Bayesian inference in dialogue

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Abstract

A word is referentially ambiguous if it has several potential referents. Observing how listeners make choices among those referents can reveal their hidden beliefs and preferences, as well as reflect their reasoning strategies. We asked subjects to observe how one of the objects is chosen following a possibly ambiguous utterance and to infer which preferences the listener may have had in mind when choosing that particular object. In order to adjust this interaction to a dialogue-like setting, we extended the traditional one-shot reference game to a round of 4-trial games. Moreover, we modeled the process within the Rational Speech Act framework, implementing iterative inference over multiple trials, where posteriors from previous trials carry over to the next trial as priors. The model predicts human inference behavior better than a baseline uniform model, as well as better than a non-iterative model. The results imply that, in principle, humans are able to compute Bayesian-like inferences in dialogue, learning about the beliefs and preferences of others in a cumulative manner.