

Ethorobotics as an emerging discipline for building better social agents

Miklósi Ádám, Eötvös Loránd University, Budapest

Ethology is the biological study of animal behaviour, including humans. In recent years, social robotics aims to build autonomous agents that co-habit with humans in various social groups at the work place, hospitals or homes for elderly. Thus it is time to establish a new interdisciplinary approach that relies on more than 100 years of biological knowledge on animal behaviour and facilitates the construction of hardware and software for social robots.

Thus ethorobotics is defined as the science of applying animal social behavioural rules for the design of social robots interacting with living beings (animals or humans). This means that ethorobotics has strong roots in biology, looking at the function of the behaviour and considers often the embodiment (shape and form) rather as a consequence of achieving the best performance under given conditions. The key example for ethorobotics is the family dog that has a long history of domestication, and proved to be very successful in human communities during the last 20-30 thousand years, despite being rather different in shape and also in behavioural and cognitive performance in comparison to humans.

After studying human-dog interaction for many years, we came to the conclusion that this relationship could provide a very good initial model for human-robot interaction. We consider the dog to be man's first 'biorobot'. Thus we suggest that social robots of the future should be by no means similar to man but represent a "new species".

We aim to present evidence how ethorobotics could promote building better social robots. Based on the detailed study of the behavioural aspects of human-dog relationship, we can make proposals for the behavioural capacities of social robots. These would include social skills, like attachment, faithfulness, emotional responsiveness, social monitoring.

Biography

Adam Miklósi is a full professor and the leader of the Department of Ethology at the Eötvös University in Budapest (Hungary). He is also the co-founder and leader of the *Family Dog Project* (<http://familydogproject.elte.hu>) which aims to study human-dog interaction from an ethological perspective. Due to the process of domestication, dogs evolved a unique relationship with humans because they had gained skills which allow specific behavioral adjustments in the human social environment. Miklósi and his collaborators showed that dogs develop specific attachment relationship with their owners, dogs are able to communicate with humans using a range of fine-tuned visual and acoustic signals, and dogs are also able to learn via observation and utilize such knowledge for their own benefit. In recent years he became interested also in the automatization of measuring dog behavior and his research group is looking at ways to study the neural and genetic aspects of dog behavior using non-invasive methods like fMRI and EEG. As a member of the "*Living with Robots and Interactive Companions*" (2008-2012) consortium he became interested in the design of social robots with specific functions. He is a main advocate of ethorobotics that aims to use ethological concepts in the planning and design of interactive, social robots. At present, he studies also dog-robot interaction which offers a new method to understand the functioning of dogs' minds.

Over more than twenty years *The Family Dog Project* published more than 150 scientific papers, and organized several conferences. In 2008 researchers and experts gathered for the first time in Budapest, and started the conferences series of Canine Science Forum (<http://csf2008.elte.hu>) to share their results and insights on dogs and their relationship with humans.

In 2014 he published the second edition of an academic volume entitled *Dog Behavior, Evolution and Cognition* by Oxford University Press that summarizes the most recent status on dog oriented research.