

The limits of fast and frugal heuristics in evolving a language de novo

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Humans have a remarkable capacity for communicating even in situations where they cannot use any pre-established language. The skill to quickly evolve a language de novo is well reported within the field of experimental semiotics [4]. Arguably, one of the reasons that humans can do this so successfully is their ability to tune their communicative behaviors to addressees, a phenomenon also known as recipient design [9]. It remains unclear, however, how this tuning of communicative behavior is implemented during live human interactions.

We investigate the explanatory sufficiency of two proposed mechanisms: perspective taking and heuristics. According to the first account, a communicator selects her behavior based on hypotheses she forms about beliefs and knowledge of the recipient, i.e. the communicator takes the perspective of the addressee [6, 7, 8]. Several researchers have argued against this account, because it seems to be computationally too costly to be a plausible account of recipient design in every day human communication [3, 10, 5]. These researchers propose an alternative mechanism that posits that recipient design is achieved by using fast and frugal heuristics. In other words, according to this account, a communicator adapts her communicative behavior by using simple, computationally cheap rules with no consideration for her addressees beliefs and knowledge.

Because recipient design seems to be an integral part of the human ability to evolve a new language, it is important to know whether or not the simpler of the two mechanisms is sufficient to explain how recipient design is implemented. To test this hypothesis we studied communicators behaviors in the context of a non-verbal communicative task (the Tacit Communication Game, TCG, see [2]). We found that the specificity of the observed trial-by-trial adjustments made by communicators is parsimoniously explained by perspective taking, but not by simple heuristics [1]. From this finding we can conclude two things. Firstly, our findings suggest that the human ability to evolve a language is based on sophisticated reasoning mechanisms that are used to form hypotheses about beliefs and knowledge of the addressee. Secondly, humans appear to have a computationally efficient way for implementing such a perspective taking mechanism after all.

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