

# Context dependence of artifact noun interpretation

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Sinn und Bedeutung 27



## Background

- **Artifact nouns (ANs)** exhibit a hallmark of vague expressions: **edge cases**



vehicle?



electronic device?

- We assume ANs 1) don't denote natural kinds; 2) refer to objects of human invention and/or objects assimilated to an intended function:

John kept a pig as a **pet**. ('pet' = AN)

# John kept a pig as a **mammal**. ('mammal' not AN)

- Because ANs are vague, boundaries of categories should be context dependent. This context dependence is under-explored.
- Highlighting an AN's function can modulate beliefs about what falls into the category. [4]:



Label: "cup" > "bowl" in 'neutral' context

Label: "bowl" > "cup" if object holds food

- AN categories are often the targets of normative rules (prohibitions/requirements) because their functions align with how to meet policy goals.

Goal: limit air pollution → "No vehicles allowed..."

### Three possible accounts of policy goal-mediated interpretation:

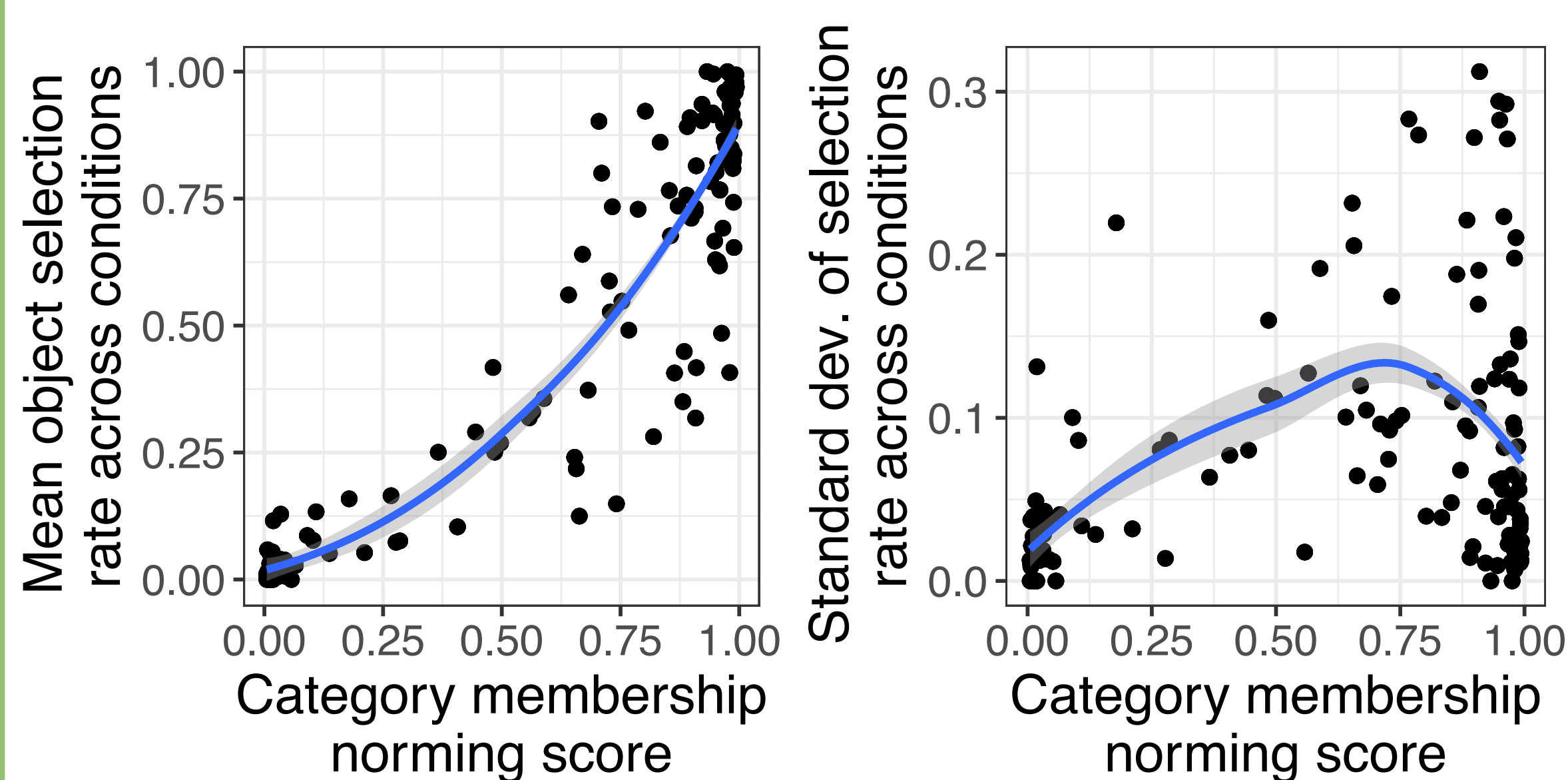
**Vagueness:** policy goals serve as cues for how to resolve the category boundary of an AN.

