

# Can character viewpoint gesture guide pronoun resolution in German?

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## Abstract

Co-speech gestures can affect ambiguous pronoun resolution (Goodrich Smith & Hudson Kam 2012). We report the findings of two forced choice studies investigating the hypothesis that performing a *character viewpoint gesture* from the perspective of the subject or the object influences the resolution of p- (Exp. 1) and d-pronouns (Exp. 2) in German. The results, however, do not corroborate our hypothesis.

Keywords: perspective in gesture, character viewpoint gesture, pronoun resolution in German

## Introduction

Since German has a rich pronominal system, there are several pronominal forms that can in principle refer to the same singular entity, among them personal pronouns (p-pros), as for example *er* ‘he<sub>p-pro</sub>’ and *sie* ‘she<sub>p-pro</sub>’ and so-called d-pronouns (d-pros), for example: *der* ‘he<sub>p-pro</sub>’ and *die* ‘she<sub>d-pro</sub>’. Previous research on anaphora resolution in German revealed a functional difference of the two forms regarding their coreference distribution (Bittner & E. Dery 2015). P-pros refer back to the most salient antecedent, i.e., normally the subject. However, they can also refer to the object referent (1a) and are therefore ambiguous. In contrast, d-pros are marked for non-topical reference, thus typically avoiding subject antecedents (1b) (Patil et al. 2023).

- (1) Der Koch<sub>i</sub> hat den Piloten<sub>j</sub> erschossen. ‘The cook<sub>i</sub> shot the pilot<sub>j</sub>.’  
a. Er<sub>i/j</sub> war sehr jung. ‘He<sub>p-pro i/j</sub> was very young.’  
b. Der<sub>j</sub> war sehr jung. ‘He<sub>d-pro j</sub> was very young.’

Previous research suggests that there are different cues guiding ambiguous pronoun resolution, among them *gender*, *grammatical function*, *order of mention*, *thematic prominence*, and *givenness* (Arnold 2010). Goodrich Smith & Hudson Kam (2012) found that the preference for the second-mentioned character as referent for the ambiguous p-pro increased, when the coreferential gesture was conflicted with order-of-mention of the referents.

Perspective can be encoded in speech-accompanying gestures, as well, the distinction relevant for the present work being the one between *character*

*viewpoint gestures* (CVGs) on the one hand and *observer viewpoint gestures* (OVGs) on the other (McNeill 1992). CVGs depict an event from a first-person perspective and their entire body is normally involved in the gesture production. OVGs, by contrast, depict an event from a third-person perspective and only hands and arms are involved in the gesture production. Besides the obvious differences in size, CVGs have been shown to be more informative than OVGs (Beattie & Shovelton 2002). In addition, CVGs and OVGs have different preferences what they typically express (Parrill 2010).

Considering (1), one could either perform a CVG from the subject's (= cook's) perspective (henceforth, subject CVG), i.e., a shooting gesture, or a CVG from the object's (= pilot's) perspective (henceforth, object CVG), i.e., backward tumbling.

Building on Goodrich Smith & Hudson Kam's (2012) findings that gestures influence how comprehenders interpret pronouns, we investigated whether the perspective expressed through a CVG serves as a cue in ambiguous pronoun resolution in German.

## Methodology

### Experiment design and procedure

Two forced choice studies with a one-factorial design were conducted (GESTURE). Participants first saw a written context. Then, they saw a videotaped target utterance. Afterwards, there was a neutral written sentence with an ambiguous pronoun. Finally, participants had to decide whether the pronoun refers to the subject or object of the target sentence. The completion took approximately 15 minutes and participants were compensated with £2.70.

### Materials and participants

Each experiment consisted of 15 target items, 15 unrelated filler items and 2 training items. Each written context consisted of 3 sentences in order to describe the event. The videotaped target sentence introduced two masculine discourse referents, one in the subject and one in the object position (cf. (1)). Target sentences occurred in three conditions: aligned with a subject CVG, aligned with an object CVG, or with no gesture (factor GESTURE). The neutral sentence containing an ambiguous pronoun started either with a p-pro (*er* 'he<sub>p-pro</sub>'; Exp. 1) or a d-pro (*der* 'he<sub>d-pro</sub>'; Exp. 2). The test items were constructed such that both the subject referent and object referent were in principle plausible antecedents for the pronoun. An example for an experimental item can be found in (2).

