Grounding of anaphora in pointing gestures: Order of mention and prominence

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Anaphor resolution involves linking an anaphoric expression to a referent residing in the mental representation of the current discourse. Following the mental models approach (Johnson-Laird, 1983), such a mental representation includes a spatial dimension such that discourse entities occupy a more or less specified spatial position in the respective model, possibly from left to right following the order of mention.

Konieczny et al. (2010) demonstrated that resolving a pronominal reference is grounded in a simulated pointing gesture to a discourse entity. In an experiment using the action sentence compatibility paradigm (Glenberg & Kaschak, 2002), participants had to judge the plausibility of sentences, using a keyboard that consisted of three buttons located in a line with a distance of about 15 cm between them. Participants had to keep the center button pressed to display sentences word by word. The stimuli consisted of a main clause with two full noun phrases and a following subordinate clause containing a pronoun. Half of the target sentences involved pronouns referring to the subject of the main clause; the remaining target sentences contained pronouns referring to the object. Plausibility was evaluated by pressing the left or right button, respectively (with button assignments reversed after half of the trials). As predicted, compatible responses were performed faster, implying that interpreting a pronoun which refers back to the subject (1) was faster when the sentence required pressing the left button, while interpreting a pronoun referring to the object (2) was faster for sentences requiring the participants to press the button on the right. Beyond the compatibility effect, a subject preference as it is generally found in German was established.

A problem with the German data is that linear order and prominence are fully confounded as the first mentioned referent usually is also the most prominent one. We can thus not know whether the left to right ordering of subject and object is due to order of mention or to prominence. This problem can be solved in investigating a language such as French where the most prominent referent in within sentence pronoun resolution is usually mentioned later in the sentence (Hemforth et al, 2010). We thus ran a French version of the experiment with a highly similar experimental set-up.

A linear mixed-effects model with participants and items as random factors showed a main effect for the fixed factor pointing compatibility. Numerically but not reliably, responses to object resolutions were faster. As in the German experiment, hand movements were faster when the forced response direction was compatible with the canonical location of the discourse referent in the mental virtual space (subject-left and object-right). These cross-linguistic data strongly confirm the grounding of pronoun resolution in pointing gestures with order of mention as a major factor for positioning referents in the virtual space.

Examples

(1) *The opera singer saw the scavenger, when she performed the difficult aria.*

(2) *The scavenger saw the opera singer, when she performed the difficult aria.*

References