**Imprecision:** boundary is fixed; goals resolve status of objects 'close enough' to the boundary.

**Domain restriction (DR):** boundary is fixed; goals signal that rule applies to a restricted set of relevant entities from the category.

## Experiment (Prolific, n = 188)

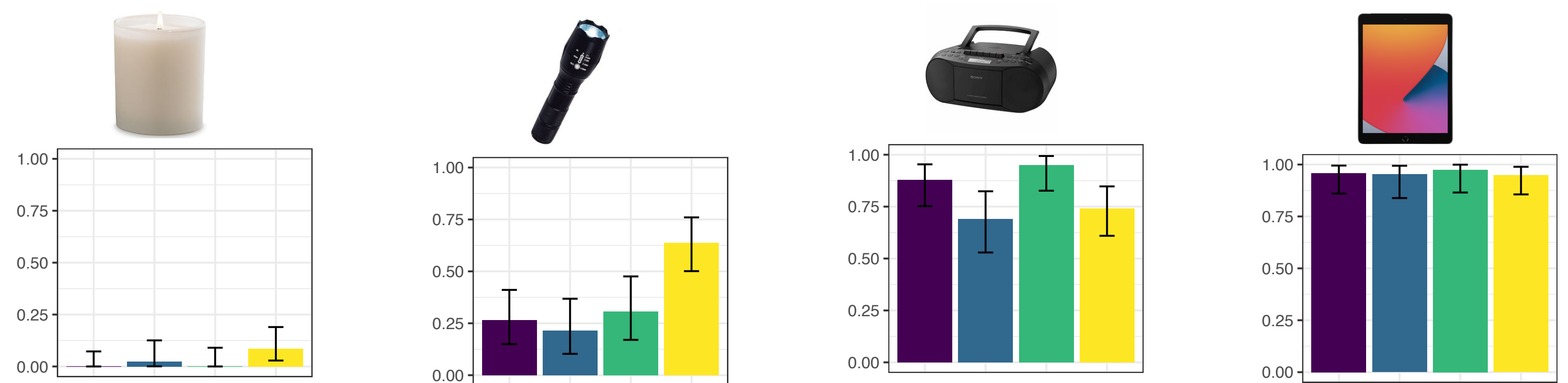
- Participants read rules featuring ANs (7 prohibitions, 5 requirements) and determined whether 12 objects fell within each rule's scope.
- Between-subjects conditions vary policy context associated with the rule
- ANs: *electronic devices, face coverings, food, furniture, jewelry, pets, sandwiches, shoes, tents, uniforms, vehicles*



