

## Production expectations modulate contrastive inferences

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Listeners, upon hearing a scalar adjective in a definite referring expression such as “the big...,” often draw **contrastive inferences**. These are evidenced as anticipatory eye movements to a *target* item in a *contrast* set, such as a big glass in the context of a small glass, even when an additional big *competitor* object is present [1]. Contrastive inferences are modulated by multiple factors, including adjective semantics [2], property salience [3], speaker reliability [4,5], and expectations of informativity [6]. We focus here on contrastive inferences associated with color adjectives. Following recent research highlighting the importance of the listener’s generative model of the speaker in generating pragmatic inferences [7,8], we test the following **expectation-based hypothesis**: that the strength of contrastive inferences triggered by an adjective can be predicted by the relative probability that the speaker would produce the observed adjective to convey the target relative to the competitor.

We manipulate speaker expectations in two ways: 1) by displaying targets with and without a color contrast; and 2) by displaying target and competitor in typical and atypical colors. The latter is motivated by the observation that speakers rarely mention an object’s color, in the absence of a contrast object, when the color is typical for the object (“yellow banana”), but often do when the color is atypical (“yellow strawberry”) [6,9,10]. Thus, contrast presence, target color typicality, and competitor color typicality all provide independent pragmatic reasons for a listener to expect a speaker to produce a color adjective. In Fig 1a, the adjective is most expected to refer to the target because target atypicality, competitor typicality, and contrast presence all support the explanation that the speaker intended to refer to the target. Fig 1b and Fig 1c show contexts with a moderate target expectation and strong competitor expectation, respectively.

**Method.** Participants ( $n=80$ ) performed an incremental selection task [11] in contexts such as Fig 1. They clicked on the object they believed the speaker intended at three different points in the utterance, which was gradually revealed on screen: in the prior window (“Click on the”), the adjective window of interest (“Click on the yellow”), and the disambiguating noun window (“Click on the yellow banana!”). Target typicality and contrast presence was a within-subjects and competitor typicality a between-subjects manipulation. There were 55 trials in total with 35 fillers. All stimuli were normed in four separate studies to ensure that: a) Each object was color-diagnostic, i.e., color was among the first three of its associated features and only one color was typical for it. b) Each object was nameable with only one possible label. c) Each object had a typical (e.g., red strawberry) and atypical (e.g., yellow strawberry) instantiation.

**Results (Fig. 2).** In the prior window, the probability of object selection was uniform. In the adjective window, the target was more likely to be selected when there was contrast ( $E = 0.59$ ,  $CI = [0.25, 0.93]$ ) and when the competitor was typical ( $E = -0.71$ ,  $CI = [-1.19, -0.21]$ ), supporting the expectation-based hypothesis. Interestingly, we observed no main effect of target typicality, counter to the results reported by [6].

**Discussion.** Methodologically, our results show that contrastive inferences can be elicited in offline clicking paradigms, though we plan to conduct the same study in an eye-tracking paradigm. The results support a production-centric view of comprehension, in line with other recent developments highlighting the importance of the speaker in comprehension [4,5,7,8].

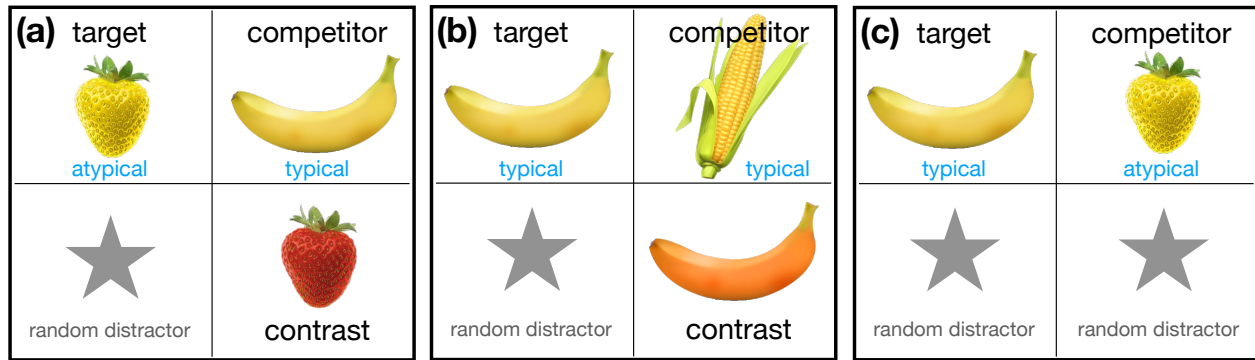


Figure 1: Example contexts that, according to the expectation-based hypothesis, should be a) most conducive to contrastive inference, b) somewhat conducive, and c) least conducive. Labels not present in experiment.

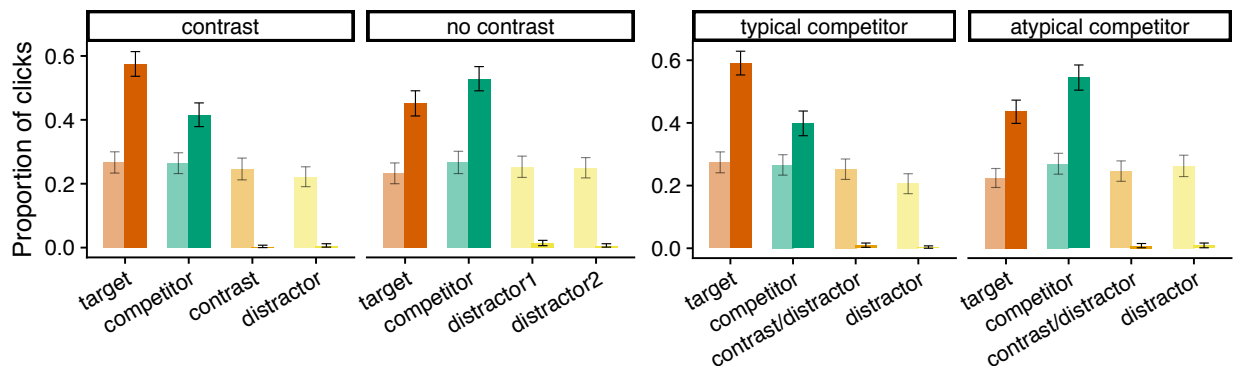


Figure 2: Proportion of object selection in adjective window (dark bars) compared to prior window (light bars) when a) contrast was present or absent and b) when competitor was typical or atypical.

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