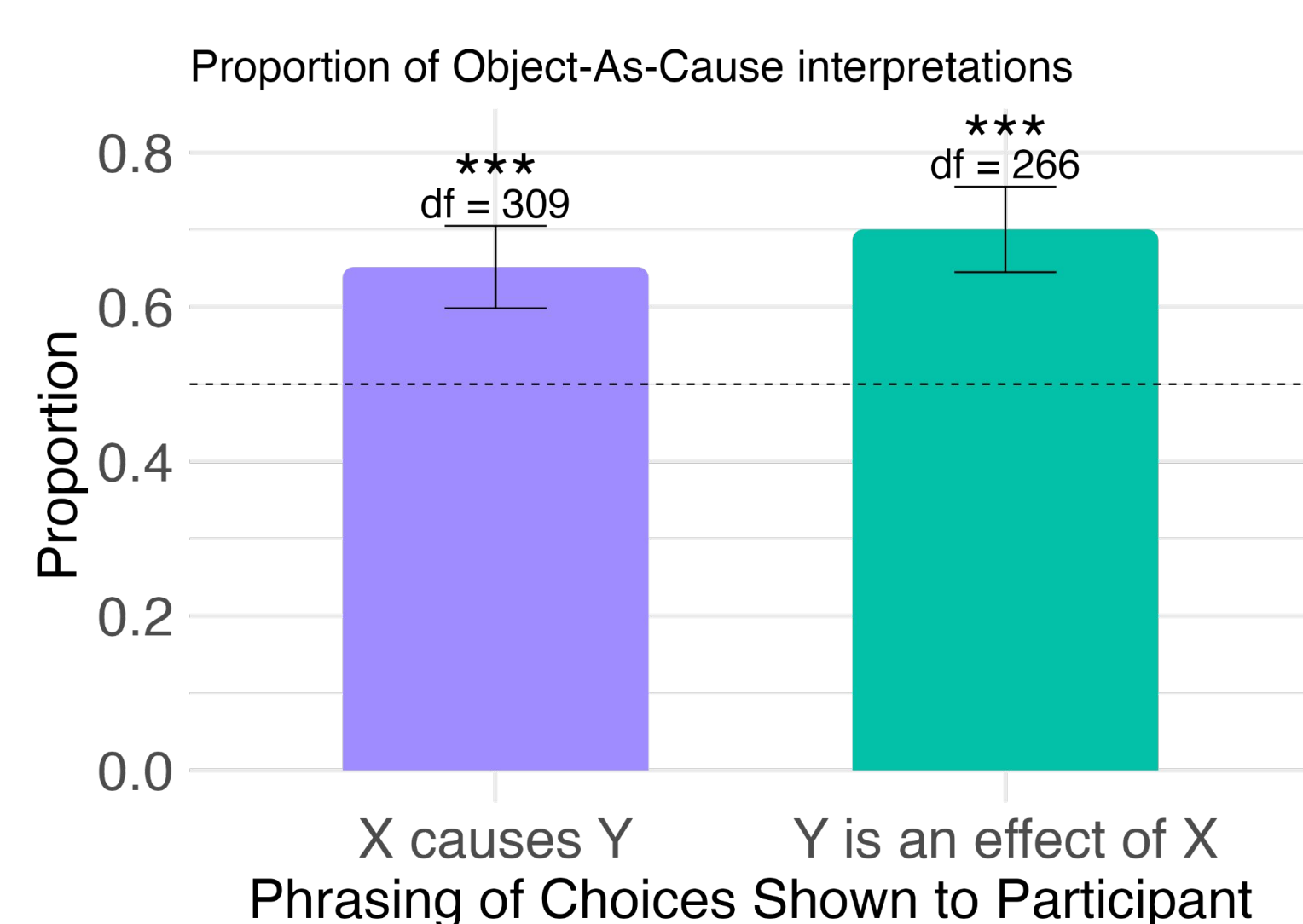
Agoriv causes Sunyup Sunyup causes Agoriv

"Effect of" phrasing

Suppose you read the following piece of information:

Sunyup is connected to Agoriv.

Agoriv is an effect of Sunyup Sunyup is an effect of Agoriv



Both conditions lead to object-as-cause preference ($p < .001$).

Rephrasing had no significant effect on object-as-cause preference ($p = 0.21$).

