

Effects of agent position and orientation on perception and production

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Abstract

In a series of aesthetic judgement tasks, we found that speakers of German display a spatial agency bias if, and only if, a scene shows an agent performing an action in the direction of a patient. The experiments reported here replicate and extend previous findings, indicating that the position of the agent relative to the patient affects how speakers perceive a depicted event. Moreover, the experiments are the first to show that the orientation of the agent and patient (toward vs. away from other event character) is another modulating factor affecting scene perception as well as scene description.

Keywords: spatial agency bias, German, scene perception, language production

Introduction

A primary goal during language comprehension is to find out who did what to whom. Thus, it is not surprising that it is one of the most well-researched topics in experimental linguistics. For example, researchers have investigated for a range of languages which information sources listeners use to identify the agent. Interestingly, non-verbal tasks reveal that people draw on their linguistic knowledge (word order specifics) and reading/writing habits even when perceiving or envisaging an event in which an agent acts upon a patient (e.g., Esaulova et al., 2021; Suitner et al., 2021).

Only recently, two studies reported a spatial agency bias (SAB) for German speakers. Suitner et al. (2021) found that Germans preferentially drew a given action between two characters evolving from left to right, in accordance with the reading/writing direction of their script and the linearization of subject and object in a canonical active sentence. Using an aesthetic judgement task, Esaulova et al. (2021) showed that German speakers preferred scenes with left-positioned agents over scenes with right-positioned agents, unlike a group of Arabic speakers (right-to-left script, subject-before-object order), who displayed the reverse bias. Moreover, German speakers were slower to describe scenes with right-positioned agents than scenes with left-positioned agents. Thus, a violation of the SAB resulted in longer speech planning times. Taken together, for literate speakers of German the left position in an event scene is typically associated with the position of the agent, so the mental representation of the event (from left to right) is in alignment with a linguistically preferred structure (subject/agent-verb-object/patient).

Other visual factors, besides agent position, have been found to affect agent identification. In an experiment by Dobel et al. (2007), German speakers had to identify the actions, actants, and objects in a scene after brief exposure (100 to 300 milliseconds) and had to judge whether the scene was meaningful or not. Scenes either showed a transitive or ditransitive event. Correct identification of the agent was affected by the position of the agent in the scene, in line with the SAB reported for German, but also by scene coherence. Recognition of the agent was hindered if the scene was incoherent and showed no interaction between characters, who were both turned away from each other. In the current paper, we report on a series of aesthetic judgements tasks, which investigated how agent position (left vs. right) and orientation of agent and patient (toward vs. away from other event character) affected German speakers' perception of transitive event scenes. As an outlook, we discuss recent findings from a scene description task investigating both of these factors in one experiment.

Methodology

In four aesthetic judgement tasks, we presented adult speakers of German with two scenes that only differed in one characteristic, see Figure 1. For each contrast, they had to select one out of three response options: preference for (1) the left picture, (2) the right picture, or (3) no preference. Participants were instructed to judge which scene was more typical, natural, or better than the other. Thus, this task assessed speakers' visual preferences without requiring a motor activity or providing a verbal description that might bias participants' decision. The ordering of the scenes in each contrast, that is, which one was displayed left or right, varied.

In the first three experiments, we used the same scenes as Esaulova et al. (2021), whose data we reanalysed and henceforth refer to as Exp. 1. All scenes showed an action between two human characters. There were eight events in total. In Exp. 1 ($N = 36$), the position of the agent was manipulated, while agent and patient both looked in the same direction, that is, rightwards or leftwards. In Exp. 2 ($N = 22$), the position of the agent was manipulated, while agent and patient both faced each other. In Exp. 3 ($N = 22$), the agent was always displayed left, but the orientation of agent and patient was manipulated, so in one scene both agent and patient looked rightwards and in the other scene both were facing each other. In Exp. 4 ($N = 44$), four events were selected that most clearly depicted an activity that, however, was not directed towards another character (incoherent scenes). The four scenes appeared twice with different characters while the position of the agent was manipulated. All participants only participated in one of the experiments.

