THE UNIVERSITY OF BIRMINGHAM
School of Computer Science
THE COGNITION AND AFFECT PROJECT

PAPERS ADDED IN THE YEAR 2011 (APPROXIMATELY)

PAPERS 2011 CONTENTS LIST
RETURN TO MAIN COGAFF INDEX FILE

NOTE

This file is http://www.cs.bham.ac.uk/research/projects/cogaff/11.html
Maintained by Aaron Sloman. It contains an index to files in the Cognition and Affect Project's FTP/Web directory produced or published in the year 2011. Some of the papers published in this period were produced earlier and are included in one of the lists for an earlier period. Some older papers recently digitised may also be included. http://www.cs.bham.ac.uk/research/cogaff/0-INDEX.html#contents

A list of PhD and MPhil theses was added in June 2003

This file Last updated: 6 Mar 2011; 6 Jun 2011; 18 Jul 2011; 1 Mar 2012; 2 Jun 2012; 7 Jul 2012; 21 Oct 2012; 24 Oct 2012; 6 Dec 2014;

PAPERS (AND TALKS) IN THE COGNITION AND AFFECT DIRECTORY
Produced or published in 2011 (Approximately)
(Latest first)

Most of the papers listed here are in postscript and PDF format. More recent papers are in PDF only. A few are html only.

The following Contents list (in reverse chronological order) contains links to locations in this file giving further details, including abstracts, and links to the papers themselves.

JUMP TO DETAILED LIST (After Contents)

CONTENTS -- FILES 2011 (Latest First)

What follows is a list of links to more detailed information about each paper. From there you can select the actual papers, in various formats, e.g. PDF, postscript and some in html.

- **Meaning-bearers in Computers, Brains, and Natural or Artificial Minds**
  Author: Aaron Sloman

- **Title: John McCarthy - Some Reminiscences**
  Author: Aaron Sloman

- **Title: A Machine's Hope**
  An essay by Jeremiah Via

- **Four Papers related to Turing** (for: **Alan Turing - His Work and Impact**)
  Editors: S Barry Cooper and Jan van Leeuwen

Published: Elsevier, 2013: http://www.cs.bham.ac.uk/~axs/amtbook/
Author: Aaron Sloman
- Paper 1: **Virtual Machinery and Evolution of Mind (Part 1)**
- Paper 2: **Virtual Machinery and Evolution of Mind (Part 2)**
- Paper 3: **Aaron Sloman Absolves Turing of -- The Mythical Turing Test**
- Paper 4: **Virtual Machinery and Evolution of Mind (Part 3)**
  Meta-Morphogenesis: Evolution of Information-Processing Machinery
- **What Sorts Of Machines Can Understand The Symbols They Use?**
  RELOCATED TO
  http://www.cs.bham.ac.uk/research/projects/cogaff/81-95.html#1986a

- **Title: Comments on "The Emulating Interview... with Rick Grush"**
  Pre-print of paper in the online journal AVANT.
  Author: Aaron Sloman

- **Evolution of mind as a feat of computer systems engineering: Lessons from decades of**
  development of self-monitoring virtual machinery.
  For Pierre Duhem Conference, Nancy, France, 19th July 2011.
  Author: Aaron Sloman

- **Panel discussion: "Under What Conditions Can a Machine Attribute Meanings to**
  Symbols?"
  (Moved to new file 12 Mar 2018)
  Panel Discussion at IJCAI 1983 (Installed 2011)
  Authors: Aaron Sloman et. al.,

- **Evolved Cognition and Artificial Cognition:**
  Some Genetic/Epigenetic Trade-offs for Organisms and Robots
  Aaron Sloman

DETAILS OF FILES AVAILABLE

BACK TO CONTENTS LIST

Filename: sloman-meaning-bearers.html
Filename: sloman-meaning-bearers.pdf
Title: Meaning-bearers in Computers, Brains, and Natural or Artificial Minds
Author: Aaron Sloman
Date Installed: 28 Oct 2012

