Artificial Empathy:
An Interdisciplinary Investigation

IJSR special issue

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Summary. One central issue of Social Robotics research is the question of the affective (emotional) involvement of users. The problem of creating a robot able to establish and to participate competently in dynamic affective exchanges with human partners has been recognized as fundamental, especially for the success of projects involving Assistive or Educational Robotics. This locates Social Robotics at the crossroad of many interconnected issues related to various disciplines, such as Epistemology, Cognitive Science, Sociology and Ethics.

Among these issues are, for example, the epistemological and theoretical problems of defining how emotions could be represented in a robot and under which conditions robots could be able to participate competently in emotional and empathic dynamics with human beings. Can robots experience emotions, or only express them? If we identify robotic 'emotions' as 'pure simulations', to which no actual experience corresponds, are there conditions in which we can consider robots as partners in emotional and empathic relations?

On the one hand these questions are related to basic scientific research, to which Robotics can contribute through operational models and experimentation carried out with the help of social robots. On the other hand these questions are inseparable from the technical issue of an efficient implementation of theoretical models in the diverse social environments in which robots are interact with humans. Which are the current technically feasible models? Which are the results of their implementation?

The issue of application raises also problems connected to the social and ethical dimension of Robotics. What are the implications of introducing robots with affective competence into our social world(s)? To what extent and in what way will supportive relations be improved if robots gain affective competences? Does handing over aspects of social care to robots mean abandoning vulnerable individuals (such as elderly persons, children, or people with disabilities) to inauthentic affective relations?

These issues lead back to epistemological and theoretical questions. Under which conditions can affective and empathic relations with robots be considered authentic?

This special session issue aims at offering an interdisciplinary context in which the different dimensions of Artificial Empathy can be explored and connected. Our goal is to stimulate the interaction between applied research and theoretical and epistemological reflections, and to promote a front line in Social Robotics research that takes all its aspects (epistemological, theoretical, technical, social and ethical) into consideration, without losing sight of its fundamental question: Under which conditions can a robot become a social partner for humans?

1. GENERAL INFORMATION

Special Issue proposed title
Artificial Empathy: models, applications, social, ethical and theoretical implications

Guest Editors

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2. SPECIAL ISSUE OVERVIEW

2.1 Special issue main topics

The special session intends to bring together articles investigating one or more aspects of Artificial Empathy in Social Robotics, Human Robot Interaction (HRI) and/or related fields. The special issue will deal with a variety of questions, related to theoretical, epistemological, applicative, social, and ethical aspects of Artificial Empathy. Some of the basic questions are the following.

- What is the relevance of the emotional and empathic dimension in HRI within the context of Social Robotics?

- What are emotions and empathy for a robot? Which conditions are required in order for a robot to be able to participate competently in emotional and empathic dynamics with human beings?
- What theoretical models of emotions and empathy can be successfully applied in the context of Social Robotics (e.g. in Assistive Robotics, in Educational Robotics, etc.)?
- What features of robotic embodiment can facilitate robots in participating competently in emotional and empathic dynamics with human beings?
- In order to be effective, does the affective interaction between robots and humans have to imitate human affective interaction, or should it develop its own specificities?
- Under which conditions can the creation of robots with affective competence positively contribute to the scientific study of human affective development and interactive dynamics?
- What are the implications of introducing robots with affective competence into our social environment(s)?
- How can/should we think about the (co-)evolution of human and robotic emotional systems in possible mixed (i.e. human and robotic) future social ecologies?
- Does handing over aspects of social care to robots mean abandoning vulnerable individuals (elderly persons, children, persons with special needs…) to inauthentic affective relations?
- Under which conditions can affective and empathic relations with robots be considered authentic?

2.2 Paper requirements

We will ask for both position papers proposing specific methodologies or approaches, and papers describing empirical or theoretical original research. The idea is that of publishing papers from the special session on Artificial Empathy that we organized at ICSR 2012, as well as papers selected through a call for papers and a related peer reviewing process. In particular, we will be looking for papers focusing on:
-models of emotional and empathic HRI, and their applications in concrete robotic architectures and HRI scenarios;
-paradigms of emotional and empathic HRI;
-the investigation of one or more aspects of Artificial Empathy through concrete case studies.

