

## Reference production in context: how discourse goals and relevance shape modifier choice

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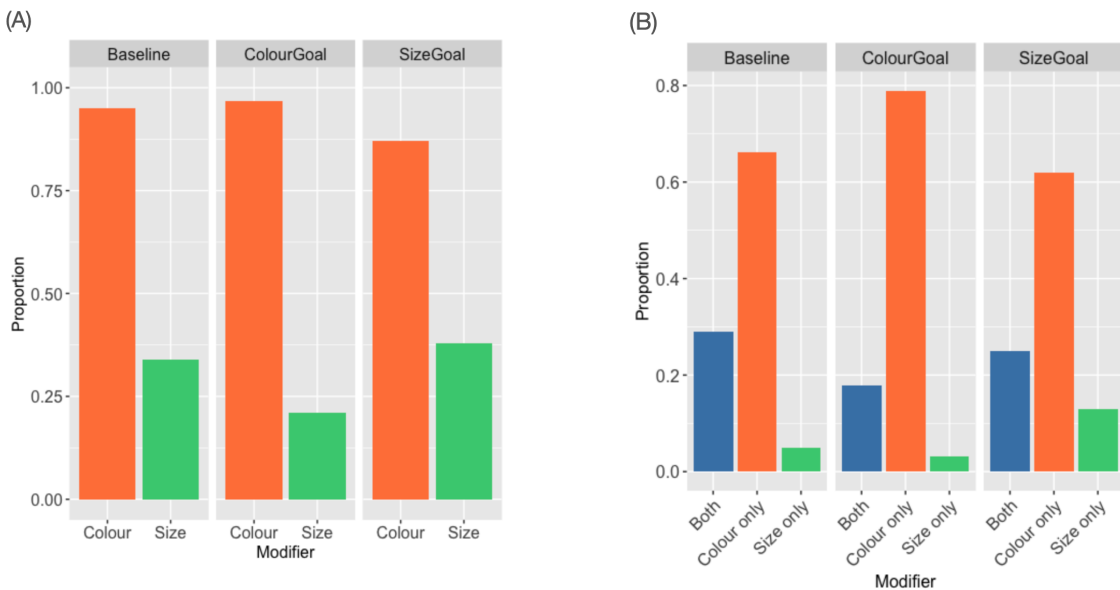
Speakers' use of adjectives to achieve unambiguous reference is a focus of extensive research, with important implications for debates about communication efficiency in the light of perceptual biases. The preference for overspecifying colour over size has been attributed to colour being an absolute and visually salient attribute, while size is relative and requires comparisons between the target and distractor objects (Belke & Meyer, 2002; Pechmann, 1989). Also, the mention of colour is often customary, especially in categories such as clothing, where colour serves as a core property (Rohde & Rubio-Fernandez, 2022; Rubio-Fernandez, 2019). Previous research has explored how domain size, scene variation, perception of contrast and attribute discriminability influence the production of redundant modifiers (Gatt et al., 2017; Koolen et al., 2013; Long et al., 2021; Rubio-Fernandez, 2021). However, this research has primarily involved artificial lab tasks in which the only goal is to achieve successful reference, whereas in a naturalistic setting, reference is often only part of the speaker's communicative aim. There is also limited discussion on how the broader discourse context affects modifier choice. To address this gap, our study aims to review the question of what makes speakers produce particular adjectives when establishing reference, exploring how this choice is connected with predicating contextually relevant properties. Specifically, we investigate the extent to which speakers take discourse goals and relevance into account when choosing which modifiers to include or omit during reference production, with a specific focus on colour and size.

In two web-based production studies, we used images of everyday objects and integrated questions in real-life contexts to facilitate natural reference production. This approach enabled us to place referential tasks in a more plausible context, where participants replied to questions with answers that involved achieving successful reference as part of the utterance (See Fig. 1). Experiment 1 examined situations where both colour and size were fully distinguishing. Each of the 18 items consisted of a pair of objects with contrasting colours and sizes (e.g., small red mug vs large blue mug) and a corresponding question prompting specification of an object. Participants (native British English speakers,  $n=48$ ) received an equal number of questions from each condition, with discourse goals relevant to colour or size or none (Which mug will you use [to create a Christmas vibe / to serve espresso]?). We found a main effect of modifier type, showing a higher frequency of colour usage compared to size across all conditions. The rate of colour specification was highest (0.97) when the discourse made colour relevant (in the colour-goal condition), whereas the rate of size specification was highest (0.38) when size was relevant (in the size-goal condition). For responses with only one modifier, the highest proportion of responses using colour only (0.79) and size only (0.13) was observed in the condition where the respective attribute aligned with the discourse goal (See Fig. 2).

Experiment 2 (in progress) explores scenarios where only one attribute, either colour or size, is fully distinguishing. This experiment follows the design of Experiment 1, with the distinction that each item consists of four objects and has two versions. In the colour- and size-distinguishing versions, the respective attribute (i.e., colour or size) fully differentiates the target from its three distractor objects. We expect to observe increased use of fully-distinguishing modifiers that align with the discourse goals and more redundant use of partially-distinguishing goal-relevant modifiers. Taken together, these experiments build on prior work to enhance our understanding of reference production in more naturalistic settings.



**Figure 1.** Sample displays from the colour-goal condition (A) and size-goal condition (B).



**Figure 2.** Proportion of modifier by occurrence (A) and by category (B) across conditions of Experiment 1. Mixed effects logistic regression was used to analyze the binary outcome of Inclusion of modifier (yes = 1, no = 0), including fixed effects for Modifier (Colour vs Size) and Condition (Colour-goal vs Size-goal) and their interaction, as well as the maximal random effect structure for Participants and Items as permitted by the data ( $p$ -values of fixed effects Modifier and Modifier  $\times$  Condition interaction  $< 0.001$ ). Modifier (colour +0.5, size -0.5) and Condition (colour-goal +0.5, size-goal -0.5) were sum coded.

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