On emergence of sign systems and language: a view from AI laboratory

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The topic of the origins and evolution of language draws attention of a number of researchers (e.g. Deacon 1997; Tomasello 2008). In particular it is claimed (e.g. Zlatev 2001) that the emergence of language (as a symbolic meaning system) is build upon some preceding stages. Facing lack of direct natural data evolutionary linguists have to base on some indirect evidence, e.g the emergence of sign languages in Nicaragua (Scott-Philips, Kirby 2010).

I will argue that AI may contribute to this problem (and suport selected claims) by the development of communities ("hordes") of grounded robotic agents communicating and interacting with their environment. The author of the abstract participates in such a research program.

Researchers developing communities of robots face two basic difficulties:

* to identify (and implement) cognitive capacities necessary for the emergence of sign systems and language,

* to stimulate the processes responsible for emergence of meaning systems, in particular of language.

I would like to present key elements taken into account in construction of models of language emergence and evolution using communities of robots.

I will argue that such modeling requires not only the construction of hordes of agents-robots, but also subsequent "generations" of the agents - by evolutionary and adaptive techniques. Such an approach enables taking into account changes in the environment in which agents are embedded and subsequent changes in their communication system(s).

It seems, that the crucial question here is how grounded robots recognize that certain behaviors are communicative. Ability to distinguish potentially meaningful behaviors gives rise to emergence of pre-linguistic stages of communication. Robots interpret and use iconic and indexical signs in their interactions. The third - symbolic - stage, with language as a mean of communication, should be achived as an effect of the course of evolution (Steels 2011). Once the level is achieved, one needs to explain the processes responsible for spreading of (new) language conventions in a population of grounded agents. Processes taking place in the group of robots should help us to understand how the social dimension emerges.

I will argue that the research leads to identification of factors influencing the process of language evolution like the constrains provided by the "body" of a robot or by external environment (so-called cognitive niches).

Finally, I will justify the relevance of the outcomes of sketched above experiments on populations of robots for studies on language emergence and evolution in human societies.

References:
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