- (2) **Context:** *Gestern habe ich etwas Unheimliches miterlebt. Ich war in der Bank, um Geld abzubeben. Du glaubst nicht, was passiert ist.* ‘Yesterday, I witnessed something scary. I went to the bank to withdraw some money. You would not believe what happened.’

**Target sentence:** *Der Wachmann<sub>subj</sub> hat den Geldtransportfahrer<sub>obj</sub> angeschossen.* ‘The security<sub>subj</sub> shot the cash transport driver<sub>obj</sub>.’

**Sentence with ambiguous pronoun:** *Er/Der war übrigens noch sehr jung.* ‘He<sub>(p-pro)</sub> / (d-pro) was still very young, by the way.’

**Question:** *Wer war noch jung?* ‘Who was young, by the way?’

For each experiment 21 monolingual native speakers of German were recruited via Prolific as participants.

## Predictions and results

Since p-pros preferably pick up subjects as antecedents in German and d-pros, by contrast, avoid topical reference, we hypothesized that performing an object CVG results in higher rates of choosing the object as antecedent of a p-pronoun (Exp. 1). For d-pros (Exp. 2), we hypothesized that the preference to pick up the non-topical referent (= the object) is boosted if an object CVG is performed. Thus, a main effect for GESTURE was predicted for both experiments. In Experiment 1, the object was chosen as a referent of the p-pro in 11.4% of the trials when an object CVG was performed, compared to 9% in the subject CVG and 14.3% in the no gesture control condition. A logistic regression model was fitted to the data, showing no main effect (cf. Table 1).

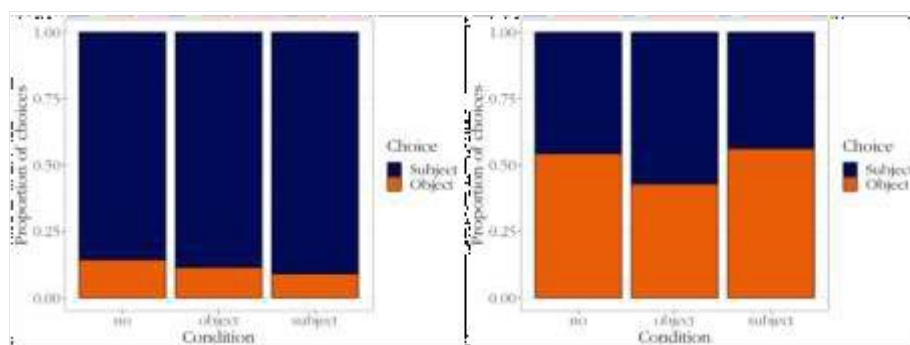


Figure 1. Proportion of choices of Exp. 1 (p-pro) and Exp. 2 (d-pro)

For Experiment 2, the object was chosen as antecedent of the d-pro in 42.9% of the trials when an object CVG was performed, compared to 56.2% in the subject CVG and 54.3% in the no gesture control condition. A logistic regression model showed a main effect for GESTURE in the pairwise comparison between the no gesture and object CVG condition (cf. Table 2).

Table 1. Logistic regression model with Gesture as fixed effect and participants and items as random intercepts (Exp. 1: p-pro).

	Estimate	Std. error	z value	Pr(>  z )
(Intercept)	-2.938	.418	-7.036	1.98e-12***
No vs. obj	.428	.358	1.197	.231
Obj vs. subj	.284	.385	.736	.462

Table 2. Logistic regression model with Gesture as fixed effect and participants and items as random intercepts (Exp. 2: d-pro).

	Estimate	Std. error	z value	Pr(>  z )
(Intercept)	.23	.474	.48	.962
Subj vs. no	-.095	.347	-.274	.784
No vs. obj	.872	.352	2.475	.013*

## Discussion and conclusion

Against our hypothesis, the results of Exp. 1 show that object CVGs do not increase the choice of the object as the antecedent of p-pros in German. This is in line with previous findings that p-pros pick up the most salient antecedent, the subject. The results of Exp. 2 suggest that the preference of d-pros to pick up non-topical referents is not boosted when an object CVG is performed. Instead, somewhat surprisingly, the preference of d-pros to pick up a non-topical referent decreased when an object CVG was performed. Overall, the results do not corroborate our hypothesis that CVGs can influence the way that ambiguous pronouns are interpreted in German.

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