

Why language acquisition and intrinsic motivation should go hand in hand

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Abstract

Language acquisition and intrinsic motivation are two topics which have mainly been studied separately both in developmental robotics and psychology. In this talk, I will show that they should in fact be studied together, especially if one wants to build developmental robots that may learn language in real complex environments. I will begin by outlining the big challenges of language acquisition in human and robots, especially those related to the acquisition of meaning. In this context, I will explain that many essential meanings learnt at the onset of language are rooted in sensorimotor representations, and affordances in particular. Thus, learning linguistic meanings implies the ability to learn motor affordances. While social learning mechanisms are essential in this process, I will explain why they are not sufficient in real complex sensorimotor spaces in which it is essential that the robot/human infant learns affordances by self-experimentation. Besides, self-experimentation through motor babbling can only be efficient if exploration is guided and organized, which is one of the main functions of intrinsic motivation. I will illustrate this point by describing several experiments in which a robot learns efficiently low-level motor skills and affordances driven by a computational model of intrinsic motivation used as an active learning heuristics. Furthermore, I will argue that intrinsic motivation conceptualized as active learning can also be essential to allow true interactive social language learning, where it allows both the teacher and the learner to control the growth of complexity in linguistic interactions. I will conclude by outlining a number of challenges implied by this joint study of language and intrinsic motivation.

Short bio

Since January 2008, Pierre-Yves Oudeyer is a research scientist in INRIA Bordeaux - Sud-Ouest, heading the FLOWERS team, in developmental and social robotics. Before that, he was a permanent researcher in Sony Computer Science Lab in Paris for 8 years (2000-2007). He studied computer science at Ecole Normale Supérieure de Lyon, and obtained his PhD in artificial intelligence from University Paris VI. He is interested in the mechanisms that allow humans and robots to develop perceptual, motivational, behavioral and social capabilities to become capable of sharing cultural representations and of natural embodied interaction.

Pierre-Yves Oudeyer's recent work in developmental and social robotics focuses on sensorimotor development: how can we build robots that can learn a variety of novel reusable skills in initially unknown environments, either by themselves or through interaction with social peers? In this research, concepts from developmental psychology are imported, formalized and implemented in robots. In particular, he is developing systems capable of intrinsically motivated exploration and learning, aka artificial curiosity, as well as biologically inspired methods of human-robot interaction.

In previous years, he also used robots to study how new linguistic conventions can be established in a society of individuals, as well as the mechanisms of language acquisition. This had a double objective: 1) contributing to the understanding of the acquisition and evolution of language(s), 2) developing new technological approaches for building intelligent sociable robots.