Where published:

in **AMD Newsletter Vol. 8, No. 1, 2011** (pages: 6--7)
http://www.cse.msu.edu/amdtc/amdnl/AMDNL-V8-N1.pdf

Response to:

> **Dialog Column**
> Are Natural Languages Symbolic in the Brain? by Juyang Weng

Abstract:

Since perceptual and other contents must change faster than physical parts of brains can
be rearranged (e.g. walking with eyes open in a busy city), biological minds need VMs.
That can include symbols, for example if you solve equations in your head, rehearse a
Shakespearean sonnet, or wonder how brains work. Brain-based VMs can also construct
and manipulate diagrams, e.g. visualising the Chinese proof of Pythagoras' theorem, or
designing a new information-processing architecture, or imagining the operation of a

threaded bolt rotating as it goes into a nut. Virtual machinery includes, but is not restricted to, discrete, discontinuous, structures and processes. Interacting VMs on computers and attached devices run concurrently -- their state being preserved in memory while CPUs switch tasks, relying on decades of complex design by hardware and software engineers, solving many different problems, including self-monitoring and control. Very few grasp the big picture combining their efforts.

Biological evolution did something similar, though far more complex and difficult to understand. Support for VMs used in human language, in construction of percepts, in formation of motives, in specifying actions, in generating, evaluating and executing plans, and learning, probably took thousands of intermediate design steps, not yet known to us. Clues exist in the competences of other animals and in pre-verbal children (Karmiloff-Smith, 1992). Exactly what the VMs are, how they evolved, how they are implemented in brains and what their functions are, are still unanswered questions. We cannot find answers simply by studying a narrow subset of products of evolution (e.g. humans) nor a narrow class of robots that mimic some tiny (often arbitrary) subset of animal competence.

Now moved to http://www.cs.bham.ac.uk/research/projects/cogaff/12.html#1202
Title: John McCarthy - Some Reminiscences
Author: Aaron Sloman
Date Installed: 8 Dec 2011

File: HTML
File: PDF
Title: A Machine's Hope
Author: Jeremiah Via
Web site: http://jeremiahvia.com/
Date Installed: 9 Oct 2011

Where published:

This was a student essay written as part of the undergraduate degree in Artificial Intelligence and Computer Science in the School of Computer Science, University of Birmingham.
http://www.cs.bham.ac.uk/

Four Papers for: Alan Turing - His Work and Impact
Editors: S Barry Cooper and Jan van Leeuwen
Date: Published July 2013: Contents List
Note: The copy-editing of this book illustrated my complaints about publishers' copy-editors here. I asked for many "corrections" to be undone, but had no control over the final stages of the process. So I'll put my definitive final versions here.
I thank Barry Cooper for helping with the battle against Elsevier and ensuring high quality of the final version of the book.
Ideas in paper 4 (below) are developed further in The Meta-Morphogenesis Project

- **Paper 1:** Filename: sloman-virt-evo-1.pdf
  Title: Aaron Sloman Develops a Distinctive View of
  Virtual Machinery and Evolution of Mind (Part 1) (Pages 97-101)
  Author: Aaron Sloman
  Date Installed: 1 Oct 2011; Updated post publication: 7 Sep 2013

  Where published: Chapter in: Alan Turing - His Work and Impact
  Book contents listed in http://www.cs.bham.ac.uk/~axs/amtbook

  Abstract:

The idea of implementing one Turing machine in another can be seen as a precursor of the now familiar idea of a virtual machine running in a physical machine. Some features of virtual machinery that are potentially relevant to explaining the evolution of mind and consciousness are discussed, including their causal powers and the differences between implementation and reduction.

