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THE SYMPOSIUM:
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**Embodied Cognition: Constructivist and Computationalist Perspectives**

Schedule Thursday, June 16th 3:30-7:00.

3:30-3:35    Introduction
3:35-4:00    Ron Chrisley: The Embodied Nature of Computation
4:00-4:25    Peter Boltuc: Psychomotoric embodiment
4:25-4:50    Marcin Schröder: Embodiment of Cognition and Ontological Status of Information
4:50-5:15    Marcin Milkowski: Situatedness and embodiment of computational systems
5:15-5:40    Oron Shagrir: In a defense of a semantic view of computation
5:40-6:40    Panel Discussion

**Posters**

*Predictive Regulation in Affective and Adaptive Behaviour: An Allostatic-Cybernetics Perspective*  
http://www.idt.mdh.se/~gdc/work/PredictiveAdaptiveBehaviorAllostatic-20160613-IACAP.pdf

*Embodied Cognition: Computationalist Perspectives*  
Pictures from the symposium – lectures and discussion
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ABOUT THE SYMPOSIUM

The term cognition is a controversial one when considered in terms of its constitution and function. On the one hand, it has been construed as a type of computation consisting of syntactical manipulations of symbolic representations. At the opposite extreme cognition is considered to be continuous with life; its constitution being constantly re-established by autopoietic self-organization fundamental to all living systems (cf. Maturana and Varela 1980, Stewart 1996, Thompson 2007, Froese and Ziemke 2009). Many perspectives, however, reside somewhere between these extremes – advocates of constructivist (including enactivist) approaches are not universal in their eschewing of representational language (cf. Chrisley and Ziemke 2003, Seth 2013, 2015, Clark 1997, 2016), and computationalists are not only those who construe cognition as “language of thought” or even human language processing.

An aspect of cognition central to the above divide is Embodiment. Embodied cognition holds that cognition is grounded in environmental interactions in the world (e.g. Wilson 2002) and is invisible in classical symbolic representation accounts of cognitive function, which is modeled on human “thinking” or “mentality”. However, modern computational perspectives on cognition such as natural computation (including info-computationalism) account for embodiment whereby cognitive processes are considered to emerge from interactions in the world (cf. Scheutz 2002, Chrisley 2009, Dodig-Crnkovic and Müller 2009, Milkowski, 2013, Dodig-Crnkovic 2014, Schroeder and Vallverdú, 2015).

In this symposium, we wish to encourage frank debate about the perceived differences in the various perspectives on constructivist and computationalist accounts of cognition, and specifically embodied cognition. This will be fostered by the balanced representation of speakers and panel discussants that represent (often diametrically) opposing perspectives in the area. This debate concerns the Cognitive Science, Computation & Cognition theme of the IACAP annual meeting and provides critical arguments concerning the controversies regarding the nature of cognition. Could it be that different approaches focus on different aspects of cognition? Thinking in early computationalism vs. generative and evolutionary mechanisms in embodied cognition? Is it possible to reconcile constructivism with computationalism in a new synthesis? What is the role of emotions in computational approaches? What is the role of higher cognitive functions in embodied approaches?
References


ABSTRACTS

Ron Chrisley: The Embodied Nature of Computation

Abstract

Although embodiment-based critiques of computation’s role in explaining mind have at times been overstated, there are important lessons from embodiment which computationalists would do well to learn. For example, orthodox schemes for individuating computations are individualist, atemporal, and anti-semantic (formal), but considering the role of the body in cognition suggests by analogy that — even to explain extant information processing systems unrelated to cognitive science and artificial intelligence contexts — computations should instead be characterised in terms that are world-involving, dynamical and intentional/meaningful. Further, the counterfactual-involving nature of computational state individuation implies that sameness of computation is not in general preserved when one substitutes a non-living computational component with a living, autonomous, free organism that merely intends to realise the same functional profile as component being replaced. Thus, contra computational orthodoxy, there is no sharp divide between the computational facts and what is usually thought of as the implementational facts, even for unambiguously computational systems. The implications of this point for some famous disputes concerning group minds, and strong AI, will be identified.

