

Informativity Modulates Linearization Preferences in Referential Interaction

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In referential communication, speakers have been shown to strategically overspecify informative pre-nominal adjectives in their expressions [1] and order them to position the most informative property early in the sequence [2], a strategy we refer to as the “informative-first linearization preference”, which can facilitate target identification for the listener [3]. Less is known, however, regarding whether informativity can influence linearization at the syntactic level, e.g., in pre- or post-nominal modifications, especially in interactive communication environments where the collaborative speaker may seek to be especially informative for the listener [4;5].

To quantify informativity of referential expressions in a visual scene, we use Referential Entropy Reduction (RER), which measures how much uncertainty about the target is reduced by each property word in an utterance [1]. Words have higher RER when they reduce uncertainty to a greater extent, by narrowing a greater referential scope in a shared visual scene. We compared Animal-Informative and Action-Informative conditions using stimuli depicting animals performing actions, which in German can be encoded flexibly using pre- and post-nominal structures (e.g., in Figure 1, *der weinende Hase* vs. *der Hase, der weint*). In both conditions, the informative property (Animal or Action) yielded a higher RER than the uninformative one.

Across three experiments we investigated whether speakers prefer the informative-first linearization preference, above and beyond the overarching syntactic preference for pre-nominal modifications: In Experiment 1, participants acted solely as speakers, collaborating with a virtual partner online to complete a maze-based sentence task for target descriptions (Figure 1). In Experiment 2, also conducted online using the maze task, increased interaction, such that participants alternated between speaker and listener roles trial by trial. In Experiment 3, participants alternated roles face-to-face in a lab setting, communicating orally with a confederate about the target figures.

When in the speaker role (Figure 2), a significantly higher proportion of participants (Group Varied) exhibited syntactic variations in Exp2 (64.56%) and Exp3 (88.89%) compared to Exp1 (44.30%). The remaining participants consistently used a single syntactic structure, predominantly the pre-nominal structure. In Group Varied, the informative-first linearization preference was observed across the three experiments, especially for the Animal property that was more likely to be encoded first in the Animal-informative Condition than in the Action-informative Condition, forming the less preferred post-nominal structure more frequently (Exp1: $\beta = 1.08, SE = 0.19, z = 5.76, p < .01$; Exp2: $\beta = 0.56, SE = 0.21, z = 2.68, p < .05$; Exp3: $\beta = 0.28, SE = 0.12, z = 2.40, p < .05$, using logistic mixed model regression).

Our experiments provide support for the informative-first linearization preference, based on RER, in a subset of participants (Group Varied). Further, this preference is enhanced in more engaging and interactive communication settings. We reason that this may be due to the trial-by-trial alternation between the speaker and listener roles, which required participants to change perspectives more frequently [6;7], resulting in more informative encoding of the utterances for efficient communication.

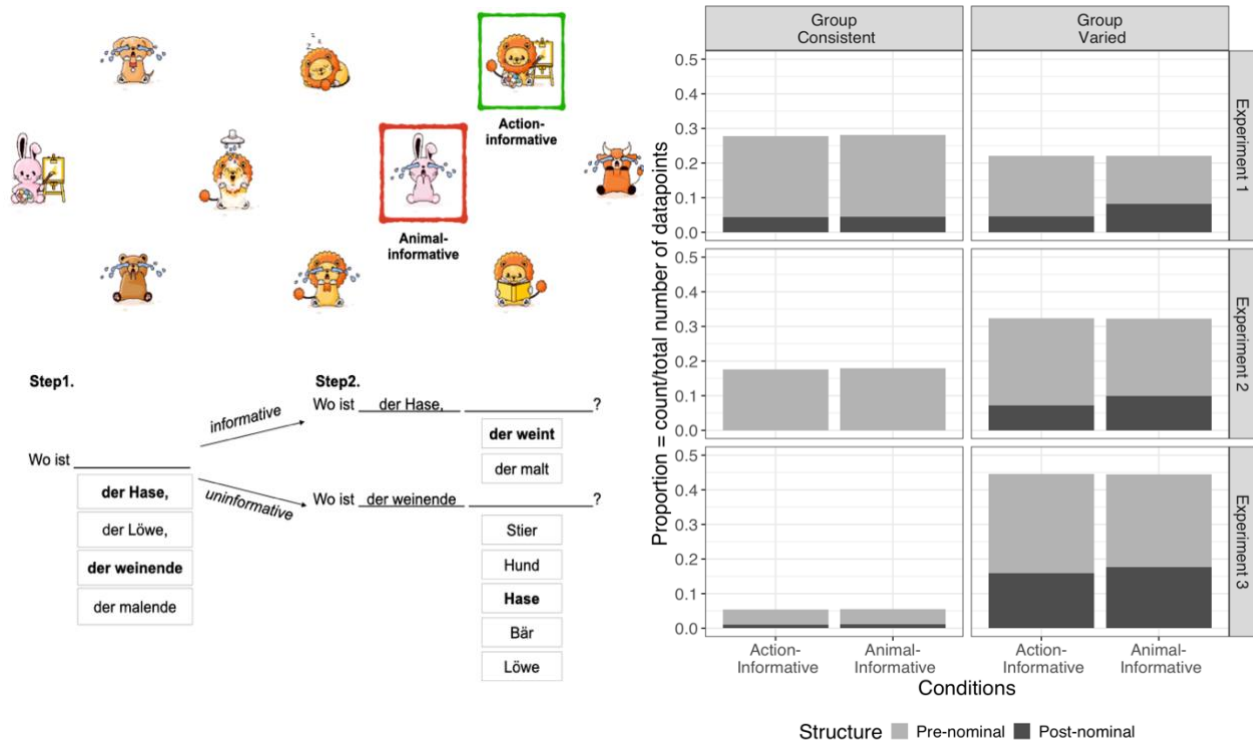


Figure 1 (left). Example visual stimulus and maze-based sentence completion task. Targets as in the Action-informative and Animal-informative Conditions. The informative property narrows down the selection scope from 10 to 2 figures, while the uninformative one narrows from 10 to 5. The two maze steps were presented sequentially. Only one target was highlighted in each trial for the subjects. Only one stem of Step2 was shown, depending on subjects' decisions at Step1.

Figure 2 (right). Proportions of the two modification structures used in each condition in the three experiments. A pre-nominal expression starts with the action property, while a post-nominal modification starts with the animal property.

Reference

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