- **Paper 2** Filename: sloman-virt-evo-2.pdf
  Title: Aaron Sloman draws together -- Virtual Machinery and Evolution of Mind (Part 2) (pages 574-579)
  Author: Aaron Sloman
  Date preprint Installed: 1 Oct 2011
  Updated: 7 Sep 2013

  Where published: Chapter in for: Alan Turing - His Work and Impact
  Book contents listed in http://www.cs.bham.ac.uk/~axs/amtbook

  Abstract:

  The ideas about virtual machinery presented in Part 1 suggest ways in which biological evolution may have taken advantage of virtual machines to produce self-monitoring, self-modifying, self-extending information- processing architectures, some of whose contents would have the defining features of qualia. This could provide a way for Darwin to answer the criticism that natural selection can produce only physical development, not mental states and consciousness. For this, evolution would have had to produce far more complex virtual machines than human engineers have so far managed, but the key idea might be the same.

- **Paper 3** Filename: sloman-turing-test.pdf
  Paper 3 Filename: sloman-turing-test.html
  Title: Aaron Sloman Absolves Turing of -- The Mythical Turing Test
  (Original title expanded by volume editor)
  Author: Aaron Sloman
  Date Installed: (Original 1 Oct 2011, revised 14 Jul 2013)

  Where published: Chapter in: Alan Turing - His Work and Impact pages 606-610
  Book contents listed in http://www.cs.bham.ac.uk/~axs/amtbook

  Abstract:

  It is widely believed that Turing proposed a test for intelligence (or thinking). I suggest this is a mistaken reading of his 1950 paper (a) because Turing was far too intelligent to propose a test with so many flaws, (b) because his words indicate that he thought it would be a silly thing to do, and (c) because there is an alternative reading of his paper as making a technological prediction, whose main function was to provide a unifying framework for discussing and refuting some common arguments against the possibility of intelligent machines. There is a more interesting and challenging type of test related to development of intelligence that was not mentioned by Turing.

  NOTE: Added 16 Dec 2014
  When a public furore followed the announcement in June 2014 that the Turing Test had at last been passed by a chatbot at an event at the Royal Society, London, I wrote two more analytical pieces, available online.
  (1) http://www.cs.bham.ac.uk/research/projects/cogaff/misc/turing-test-2014.html
  Judging Chatbots at Turing Test 2014
  Comments relating to the "Turing Test" event at the Royal Society in London UK, on 6-7th June 2014, by one of the "judges", explaining why the very idea of a test for intelligence (as opposed to a test for a theory of intelligence) is deeply confused (compare a test for a Turing machine).

(2) http://www.cs.bham.ac.uk/research/projects/cogaff/misc/black-box-tests.html
Judging Chatbots Without Opening Them: Limitations of "black-box" tests.

- **Paper 4 (2011 preprint and published version)**
    Filename: sloman-meta-morph.pdf
    (2011 preprint, Revised 15 Jan 2017)

    Filename: sloman-amt-paper4.pdf
    (Revised, slightly compressed, published version: Sept 2013)

Original title: Virtual Machinery and Evolution of Mind (Part 3)
    Subtitle: Meta-Morphogenesis: Evolution of Information-Processing Machinery
Title of published version in Part 4 of the book:
    Aaron Sloman travels forward to --
    Virtual Machinery and Evolution of Mind (Part 3)
    Meta-Morphogenesis: Evolution of Information-Processing Machinery
Author: Aaron Sloman
Date Installed: 1 Oct 2011. Pre-publication version updated 15 Jan 2017
Ongoing project overview:
http://www.cs.bham.ac.uk/research/projects/cogaff/misc/meta-morphogenesis.html

Where published: Chapter in: Alan Turing - His Work and Impact pages 849-856.
Book contents listed in http://www.cs.bham.ac.uk/~axs/amtbook

Abstract:

Much of Turing's work was about how large numbers of relatively simple processes could cumulatively produce qualitatively new large scale results e.g. Turing machine operations producing results comparable to results of human mathematical reasoning, and micro-interactions in physicochemical structures producing global transformations as a fertilized egg becomes an animal or plant. In the same spirit, this paper presents a first-draft rudimentary theory of "meta-morphogenesis" that may one day show how, over generations, interactions between changing environments, changing animal morphologies, and previously evolved information-processing capabilities might combine to produce increasingly complex forms of "informed control", starting with control of various kinds of physical behaviour, then later also informed control of information-processing. Eventually, this could explain philosophically puzzling features of animal (including human) minds, such as the existence of "qualia"; and also enhance our still incomplete understanding of requirements for future machines rivalling biological intelligence. This will require us to explore the space of possible minds, and the requirements different sorts of minds need to satisfy -- many of which are unobvious. These ideas point to some consequences of embodied cognition that often go unnoticed.

