A NEW COMPUTATIONAL MODEL OF ALIGNMENT AND OVERSPECIFICATION IN REFERENCE

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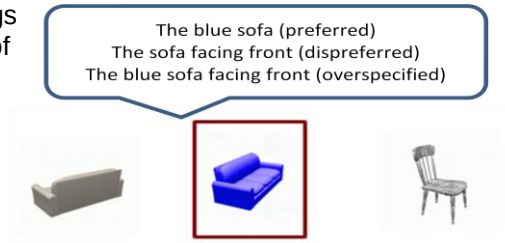
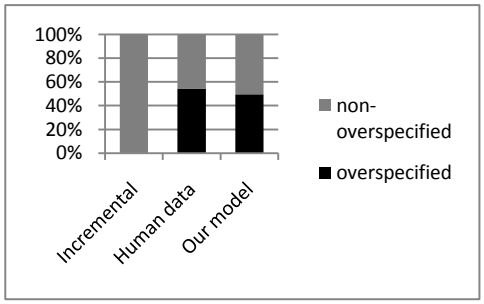
Models of reference production are influenced by findings that in visual domains, speakers tend to select attributes of a target referent based on their degree of *salience* or *preference*. Preferred attributes are often selected when they have no discriminatory value leading to *overspecification* (Pechmann, 1989; Belke & Meyer, 2002; Engelhardt, Bailey, & Ferreira, 2006).



Existing computational models – of which the Incremental Algorithm (IA; Dale & Reiter, 1995) is arguably the most popular – capture this by selecting properties of a target in order of preference (e.g. colour before orientation), stopping when the description is distinguishing. The IA only overspecifies if it selects a preferred property before a dispreferred one, when the dispreferred one alone would suffice. However, recent work suggests a complex interaction between alignment and preferences in interactive settings. Goudbeek and Krahmer (2010) showed that speakers who are primed with a dispreferred attribute are more likely to re-use it in later references to different targets. Crucially, these experiments showed evidence of overspecification even though the primes themselves were not overspecified. However, they raise the question whether overspecification is itself something that can be primed. Using a similar paradigm, we show that speakers primed with overspecified descriptions evince an increased likelihood to overspecify, using both preferred and dispreferred attributes, even when either one would suffice. We model this computationally as a process of competition between a preference-based selection process and a priming-based one acting in parallel.

In our experiment, participants were primed with overspecified descriptions containing both a preferred and a dispreferred attribute and then were asked to refer to a different object which could be identified using either attribute alone. As shown in the adjacent figure, participants overspecified over 50% of the time, using both the preferred and dispreferred attribute. Note that the Incremental Algorithm would predict 0% overspecification, since it would always choose the preferred attribute first, and then stop on finding the description to be distinguishing.



To account for the human data, we propose a model consisting of an incremental, preference-based search process based on the IA, which selects properties concurrently and in competition with a priming-based process, both contributing properties to a limited capacity working memory buffer. Priming is modelled through a process of spreading activation, whereby an attribute which has been used in a description activates all other properties which share the same attribute (e.g. all values of orientation or colour). A description is built by taking properties from working memory, and overspecification occurs when both concurrent processes add properties to the buffer, though only a subset would suffice to identify the target. As shown in the figure, our model's rate of overspecification is much closer to the human data; indeed, we find no significant difference in percentage overspecification between the model and the human data, though both differ significantly from the baseline Incremental Algorithm, which never predicts overspecification in these experimental contexts.

References

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