Ron Chrisley is a Reader in Philosophy (Informatics, Sackler Centre for Consciousness Science, Centre for Cognitive Science, Evolutionary and Adaptive Systems Research Group) at the University of Sussex. Ron Chrisley was the first recipient of the Bachelors of Science in Symbolic Systems from Stanford University, which he received with honours and distinction in 1987. He began his academic career as an AI programmer and research assistant at Stanford’s Psychology Department, Stanford’s Knowledge Systems Laboratory, NASA, and Xerox PARC. He also conducted research on neural networks for speech recognition as a Fulbright Scholar at the Helsinki University of Technology in Finland, and at ATR Laboratories in Japan. In 1997 he received a DPhil in Philosophy from the University of Oxford. In 1992 he took up a lectureship in Philosophy in the School of Cognitive and Computing Sciences at the University of Sussex. From 2001-2003 he was a Leverhulme Research Fellow in Artificial Intelligence at the School of Computer Science at the University of Birmingham. Since 2003 he has been the director of the Centre for Research in Cognitive Science (COGS) at the University of Sussex.
Piotr Bołtuć: Psychomotoric embodiment

Biologically inspired view on cognitive architectures allows us to deflate the gap between information and ontological reality, between computation and implementation, and, at the limit, between software and hardware. The right kind of ontological theory of information has been worked out by Luciano Floridi. The general psychomotoric explanation of perception, presented by Kevin O’Regan, allows us to tackle the gap between computation and implementation, and in fact hardware versus software. It may avoid the problem of symbol grounding, quintessential in computer science. The view brings us close to defining ‘a robot that feels’ (O’Regan 2010) in advanced psycho-engineering terms that allow the same criteria to apply to robotic and animal cognitive architectures.

Psychomotoric ontology in robotics can be characterized as strong relationism. Think of a soft sponge! It is not soft to a butterfly (that is too fragile to squeeze it), or to an industrial bulldozer (that is too crudely-powerful to register its softness in any way); but it is soft to human touch and the touch of machines or animals with sufficiently similar sensory capabilities. In the same manner, things are red, painful, or even real (ontologically present) only to the systems able to function in the same perceptual space. Here empirical general theory of (animal and artificial) mind exhibits impressive affinities with philosophies of Spinoza, Kant (and especially, some of Kant’s followers), without endorsing specificities of those views. O’Regan’s recent work on communicative interactions that produce the understanding of space in the minds of all kinds is another step towards a general psychomotoric ontology. My long-standing argument that the gold standard of non-reductive consciousness requires one more component, a (physical) emitter of the stream of first-person consciousness (Boltuc 2016, 2012, 2010, 2009; Boltuc and Boltuc 2007), does not put the sensorimotor project into question – it postulates a functionally marginal, yet philosophically important addition.

Piotr (Peter) Bołtuć is full Professor of Philosophy and the endowed Louise Hartman Schewe and Karl Schewe Professor of Liberal Arts and Sciences at the University of Illinois Springfield (UIS). He is also University Professor of E-Education at the Warsaw School of Economics. He was a Fulbright Scholar at the Department of Philosophy, Princeton University; SCR member at St. John’s College, Oxford; Visiting Fellow at the Department of Philosophy, Australian University; a visiting graduate professor at Poznan University and a visiting
associate at the Laboratoire Psychologie de la Perception, CNRS - Université Paris Descartes. This Summer he is the Erskine fellow at the Department of Philosophy, University of Canterbury NZ. Formulated The Engineering Thesis in Machine Consciousness, the idea that non-reductive materialism nearly entails the view that first-person consciousness can be engineered in robots [Boltuc 2013, 2012, 2011, 2010, 2009; Boltuc and Boltuc 2007]. Presented the Church-Turing Lover, an argument that even if h-consciousness is epiphenomenal it does not have to make it irrelevant [Boltuc 2016, 2010]. Analyzed ways for a deflationary theory of consciousness to avoid epiphenomenalism [Boltuc 2010A]. Currently working on philosophy of Biologically Inspired Cognitive Architectures.

