The 6th AISB Symposium on Computing and Philosophy: the scandal of computation - what is computation?

As part of the AISB Annual Convention 2013 to be held at the University of Exeter on April 2nd-5th 2013
http://emps.exeter.ac.uk/computer-science/research/aisb/

The convention is organised by the Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB)
http://www.aisb.org.uk/

OVERVIEW:

What is computation? Society builds and uses millions of computers each year so at first sight the answer seems trivial. A computer is merely a general purpose, typically electronic device, that can be programmed to carry out a finite set of arithmetic or logical operations. These days they announce their ubiquity to the world in phones, desktop devices, washing machines, even lawn mowers.

Historically, however, the etymology of the word (from the OED) informs us that the notion of computation was identified with the action of humans who make calculations, often with the aid of calculating machines. In the 1940s this definition was refined with that of an "effective method" (a procedure that reduces the solution of problems to a series of rote steps which is bound to give the correct answer in finite time for all possible inputs), to yield the notion of the algorithm an effective method for calculating the values of a function and the notion of the effective calculability of functions with an effective method (algorithmic solution). In this way, the notion of computation came to be identified with the actions [steps] carried out by [automated] computers to produce definite outputs [in finite time]. This notion frames computation in terms of an agent, which raises the questions of what computation is per se - merely the dynamics of information flow? And in this scenario, how can computational data be meaningful? How can meaningful data acquire truth-values?

For a long time our ideas about computations (or about the underlying computational models) were more or less rigid, fixed, established in the middle of the twentieth century. In the centre there was the model of a classical Turing machine, with its scenario of a finite computation defining a fixed mapping from the inputs to the outputs. The computations of Turing machines served as a means for defining the complexity of computations, the notion of the universality of computations, and the notion of computability (historically, the lastly mentioned three notions should have been listed in a reversed order). Nevertheless, with the advent of modern computing technologies, networking, and advances in physics and biology, has emerged the ideas that computation is a far broader, far more common, and more complex phenomenon than that modelled by Turing machines. It has been increasingly more difficult to see newly emerging models of computations through the optics of Turing machine computations. Examples include biologically inspired models—such as neural nets, DNA computing, self-assembled structures, molecular computers, cognitive computing, brain computing, swarm computing, etc., or physically inspired models, such as quantum computing, relativistic computers, hyper-computers, and, last but not least, “technologically enabled” models, with the prominent example of the Internet, but also various (also mobile) networks.

In this symposium we hope to address these and other key issues related to the "scandal of computation"...
TOPICS OF INTEREST

1. CORE PHILOSOPHICAL ISSUES
   Questions of ontology and epistemology.

   i. WHAT IS COMPUTATION?
      Does computation (the unfolding process of a computational system) define a natural
      kind? If so how to differentiate the computational from the non-computational?

   ii. COMPUTATION AS AN OBSERVER RELATIVE PHENOMENON
      Computation as an observer relative phenomenon (cf. Searle); does a rock implement
      every input-less FSA (Putnam)?

   iii. A DIGITAL ONTOLOGY
      Digital ontology' (Zuse), "the nature of the physical universe is ultimately discrete"; cf.
      Kant's distinction - from the antinomies of pure reason - of "simple parts" and no simple
      parts; the discrete and the analogue.

   iv. PAN-COMPUTATIONALISM
      Is the evolution of the universe computable as the output of an algorithm? I.e. is the
      temporal evolution of a state of the universe a digital informational process akin to what
      goes on in the circuitry of a computer?

2. SOME COMPUTATIONAL-PHILOSOPHICAL ISSUES
   Computation in machines and computation in nature; Turing versus non-Turing computation

   i. COMPUTATION IN NATURE
      Investigating the difference between formal models of physical and biological systems
      and physical/biological reality-in-itself and the implication(s) for theory of mind /
      cognition.

      (a) The study of 'computation' using natural processes / entities (i.e. machines not
          exclusively based on [man-made] silicon-based architectures).

      (b) What is the underlying nature of such natural [physical/biological] computational processes? I.e. are the
          laws of natural processes computational at their very core OR merely contingently computational because the
          mathematical language we use to express them is biased towards being computational?

   ii. FORMAL THEORIES OF NON–TURING MODELS OF COMPUTATION
      Investigating the philosophical implications of non-Turing computability for the
      philosophy of science/physics and the philosophy of mind.

      (c) Questions regarding the ultimate nature of causality and its relationship to
          computational (both TM and non-TM) models and implications for philosophy of
          physics/science and the philosophy of mind.

      (d) Bio-hybrid [Animat] 'computational' systems (aka A-Machines); the
          phenomenology of A-Machines; the putative TM/non-TM computational
          capacity of A-Machines.
3. SUBMISSION AND PUBLICATION DETAILS
Submissions must be full papers and should be sent via EasyChair:
<https://www.easychair.org/conferences/?conf=aisb13cp>

Text editor templates from a previous convention can be found at:
<http://www.aisb.org.uk/convention/aisb08/download.html>

We request that submitted papers are limited to eight pages. Each paper will receive at least two reviews. Selected papers will be published in the general proceedings of the AISB Convention, with the proviso that at least ONE author attends the symposium in order to present the paper and participate in general symposium activities.

4. IMPORTANT DATES
i. Full paper submission deadline: 14 January 2013
ii. Notification of acceptance/rejection decisions: 11 February 2013
iii. Final versions of accepted papers (Camera ready copy): 4 March 2013
iv. Convention: 2-5 April 2013 [confirmation of symposium dates tbc]

5. ADDITIONAL INFORMATION
Please note that there will be separate proceedings for each symposium, produced before the convention. Each delegate will receive a memory stick containing the proceedings of all the symposia. In previous years there have been awards for the best student paper, and limited student bursaries. These details will be circulated as and when they become available. Authors of a selection of the best papers will be invited to submit an extended version of the work to a journal special issue.

6. SYMPOSIUM ORGANISERS:

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7. SYMPOSIUM WEBSITE: http://extranet.smuc.ac.uk/events-conferences/AISB-Symposium-2013/Pages/default.aspx

8. POSTER ADVERTISING THE CFP: This will be available to download from the above webpages.

9. INDICATIVE PC (TBC)