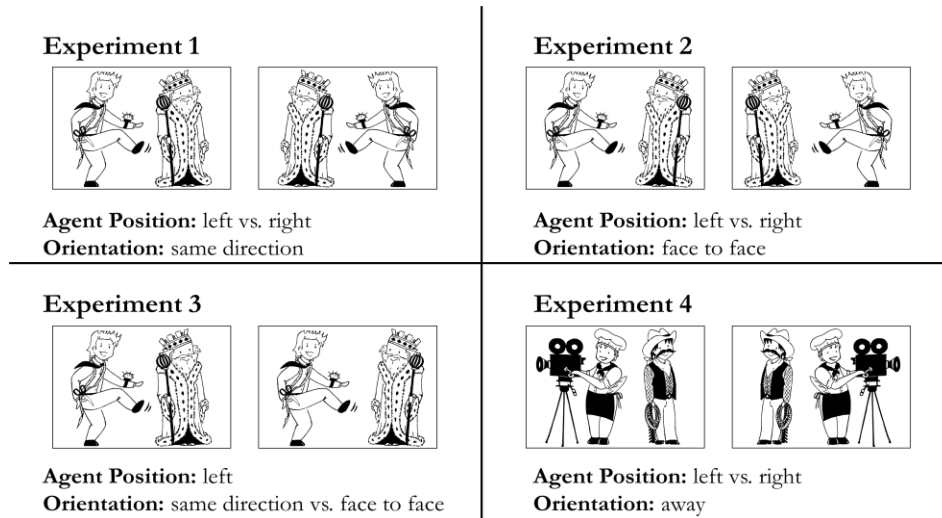


Figure 1. Experimental designs in the aesthetic judgement tasks.

Results

Figure 2 shows the proportion of selected responses per event in each of the four experiments. For statistical analyses, we coded speakers' selections as Agent Left response (Exp. 1, Exp. 2, Exp. 4) or not, or Agent facing Patient response (Exp. 3) or not. Generalized linear mixed effects models tested whether these responses were selected above chance. Chi-Square goodness of fit tests were used to assess speakers' preferences for single events.

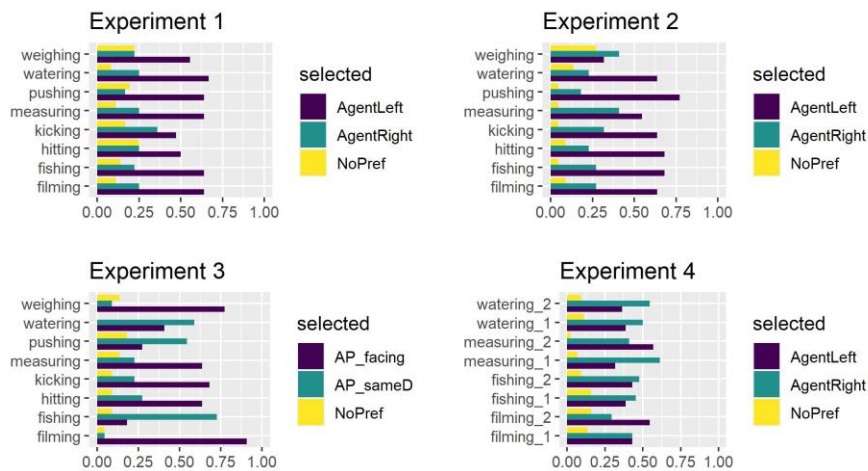


Figure 2. Bar charts showing the proportion of selected responses.

In Exp. 1 and Exp. 2, speakers were more likely to select the scene with a left-positioned agent (across experiments, Est. = 0.57, SE = 0.25, $z = 2.31$, $p = 0.02$) than the other two response options. No such preference was observed in Exp. 4. In Exp. 3, we observed a preference for face-to-face scenes for some (filming, hitting, kicking, measuring, weighing), but not all scenes.

Discussion

Consistent with previous findings, our results show that German speakers display a preference for left-positioned agents. Crucially however, we could demonstrate that the SAB only holds for scenes in which the agent performs an action in the direction of the patient. Incoherent scenes do not evoke the SAB. With respect to orientation, we observed an overall preference for scenes where agent and patient face each other. However, this preference seems to be more action specific, that is, for some events (e.g., filming), the scene with both characters facing each other appears to be more meaningful than for others (e.g., pushing). In a recent scene description task we conducted, we found that the orientation of agent and patient towards each other also affects speech-production latencies (Schlenter & Penke, in prep.). Face-to-face scenes required more time for sentence planning than scenes where agent and patient were oriented in the same direction. Moreover, speakers produced more passives for face-to-face scenes compared to same-orientation scenes. Both findings suggest that a patient that faces the agent is less prototypical and, hence, more prominent. To conclude, agent position and orientation in a scene can affect perception and how the scene is described. They should, hence, be taken into account when designing materials for psycholinguistic experiments.

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