**Marcin J. Schroeder: Embodiment of Cognition and Ontological Status of Information**

Abstract

Concept of the embodiment of cognition, if understood literally, refers to Cartesian dualism of body and mind. In the past the former side of the opposition, "body" seemed easily comprehensible, the latter, "mind" was a mystery. So, embodiment was considered a way to resolve this mysterious character of cognition, but the solution was rather illusionary. Similar danger is in the assumption that the slogans "Information is physical" (Landauer) and "It from bit" (Wheeler) and their more extensive explanations utilizing the common sense concept of "physical reality" or "physical entity" give information a firm conceptual foundation. The present paper presents the fallacies behind the traditional way of thinking and provides a proposal of ontological foundations for information, which can serve as a point of departure for the discussion of embodied cognition without need for Cartesian dualism.

**Marcin Schroeder** is a Professor of Mathematics at Akita International University in Japan where he has worked since 2004. Since 2015 he has been the Editor-in-Chief of the journal Philosophies. His current research interests and expertise focus on philosophical, scientific and mathematical, aspects of information, its integration and dynamics (computation), artificial intelligence, artificial life, theoretical modeling of consciousness. Other topics of interest include philosophy of science, aesthetics, liberal arts education, and intercultural communication.
Marcin Miłkowski: Situatedness and embodiment of computational systems

Abstract

In my talk, I will focus on the interaction of cognitive systems. Cognitive systems, as I contend, are best elucidated as computational mechanisms interacting with their environment. The role of interactions with the environment as well as the other physical features of these mechanisms is crucial for understanding natural cognition.

After presenting a simple test case – of people solving cryptarithmetic puzzles, as studied by Newell and Simon (1972) – I will discuss the claim of proponents of embodied cognition (A. D. Wilson and Golonka 2013; M. Wilson 2002) that embodiment is actually a substantial feature of cognition. They claim that cognitive systems are situated in their environments, that cognition is time-pressured, that the cognitive work should be analyzed in the environment and can be off-loaded to it, and that it’s action-oriented. But computationalism does not in any way contradict these claims.

Embodied cognition does not really present an utterly new way of looking at cognition; it’s simply a consequence of physicalism. What the embodied cognition approach actually does in real research is reminding that cognitive processes shouldn’t be over-intellectualized. But in no way does it challenge computationalism (contra Barrett 2015).

References:

Marcin Miłkowski works as associate professor in the Institute of Philosophy and Sociology of the Polish Academy of Sciences. He is presently coordinating a
project Cognitive Science in Search of Unity – a 5-year project funded by the National Science Centre, building a team of philosophers of cognitive science who deal with question of unification and mechanistic integration of models. He is deputy editor-in-chief of Przegląd Filozoficzno-Literacki (Philosophical-Literary Review), editor in Paladyn. Journal of Behavioral Robotics, and member of the advisory board of Avant. Trends in Interdisciplinary Studies. From 2005-2011, he was a member of the executive board of the Center for Philosophical Research, and since 2009, he is a secretary of the Polish Association for Logic and Philosophy of Science. His book Explaining the Computational Mind was published in 2014 for which he was awarded the National Science Centre prize in humanities and social sciences for young scientists.

Oron Shagrir: In a defense of a semantic view of computation

Abstract

A semantic view of computation maintains that computational states are type-individuated, at least in part, by their semantic properties. My aim in this talk is to outline a version of the semantic account that is in accord, at least to a large extent, with the objectivity desideratum (Piccinini 2015). The account distinguishes between the notions of implementation and computation. While implementation can be characterized in non-semantic terms, computation is essentially semantic. Computational structure is an implemented formal structure (e.g., automaton) whose states have content. The formal structure a system implements is an objective matter. In some cases (e.g., brains) content is also objective, and in other cases it is not.

Oron Shagrir is the Schulman Professor of Philosophy at the Hebrew University of Jerusalem. His research focuses on the nature of computation, and in particular on the role of computational approaches and the computational-level in cognitive neuroscience. He defends the view that computing is a sort of modeling. He is the editor, with Jack Copeland and Carl Posy, of Computability: Turing, Gödel, Church, and Beyond (MIT 2013), and the author of articles published in Mind, Philosophy and Phenomenological Research, Philosophical Studies, Philosophy of Science, The British Journal for the Philosophy of Science, and other journals.