

CDS NEWSLETTER

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Editorial

Explaining and Communicating About Developmental Systems: How To Change Representations



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Human infants have an extraordinary capability to discover new ways of representing and manipulating knowledge, and a key dimension of development is the progressive transformation of sensorimotor and cognitive representations. Such adaptation of representations provides high flexibility and creativity to humans, and for this reason researchers have also tried to study how analogous mechanisms could be implemented in developing robots. However, how these mechanisms are working in humans, and what are the possible approaches to implement them in machines, are still largely open questions.

This issue's dialog, initiated by Stéphane Doncieux, explores various challenges of how and why representational redescription capabilities (reusing the terms of Annette Karmiloff-Smith) could be happening in robots, with contributions from Jessica Kosie and Dare Baldwin, Georges Konidaris, Freek Stulp and Timothy Hospedales, Paul Verschure and Giovanni Pezzulo, Frank Guerin, Paul Abelha and Bipin Indurkha. In particular, they discuss how new representations can be formed out of the dynamic interaction between learning algorithms, cognitive architecture and their physical and social embodiment. The dialog highlights the need for a multiplicity of processes, happening at different time scales and levels of abstraction, ranging from fast opaque low-level sensorimotor learning to slow, more transparent rule-based learning.

This dialog illustrates, as previous dialogs in this newsletter, a major finding of modern development sciences: the biology and behavior of cognitive minds cannot be conceptualized through the reductionist nature/nurture lens anymore, but should rather be

studied as the result of the history of dynamical interaction between biological, cognitive and social structures in particular contexts. Body features such as the shape of the legs, or skills such as running or writings cannot be reduced to certain genes or certain neurons, but their origins depend on the full context which drives their activation and connection with other processes.

This is challenging many representations of human biology and cognition that science has been building in the 20th century, and in particular the representations organized around "innate" and "acquired" that are now popular in the general public. In the new dialog proposed in this newsletter, John Spencer, Mark Blumberg and David Shenk observe that in spite of numerous scientific discoveries supporting the view of development as a complex multi-factored process, the discussions of development in several scientific fields and in the general public are still strongly organized around the nature/nurture distinction. Thus, they ask a crucial question: is this because there is not yet sufficient scientific evidence, or is this because the simplicity of the nature/nurture framework is much easier to communicate (or just better communicated by its supporters)? Those of you interested in reacting to this dialog initiation are welcome to submit a response by April 15th, 2015. The length of each response must be between 600 and 800 words including references (contact pierre-yves.oudeyer@inria.fr).

CDS TC Community News

As announced in the previous issue, the name of the newsletter, as well as the name of the technical committee and of the companion

IEEE CIS journal, have changed. They are now respectively the [IEEE CIS Newsletter](#), [TC](#) and [Transactions](#) on “Cognitive and Developmental Systems” (CDS). This evolution in the name reflects the goal of contextualizing the study and modeling of developmental systems, which remain a central topic, with related interdisciplinary issues on cognitive systems, evolutionary-developmental processes, and the processes that give rise to structure at different scales ranging from body and brain growth to the formation of social structures in groups of interacting individuals.

In this context, I would like to address a warm thank to Angelo Cangelosi who has achieved, as editor-in-chief of the *Transactions on AMD/CDS*, an outstanding job in providing a new dynamics to the journal, working on the consolidation of the community and soliciting several special issues who have already been published or are forthcoming. In 2016, the new editor of the *IEEE CIS TCDS* journal will be Yaochu Jin, who will continue the work to

gather a growing interdisciplinary community around the study of the mechanisms of development and cognition in natural and artificial systems.

One particularly stimulating yearly event where many gather to share their advances in these areas is the [IEEE ICDL-Epirob conference](#), which will happen this year in Cergy-Pontoise/Paris, on 19th-22th September. The general chairs are Philippe Gaussier and Minoru Asada, and the program chairs are Verena Hafner and Alexandre Pitti. The conference will feature invited talks by Karl Friston, Julie Grezes and Tamim Asfour. The deadline for paper submission is 1st April. I would like to bring special attention to the Babybot Challenge organized for the second time at the conference, and implementing a competition of computational models addressing the findings of selected infant studies. The deadline is the 15th of June, and more information can be found at: <http://www.icdl-epirob.org>

Links

Previous open-access editions of the newsletter can be found at: <http://icdl-epirob.org/cdsnl>
Web site of the IEEE TC on Cognitive and Developmental Systems: <http://icdl-epirob.org/amdtc>
IEEE ICDL-Epirob conference: <http://www.icdl-epirob.org>

Table of Contents

Editorial

Pierre-Yves Oudeyer Explaining and Communicating About Developmental Systems: How To Change Representations	1
---	---

Dialogue

Stéphane Doncieux Representational Redescription: the Next Challenge?	4
Jessica E. Kosie and Dare Baldwin Flexibility Is Key in Representational Redescription	5
George Konidakis What Are Representations For?	7
Freek Stulp and Timothy Hospedales Dual-Process Representational Redescriptions	8
Paul Verschure and Giovanni Pezzulo Embodied Knowledge Acquisition: Examples From the Distributed Adaptive Control Architecture	9
Frank Guerin, Paulo Abelha and Bipin Indurkha Analogy May Be the Key	10
Stéphane Doncieux Summary and Reply	11

New Dialogue Initiation

John P. Spencer, Mark Blumberg, David Shenk Moving Beyond Nature-Nurture: a Problem of Science or Communication?	13
--	----

IEEE TAMD Table of Contents

Volume 7, Issue 3, September 2015	15
Volume 7, Issue 4, December 2015	18