



illustrations Shun Iwasawa

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## The Robotics and the Living *Concepts and Design of Intelligent Systems, Contribution of Enaction, Cybernetics and Complex Systems*

Book launch "*la Révolution de l'Intelligence du Corps*"

Université de Cergy-Pontoise, Monday December, the 9th

**laboratoire ETIS**, University of Cergy-Pontoise - UMR CNRS 8051 ENSEA

*"The organization, the organized thing, the action to organize, and the result are inseparable".*

Paul Valéry

### Abstract:

Intelligent systems require a body to interact with the environment depending on the context. This apparently simple proposal has strong implications for the understanding of living organisms in their complexity, but also for anyone who wants to design robots closer to living organisms in the way they operate.

In biology, sensory and motor information is integrated with both the morphology of the sensors and the physiology of the musculo-skeletal system, this integration is called "Simplexity" by Alain Berthoz. Simplexity also corresponds to the idea of reentry that perception is based on the act, rather than the action.

In robotics and AI, the idea that the physical structure (physical) and the function that underlies it (the computational processes) are connected is formulated by Rolf Pfeifer with the concept of "morphological computation". Recent developments in new materials, sensors and actuators closest to human tissue, human sensory receptors and to human physiology will make possible a new bio-inspired robotics.

In cognitive sciences, Kevin O'Regan suggest that it is the sensorimotor contingencies and our action in the world that can permit us to perceive things through our body. The incarnation of perceptual activity means, at the same time, the structure and form of the living body plays a key role in the dynamics of interpersonal interaction. For Charles Lenay, our consideration of the body of others (the body image that everyone gives to the perception of its partners) can propose ways of original explanation of the recognition of others or of imitative expressions.

The counterpart of this research is the work of Nicolas Rougier in computational neuroscience, studying in particular the interaction between the brain, body and environment and offers an epistemological break in the concept model. Similarly, Philippe Gaussier offers computational neuroscience models for social and developmental robotics, or how neuronal dynamics and behaviors emerge from interaction of the robot in its physical and social environment.

Around the themes presented in "The Simplexity" Alain Berthoz (2009, Odile Jacob), "Why Red Does Not Sound Like a Bell" Kevin O'Regan (2011, Oxford UP), "Darwin" Charles Lenay (1999, Belles Lettres), "La Revolution de l'Intelligence du Corps" of Rolf Pfeifer and Alex Pitti (2012, Manuella Editions) and "Morphogenetic Engineering" Rene Doursat et al. (2012, Springer), this meeting will attempt to bring together ideas from biology, biologically-inspired robotics, cognitive sciences, and the approach of complex systems with multi-agent systems and computational neuroscience.

## Invited Talks:

- Alain Berthoz, Professeur Emerite, Collège de France, membre de l'Académie des Sciences et de l'Académie des Technologies, Paris.
- René Doursat, Researcher and former Director of l'Institut des Sciences Complexes, Paris Ile-de-France.
- Philippe Gaussier, Professor and Director of neurocybernetics team, lab. ETIS, University of Cergy-Pontoise - UMR CNRS 8051 ENSEA
- Charles Lenay, former Director of COSTECH unit, Université de Technologie de Compiègne
- Kevin O'Regan, Researcher and past director of LPP, Université Paris Descartes, Paris.
- Rolf Pfeifer, Professor and Director of the AILab ETH, Zurich.
- Nicolas Rougier, Researcher INRIA, Inst. des maladies neurodégénératives, Université Victor Segalen, CNRS

### Where:

Université de Cergy-Pontoise, Site Saint-Martin

### When:

Monday December, the 9th

### Tentative Program:

soon! This conference will be podcasted on internet.

09.00 - 09.20: welcome: Alex Pitti & Manuella Vaney

09.20 - 10.10: Talk 1: Nicolas Rougier - "How embodiment redefines the limits of the model and the role of the observer"

10.10 - 11.00: Talk 2: Charles Lenay - "Engagement corporel pour les interactions sociales : approche minimaliste"

11.00 - 11.20: coffee & tea break

11.20 - 12.10: Talk 3: Rolf Pfeifer - "Soft robotics" - the next generation of intelligent machines

12.10 - 13.00: Talk 4: Alain Berthoz - Sensory-Motor Coordination, Simplicity

13.00 - 14.30: lunch

14.30 - 15.20: Talk 5: Kevin O'Regan - "Making robots that really feel"

15.20 - 16.10: Talk 6: René Doursat - Evolution, development, and multi-agent systems (chemistry)

16.10 - 16.30: coffee & tea break

16.30 - 17.20: Talk 7: Philippe Gaussier - Neuro-robotics

Where where where: [more info in this page](#)

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### Organized by:

Laboratoire ETIS - UMR CNRS 8051 - UCP - ENSEA

Chair of Excellence CNRS-UCP (Alexandre Pitti), ANR NeuRobot