For more on Meta-Morphogenesis see:

- http://www.cs.bham.ac.uk/research/projects/cogaff/misc/meta-morphogenesis.html
    (Discussion note -- HTML)
- http://www.cs.bham.ac.uk/research/projects/cogaff/misc/construction-kits.html
    Construction kits for evolving life (Installed 2014 -- still being revised)
    (Including evolving minds and mathematical abilities.)
    The scientific/metaphysical explanatory role of construction kits:
    fundamental and derived kits, concrete, abstract and hybrid kits, meta-construction kits.
- Talk 102: Meta-Morphogenesis: of virtual machinery with "physically indefinable" functions
    (Presentation -- PDF)
- There are also some online video presentations related to this topic.

Title: What Sorts Of Machines Can Understand The Symbols They Use?
Author: Aaron Sloman
RELOCATED TO
http://www.cs.bham.ac.uk/research/projects/cogaff/81-95.html#1986a

Filename: sloman-comments-on-grush.pdf
Title: Comments on "The Emulating Interview... with Rick Grush"

Pre-print of a paper in the online journal AVANT, The Journal of the Philosophical-Interdisciplinary Vanguard,
commenting on a report on Rick Grush being interviewed by Przemyslaw Nowakowski in:
The Emulating Interview pp 213--224 (English version), 2011.
Author: Aaron Sloman
Date Installed: 8 Jun 2011

Where published:

> This is a pre-print of that appeared in AVANT. The Journal of the Philosophical-Interdisciplinary Vanguard
> http://avant.edu.pl/en/ -- An Open Access Online Polish-English Journal

Abstract:

> This is a response to some parts of the Grush interview by Przemyslaw Nowakowski
> published here:
> http://www.avant.umk.pl/en/2010/11/the-emulating-interview...-with-rick-grush/
>
> My views are very close to those expressed by Rick Grush, but I think some of the
> things he says are misleading. I don't know whether that is because he simply has not
> expressed himself clearly, or because what he meant to say really is different from what
> I think he should have said, or because I misinterpreted what he wrote. I hope these
> comments will turn out to be clarifications rather than criticisms.

Filename: sloman-sps-2011.pdf (DRAFT)
Title: Evolution of mind as a feat of computer systems engineering: Lessons from decades of development of self-monitoring virtual machinery.
Author: Aaron Sloman
Date Installed: 6 Jun 2011 **Updated:** 11 Jun 2011 (added anti-zombie argument); 16 Jul 2011 (minor changes)

Slides for talk: http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#sps11

Presented at the following conference. Will be published in French with commentaries in The "Philosophy of science" series of http://www.vuibert.fr/
A Preprint of this paper was published (with a brief commentary, by Marcin Milkowski) in English and Polish
with title "Evolution: The Computer Systems Engineer Designing Minds"
in the open access Polish student philosophy journal http://avant.edu.pl/en/issues/ in issue 2011-2
http://avant.edu.pl/en/22011-2/

> **Presented at: Pierre Duhem Conference**
> Nancy France, Tuesday 19th July 2011 Co-located with CLMP 2011: 14th Congress of Logic, Methodology and Philosophy of Science Nancy, July 19-26, 2011
>
> I regret I am unable to translate the following reliably:
> http://www.sps-philoscience.org/activites/activite.php?id=15
> **V. conférences de Clark Glymour et Aaron Sloman**
> **Le Mardi 19 juillet 2011, 09:00 à 13:00**
> **Présentation des conférences Duhem**.
> La Société de Philosophie des Sciences (SPS) organise chaque année des conférences
> publiques, intitulées "Conférences Pierre Duhem" qu'elle confie à des chercheurs
> confirmés qui comptent ou non parmi ses membres. Les conférenciers exposent un
> travail original qui entre dans l'un des domaines de spécialité que couvre statutairement

la SPS. Ils s'appuient sur un texte inédit. Le texte des conférences (et des commentaires) est ensuite [publié](#).

