Production expectations modulate contrastive inference

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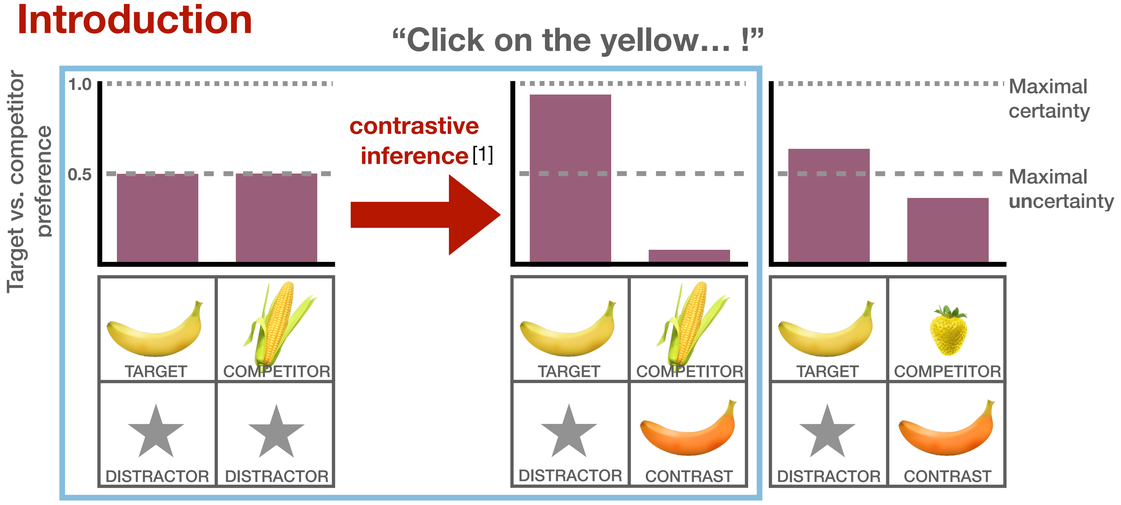
Introduction

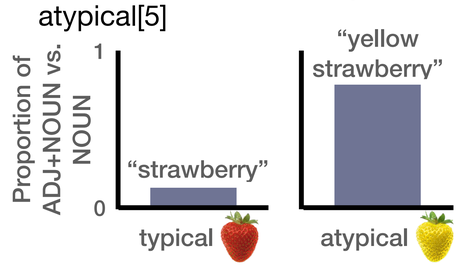


Background

- Presence of contrastive inference is a function of multiple linguistic and extra-linguistic factors [1,2,3]
- For color adjectives in particular, contrastive inference has been observed to be volatile [1]

Modifier production probabilities for color

- Color is used redundantly when color is atypical[5]



New account of contrastive inference

- We propose **speaker-centric account** of contrastive inference. In the Rational Speech-Act (RSA) framework[4], listeners' expectations are the speaker's contextual probability of producing the adjective **for each item in the display**.

$$P_{L_1}(r \mid u) \propto P_{S_0}(u \mid r) * P(r)$$

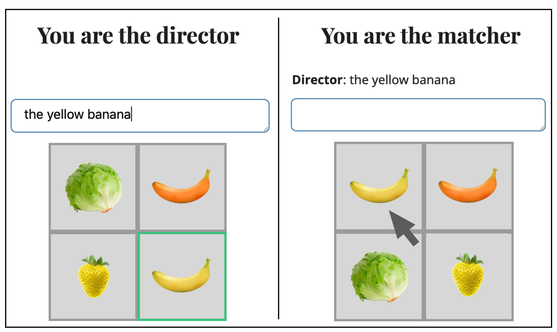
assumed to be uniform

- **Prediction**: The greater the asymmetry in modifier production expectation for target vs competitor, the greater the predicted size of the target preference.

Production experiment

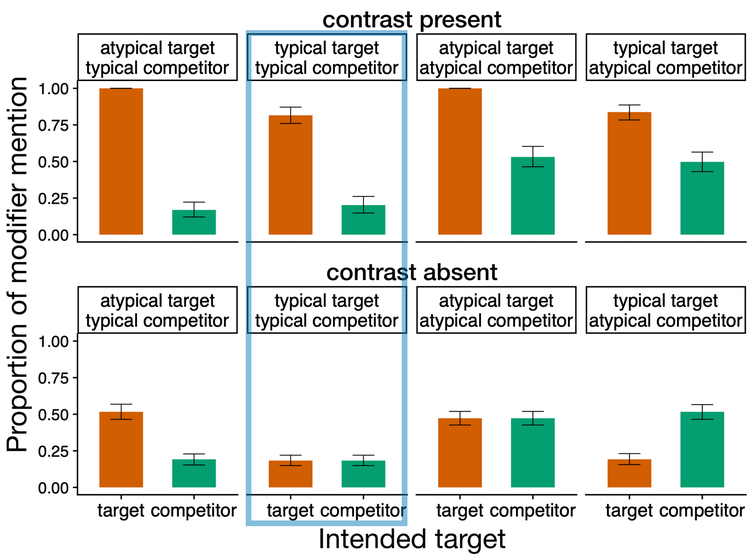
$P_{S_0}(u \mid r)$

Method: Interactive reference game



MTurk
n = 112 dyads
trials = 60
(32 critical)

