Alignment in Naturalistic Dialogue: Language Production in Interactive Reference Production

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Speakers trying to distinguish one object from others often use referring expressions such as 'the red chair' and 'the large couch'. According to Dale and Reiter (1995)'s Incremental Algorithm, there is a fixed preference order of attributes, in which definite attributes (e.g., color) are preferred over less definite attributes (e.g., size). According to the Incremental Algorithm, speakers will never use a dispreferred attribute when a preferred attribute is sufficient for identification. In contrast, Goudbeek and Krahmer (2012) found that speakers describing pictures of furniture might use a dispreferred attribute (orientation) instead of a preferred attribute (color) when they are primed to do so. Inspired by the Interactive Alignment Model (Garrod & Pickering, 2004), they conjuncture this is due to speakers aligning with their conversational partner by using the same linguistic representations, to make sure conversation goes smoothly.

However, Goudbeek and Krahmer (2012) used a relatively artificial paradigm: speakers interacted with a computer and were primed by a pre-recorded computerized female voice. We aimed to replicate this study creating a more naturalistic setting involving two human participants in naturalistic dialogue.

Following their study, we used pictures depicting furniture items (a fan, a chair, a couch, and a desk) in four different colors (blue, green, red, and grey) and two different sizes (large or small). There were three types of trails: color trials, size trials and filler trials. Both participants view the same pictures, but in a different layout. Participants engaged in a computer task together, taking turns identifying the target picture (accompanied by two distractors) to their conversational partner.

Our experiment went as follows. Participant A describes the target picture (framed by a red border on the screen) to participant B. Depending on the trial, participant A used (was *forced* to use) either a preferred or dispreferred attribute to describe the target picture to participant B. In the color prime, the target picture had a different color (e.g. red) than the distractors (e.g. both green), but the same size (all large). In the size prime, the target picture had a different size (e.g. large) and the distractors (e.g. both small), but the same color (e.g. all green, see Figure 1, square 1).

Second, participant B indicated the matching picture by pressing a key of the corresponding number on their keyboard, e.g. '1' (see Figure 1, square 2). Third, the participants switched roles: now participant B was the director and participant A the

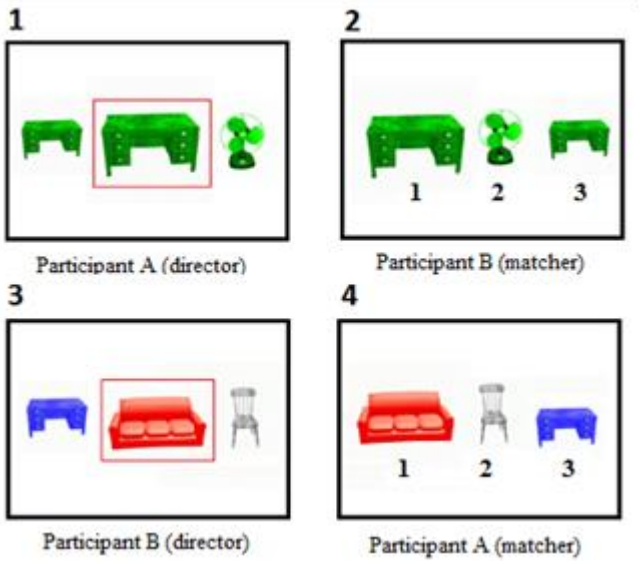

Figure 1. Example of a size trial in the director-matcher task

matcher. In contrast to the previous turn, now the target picture differed in both color and size (e.g., large and red) from the distractors (e.g., one small and blue, one small and grey). This gave participant B the *choice* to use either the preferred or dispreferred attribute to distinguish the target picture from the distractors (see Figure 1, square 3). In case participant B aligned with participant A, they used color when participant A (i.e., in color trials) used the preferred attribute, and size when participant A used the dispreferred attribute (i.e., in size trials). Finally, participant A selects the matching picture (see Figure 1, square 4). In this way, we induce priming or preferred or dispreferred properties (and potentially alignment) in a naturalistic setting.

For our statistical analyses, we used the proportion of attribute use as our dependent measure to create a measurement for alignment, including overspecification (the speaker using both the preferred and dispreferred attributes).

Our results indicate that participants generally preferred to use color (M = .80, SE = .03) over size (M = .52, SE = .03), $F(1, 68) = 33.67$, $p < .0001$, $\eta^2 = .33$. Type of prime had a significant main effect on attribute choice, $F(1, 68) = 47.36$, $p < .0001$, $\eta^2 = .41$. Participants primed with color used the preferred attribute color (M = .85, SD = .21) significantly more than the dispreferred attribute size (M = .31, SD = .28). In contrast to the (statistically non-significant) difference found by Goudbeek and Krahmer (2012), participants primed with size did not show a preference for using size (M = .72, SD = .29) over color (M = .75, SD = .31, see Figure 2) in the size priming condition, but, importantly, they did use size substantially more than in the color priming condition.

In conclusion, we were able to replicate the findings by Goudbeek and Krahmer (2012), showing that regarding referential expressions, speakers do not only align the choice of attributes in their referential expressions when interacting with a computer, but also in a naturalistic interaction with another human.

This experiment is part of a larger project studying the effect of emotion on language production. In future studies we aim to study the underlying mechanism of the language production (of referring expressions) of emotional speakers.

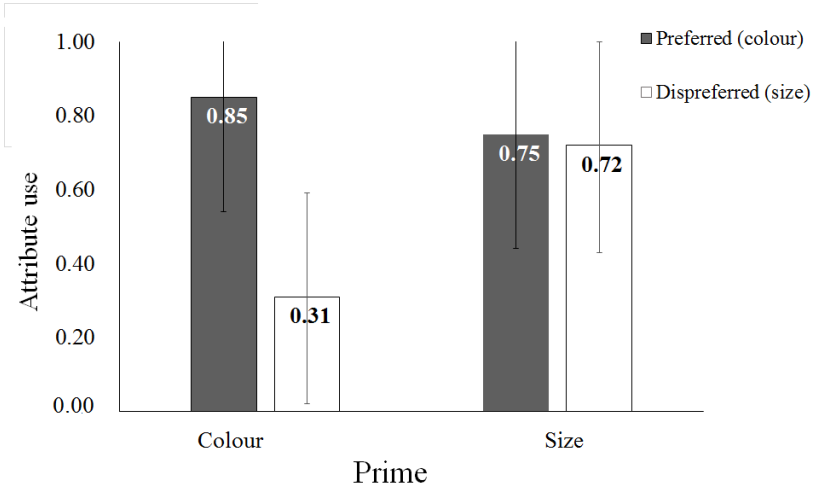

Figure 2. Proportion of preferred and dispreferred attributes per Prime (Color or Size)

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