

Binding options of German demonstrative pronouns: A large-sample study and a computational model

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Using self-paced reading and acceptability rating studies, Hinterwimmer and Brocher (2018) have shown that German demonstrative pronouns (DPros) can be bound not only by clause mate referential expressions, but also by universally quantified DPs as long as respective binders are not grammatical subjects. Consequently, they concluded that DPros receive bound variable-like interpretations in the same way as personal pronouns (PPros), with their anti-subject bias being a result of their status as the marked pronoun variant. However, universal quantifiers can not only bind pronouns in standard binding configurations requiring c-command, but also allow for so-called *telescoping* across sentence boundaries (for example, in 1, the DP headed by the universal quantifier ‘*Each*’ doesn’t c-command any pronoun in the second sentence); in contrast, negative quantifiers only allow standard binding and no telescoping.

In order to conclude that DPros give rise to bound variable-like interpretation, one would have to show that there is no processing difference between DPros and PPros in sentences where the only available binder is a negative quantifier. However, if there is an effect of quantifier type it would provide evidence that DPros are not bound in the same way as personal pronouns. We conducted three self-paced reading studies (n=46, 49, 151) with the same material. Participants were presented with target sentences (as the second sentence in example 2) in a fully-crossed 2x2 design with two types of pronouns (PPros and DPros) and two types of quantifiers (universal and negative). The target sentence was preceded by an introductory sentence to set up a sound context for the use of these two types of quantifiers; it was the same across four conditions. In each case, only the quantificational object DP (headed by the quantifier *jeden* or *keinen*) was available as binder, due to matching gender features. We found an effect of pronoun type and quantifier type — a slowdown for DPros and negative quantifiers — and crucially their interaction. Although the interaction effect was small in size, it is crucial from the theoretical point of view because an interaction between pronoun and quantifier type implies that DPros are possibly not bound in the standard way (the way PPros are bound).

A straightforward model of pronoun resolution implemented in the cue-based retrieval architecture (Lewis and Vasishth, 2005), such as the one for reflexive binding reported in Patil et al., (2016), cannot capture the contrast we observed in our data. Hence, we propose a three-step algorithm as a computational model of processing demonstrative pronouns in German: (I) **RETRIEVE**: a cue-based retrieval of the antecedent using lexical semantic features of the pronoun, e.g. phi-features and animacy. (II) **REVIEW**: check relational and semantic constraints between the retrieved DP and the pronoun, e.g. c-command and scope. (III) **RESOLVE**: resolve the dependency between pronoun and the antecedent. We further show that the **RETRIEVE-REVIEW-RESOLVE** model can also capture processing differences between the two types of bound variable pronouns in English reported in Moulton and Han (2018) studies. With self-paced reading studies, they showed that c-commanded bound variable pronouns (3a) and non-c-commanded but semantically bound variable pronouns (3b) are processed differently.

Examples

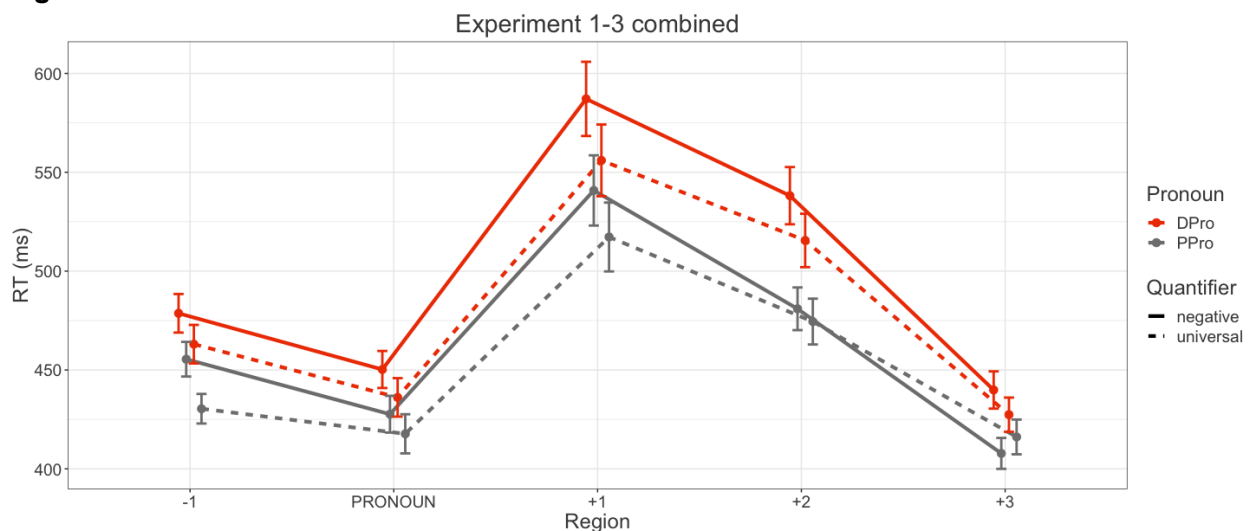
(1) **Each** / **#No** degree candidate walked up to the stage. **He** took his diploma from the Dean and returned to his seat. (Roberts 1989)

(2) In der Grundschule, in der die Lehrerin arbeitete, wurde auch eine Hausaufgabenbetreuung angeboten. Die Lehrerin lobte **jeden** / **keinen** Jungen, der fleißig war, vor **seiner** / **dessen** Klasse, weil die anderen Kinder sich (daran ein Beispiel nehmen konnten / gleichbehandelt fühlen sollten).

In the elementary school in which the teacher_{FEM} worked, after-school homework supervision was offered. The teacher_{FEM} praised every / no boy who was diligent in front of his_{PPro} / his_{DPro} class, because the other children (could take an example / should feel treated equally).

(3) a. It seems **each boy** brought fresh water from the kitchen quickly right before **he** went on an early break. b. After **each boy** brought fresh water from the kitchen quickly it seems that **he** went on an early break.

Figure



References

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