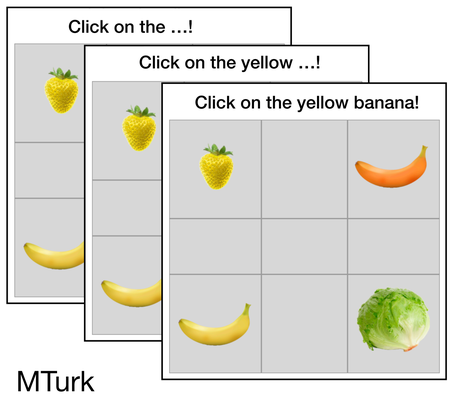
Results: Color modifier production probability is higher for more atypical items (target: E = 2.65, CI = [2.32, 3.00]) and when a contrast is present (E = 5.05, CI = [4.60, 5.53]).



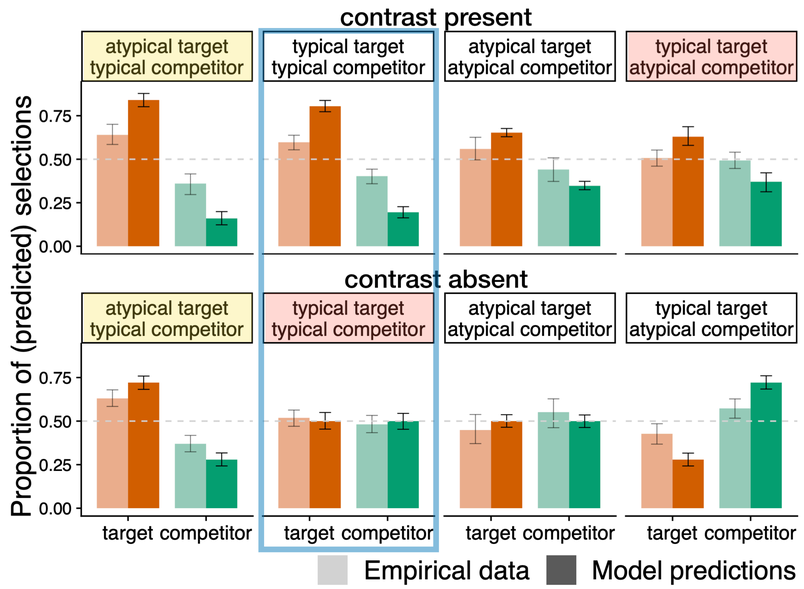
Model predictions & comprehension experiment

$P_{L_1}(r \mid u)$

Method: Incremental decision task[6]

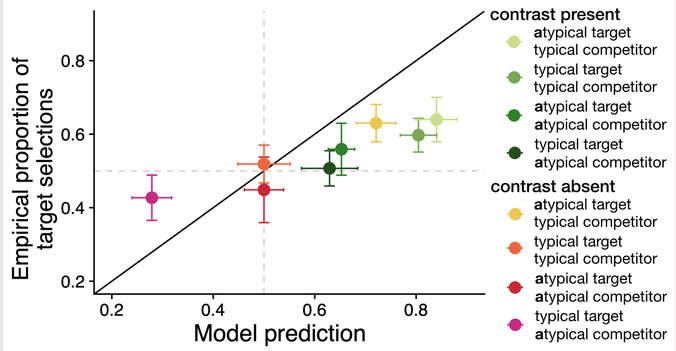


MTurk
n = 211
trials = 55 (20 critical)



Results:

- Target preference changes across contrast conditions → stronger contrastive inference between some conditions (e.g., marked by blue border) than others (e.g., conditions in yellow and red)
- Main effect of contrast presence (E = 0.31, CI = [0.12, 0.50]) and competitor typicality (E = –0.50, CI = [–0.87,–0.14])
- Model predicts empirical results (r=0.81)



Conclusion

- Empirical support for a highly pragmatic **speaker-centric model of comprehension**.
- **Behavioral pattern** of target preference when a contrast is present is not on its own sufficient to detect contrastive inference.
- The **high variation across conditions** but within the color adjective domain speaks against a uniform treatment of color adjectives.

References
[1] Sedivy et al (1999). Achieving incremental semantic interpretation through contextual representation. *Cognition*, 71(2), 109-147
[2] Aparicio, H. et al (2016). Processing gradable adjectives in context: A visual world study. In *Proceedings of SALT*
[3] Rubio-Fernandez, P. et al (under review). Contrastive inferences are sensitive to informativity expectations, adjective semantics and visual salience. psyArXiv preprint https://doi.org/10.31234/osf.io/ mr4ah
[4] Goodman, N. D., & Frank, M. C. (2016). Pragmatic language interpretation as probabilistic inference. *TICS*, 20(11), 818-829
[5] Westerbeek, H. et al (2015). Stored object knowledge and the production of referring expressions: the case of color typicality. *Frontiers in Psychology*, 6, 935.
[6] Qing, C., Lassiter, D., & Degen, J. (2018). What do eye movements in the visual world reflect? A case study from adjectives. In *CogSci.*