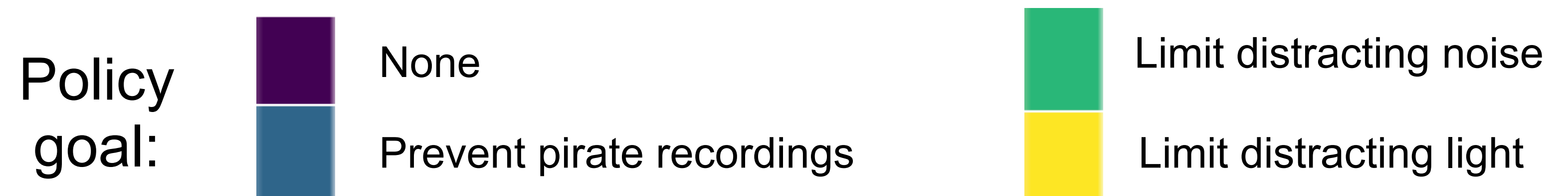
Norming prompt: "Is [object] a(n) [AN]?"

Works cited: [1] Heather Burnett. Signalling games, sociolinguistic variation and the construction of style. L&P, 2019. [2] Scott Grimm and Beth Levin. Artifact nouns: Reference and countability. In Proc. NELS, 2017. [3] Justine Kao, Jean Y Wu, Leon Bergen, and Noah D Goodman. Nonliteral understanding of number words. PNAS, 2014. [4] William Labov. The boundaries of words and their meanings. Repub. in Fuzzy Grammar: A Reader, 2004. [5] Daniel Lassiter and Noah D Goodman. Context, scale structure, and statistics in the interpretation of positive-form adjectives. In Proc. SALT, 2013. [6] Ciyang Qing. Semantic Underspecification and Its Contextual Resolution in the Domain of Degrees. Doctoral dissertation, 2020.

## Results: Policy goals modulate the resolution of AN vagueness



"No electronic devices are allowed in the theater"



### Challenge for imprecision accounts:

- Some objects normed as category members but exhibit relatively low selection rates in some policy goal conditions.
- Ex: boombox in the *electronic devices* scene
- Account must posit that these objects are outside category but merely 'close enough' when relevant for advancing policy goals.

### Challenge for DR accounts:

- Experimental contexts permit explicit meta-linguistic commentary as to what 'counts as' a member of the category denoted by the noun as in (1), similar to negotiating gradable adjective thresholds (2) but unlike canonical DR contexts (3):

(1) No electronic devices are allowed in the theater. (By the way: for our purposes, a flashlight [counts / doesn't count] as an electronic device.)

(2) Get me a long ladder. (By the way: for our purposes, 20 feet counts as long for a ladder.)

(3) (Planning a party): Put all the bottles of Heineken in the fridge. (# By the way: for our purposes, nothing that my neighbors bought for their party counts as a bottle of Heineken.)

## Model: The Goal-Sensitive (GS) Rule Interpreter

Sensitive to beliefs about signaler's non-communicative goals (e.g. [1], [3])

$$L_1(obj, goal | rule) \propto S(rule | obj, goal) \cdot P_G(goal | rule) \cdot P_{CAT}(obj | rule)$$

Joint posterior probability that object *obj* is prohibited and signaler has particular policy goal, given observation of a rule.

Signaler probability of producing *rule*, given *goal* and intention of prohibiting *obj*. \*