Experiment 2

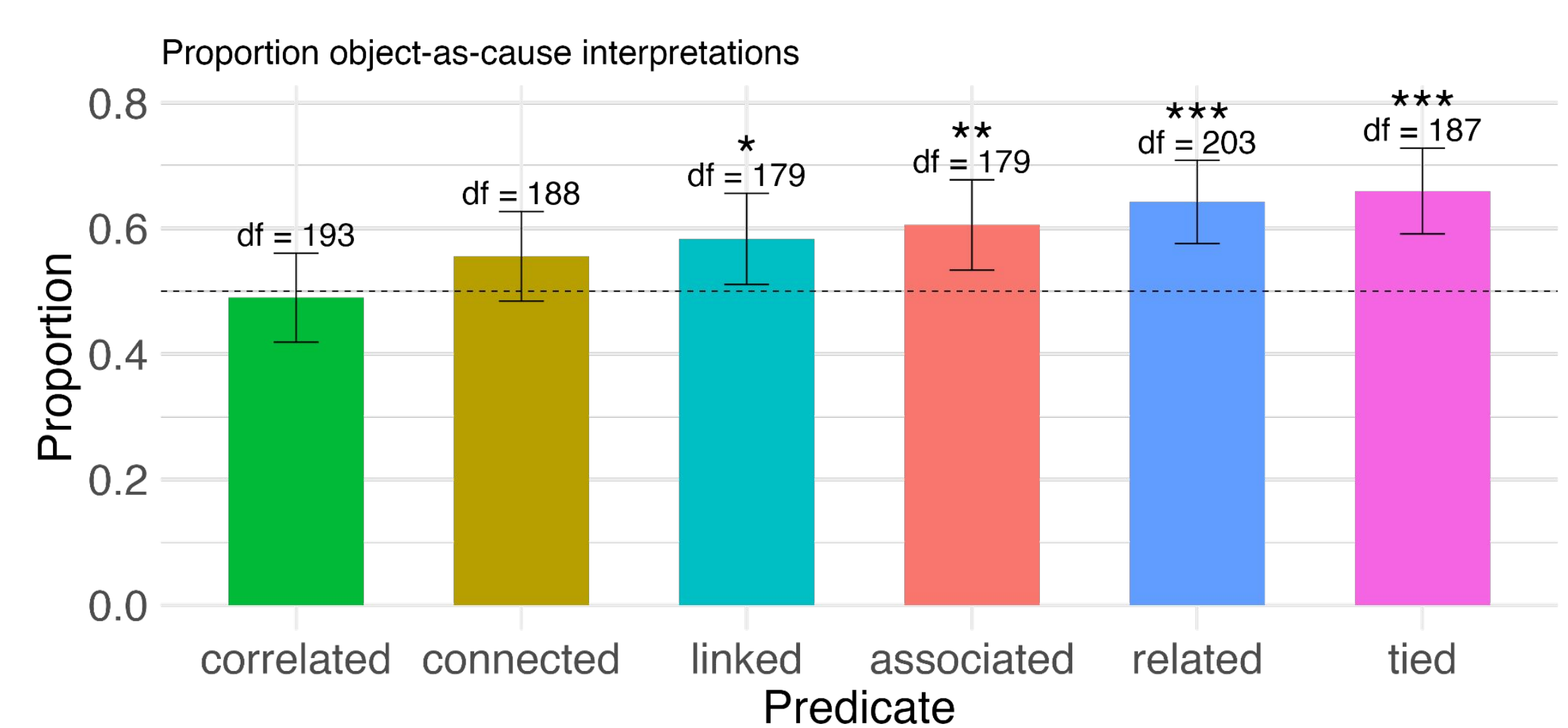
Object-as-cause preference differs across predicates.

"Tied to" Condition

Suppose you read the following piece of information:

Sunyup is tied to Agoriv.

Agoriv causes Sunyup Sunyup causes Agoriv



Different predicates lead to different rates of object-as-cause preference.

No verb led to the opposite preference.

Conclusions

The QUD account fails to explain:

1. Why topicality manipulations consistently fail
2. Why "What causes [topic]?" would be the default QUD
3. Why different verbs have different bias rates.

Meanwhile, verbs could lexically specify a preference for object-as-cause or subject-as-cause, predicting asymmetries.

References

- [1] Gershman, S. J., & Ullman, T. D. (2023). Causal implicatures from correlational statements. *PLOS ONE*, 18(5)
- [2] Haber, N. A. et al. (2022). Causal and Associational Language in Observational Health Research: A Systematic Evaluation. *American Journal of Epidemiology*, 191(12)
- [3] Lassiter, D., & Franke, M. (2024). The rationality of inferring causation from correlational language. *Proceedings of the Annual Meeting of the Cognitive Science Society*,