3. EDITORS OF THE SPECIAL ISSUE

3.1 Luisa Damiano

Dr. Luisa Damiano (PhD in Epistemology of Complex Systems, with specialization in Epistemology of Cognitive Sciences) is a post-doctoral research fellow in Epistemology at the University of Bergamo (Italy), where she recently established, together with Prof. Gianluca Bocchi, the Epistemology of the Sciences of the Artificial Research Group (ESARG). She is currently working in two projects: (1) the Epistemology of the Artificial Project, dedicated to the study and development of the epistemological groundings of the synthetic (hardware, software, and wetware) modelling of life and cognition; (2) the Artificial Empathy Project, dedicated to the epistemological exploration of how the notion of empathy is conceptualized and made operational within the contexts of Cognitive, Developmental and Social Robotics. She is writing, together with Prof. Paul Dumouchel, a book entitled *Artificial Empathy*, which will be published by The Michigan State University Press (under contract).
Her current research work is grounded on her doctoral research, dedicated to the models of living and cognitive systems developed by the Embodied and the Enactive Cognitive Science. She published several articles and a book (Damiano L., *Unità in dialogo*, Mondadori, Milano 2009) on these topics.
Dr. Damiano chaired the workshop on *Embodiment* at Epirob09, co-organised and co-chaired the two editions of the workshop *The Mechanization of Empathy in Health-care (*Ristumeikan University, Kyoto, Japan, 2008; University of Bergamo, Bergamo, Italy, 2010*),* co-organized and co-chaired the *International Workshop on the Synthetic Modeling of Life and Cognition: Epistemological, Social and Ethical Issues* (Ritsumeikan University, Kyoto, Japan, 2012), co-organized and chaired the *Special Session on Artificial Empathy* at ICSR 2012.

3.2 Paul Dumouchel

Paul Dumouchel is Professor in the *Graduate School of Core Ethics and Frontier Sciences* (Ritsumeikan University, Kyoto) where he teaches political philosophy as well as philosophy of sciences. His main fields of research are philosohy of social and biological sciences, as well as political philosophy. He is the author of *Emotions* (Paris : Les empécheurs de penser en rond) and with Jean-Pierre Dupuy *L'Enfer des choses, René Girard et la logique de l'économie* (Paris, Seuil). He has published many articles on emotions as an object of research in both social and biological sciences, on violence, war and terrorism as well as in the history of philosophy. He is co-editor with R. Gotoh of *Against* Injustice (Cambridge University Press, 2009) and his latest book is *Le Sacrifice Inutile essai sur la violence* politique (Flammarion, 2011). Together with Dr. Luisa Damiano, they are writing the book *Artificial Empathy*, The Michigan State University Press (under contract). He co-organized and co-chaired the Special Session on *Artificial Empathy* at ICSR 2012.

3.3 Hagen Lehmann

Dr. Hagen Lehmann is a post-doctoral research fellow in the School of Computer Science & STCA at the University of Hertfordshire (United Kingdom), in the Adaptive Systems Research Group. He was involved in the iTALK project and works currently in the AURORA and the LIREC projects. Within the LIREC project he works on the development of a therapeutic robot to help children with autism to enhance their social skills and their ability to express emotions within triadic interactions between the child, the therapist and the robot.
Within the iTALK project he worked on the use of mutual gaze in human conversational pairs to inform the development of robot gaze controllers and on childlike language acquisition through the interaction between humans and the iCUB robot.

The AURORA project aims at the development of social robots as home companions for elderly persons. The assessment of the emotional needs of the elderly persons interacting with these robots is a central issue of this research.
Dr. Lehmann received his M.S. in Psychology from the Technical University Dresden and his Ph.D. in Computer Science from the University of Bath. He worked in different interdisciplinary research fields, examining possible reasons for the evolution of social structure in non-human primates and the role of social dominance in this process. While studying at the Max-Planck Institute for Evolutionary Anthropology in Leipzig, he worked with different primate species and human infants. The topic of this research was social gaze behaviour and its role in human social evolution.
He co-organized the ICDL-EpiRob special session *Social Gaze: From Human-Human to Human-Robot Interaction* in 2011, the workshop *Gaze in HRI: From Modelling to Communication* at HRI, Boston 2012, and the special session on *Artificial Empathy* at ICSR 2012.