Prior over goals\*

Prior beliefs that *obj* is prohibited, given lexical content of *rule*. \*

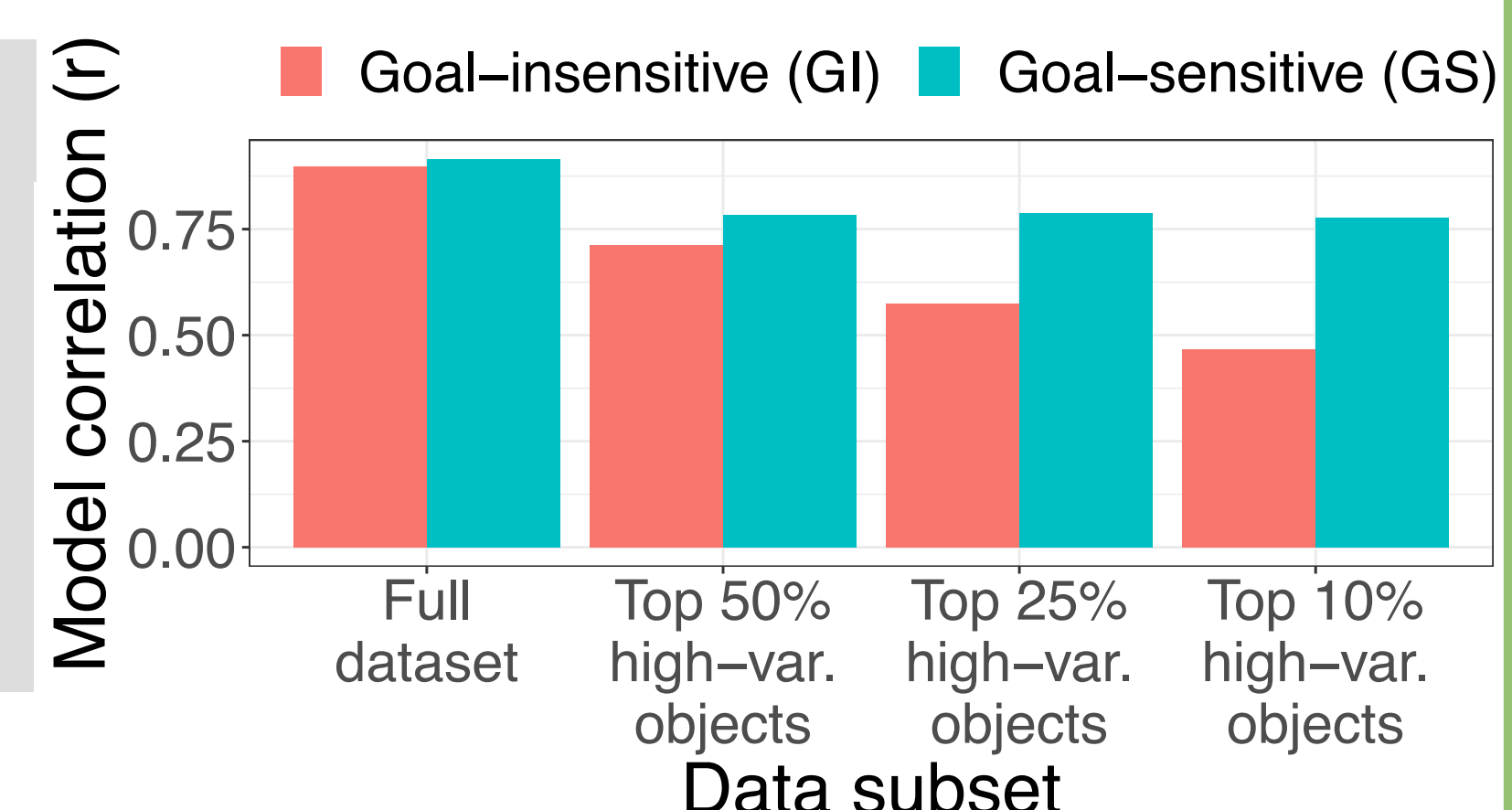
### Goal-Insensitive (GI) Baseline Model:

$$L_1(obj, goal | rule) \propto S(rule | \cancel{obj, goal}) \cdot P_G(\cancel{goal} | rule) \cdot P_{CAT}(obj | rule)$$

### Bayesian Model Comparison

- $\Pr(GS|data) > \Pr(GI|data)$  by factor of >30
- GS model outperforms GI model particularly when focusing on high-variance objects

\*parameterized from separate norming studies.



## Conclusion

- Experiment + modeling support claim that highlighting an AN's contextual function affects the resolution of AN vagueness
- Analysis extends computational modeling of vague interpretation beyond single-dimensional gradable adjectives (cf. [5], [6]) to multi-dimensional expressions.
- Semantic denotation of ANs requires specifying free semantic parameter(s) whose value(s) determine <e,t>-type function in context (see e.g. [2])

Data and model predictions at [github.com/bwaldon/artifactNouns](https://github.com/bwaldon/artifactNouns)