

A model of cultural co-evolution of language and mindreading

Marieke Woensdregt

University of Edinburgh, Edinburgh, United Kingdom

Simon Kirby

University of Edinburgh

Chris Cummins

University of Edinburgh

Kenny Smith

University of Edinburgh

Abstract: Language requires mindreading for entertaining communicative intentions, and mindreading in turn profits from language as a means for sharing mental states. Hence it has been hypothesised that the two skills have co-evolved.

We present a Bayesian agent-based model to formalise this hypothesis. This model combines referential signalling with mental states, such that a speaker's topic choice is probabilistically dependent on their perspective on the world. In order to learn the language, a learner has to simultaneously infer the speaker's lexicon and perspective. Learners can solve this task by bootstrapping one with the other, but only if the speaker uses an informative language.

We will present results of an iterated learning version of this model, showing that selection on communication results in the emergence of a fully informative lexicon from scratch. However, selection on perspective-taking alone also results in the emergence of partially-informative lexicons, which is sufficient for inferring others' perspectives.