Pour l'année 2011, la SPS a souhaité organiser ces conférences à Nancy dans le cadre du [congrès CLMPS](#) comme symposium affilié afin de permettre à un maximum de personnes d'y assister. Ces conférences ont de plus été organisées en collaboration avec le Laboratoire Lorrain de Recherche en Informatique et ses Applications ([LORIA](#)), qui fournit deux des répondants aux conférenciers.

Thème : philosophie de l'intelligence artificielle
Date : mardi 19 juillet, à Nancy
Lieu : voir le programme détaillé du CLMPS
Conférenciers invités : Clark Glymour (Carnegie Mellon University) & Aaron Sloman (université de Birmingham)
Organisation : Max Kistler (président du comité scientifique) et Cyrille Imbert (Archives Poincaré, Nancy)
Discutants : Isabelle Drouet (IHPST), Jean-Paul Haton (LORIA, Nancy), Philippe de Groote (LORIA, Nancy), Matteo Mossio (Department of Logic and Philosophy of Science, University of the Basque Country, Spain).

Les conférences sont organisées avec le soutien du LORIA, de l'IHPST et de la MSH Lorraine.

Abstract:

What we have learnt in the last six or seven decades about virtual machinery, as a result of a great deal of science and technology, enables us to offer Darwin a new defence against critics who argued that only physical form, not mental capabilities and consciousness could be products of evolution by natural selection. The defence compares the mental phenomena mentioned by Darwin's opponents with contents of virtual machinery in computing systems. Objects, states, events, and processes in virtual machinery which we have only recently learnt how to design and build, and could not even have been thought about in Darwin's time, can interact with the physical machinery in which they are implemented, without being identical with their physical implementation, nor mere aggregates of physical structures and processes. The existence of various kinds of virtual machinery (including both "platform" virtual machines that can host other virtual machines, e.g. operating systems, and "application" virtual machines, e.g. spelling checkers, and computer games) depends on complex webs of causal connections involving hardware and software structures, events and processes, where the specification of such causal webs requires concepts that cannot be defined in terms of concepts of the physical sciences. (e.g. concepts like "winning a game", "pawn", "defend", "illegal access", "spelling error", and also "desire", "belief", "preference", "learning", "remembering", and others). That indefinability, plus the possibility of various kinds of self-monitoring within virtual machinery, seems to explain some of the allegedly mysterious and irreducible features of consciousness that motivated Darwin's critics and also more recent philosophers criticising AI. There are consequences for philosophy, psychology, neuroscience and robotics.

Keywords: Architecture, Causation, Cognition, Consciousness, Control, Darwin, Designer Stance, Downward Causation, Evolution, Explanatory Gap, Huxley, Layers, Mind, Self-monitoring, Universal Turing machine, Virtual Machine Supervenience, Virtual Machinery

See also:

Virtual Machines in Philosophy, Engineering & Biology (2008)
http://www.cs.bham.ac.uk/research/projects/cogaff/08.html#803

What Cognitive Scientists Need to Know about Virtual Machines
http://www.cs.bham.ac.uk/research/projects/cogaff/09.html#901

Virtual Machines and the Metaphysics of Science
http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#mos09

How Virtual Machinery Can Bridge the "Explanatory Gap", In Natural and Artificial Systems
in Proceedings SAB 2010
http://www.cs.bham.ac.uk/research/projects/cogaff/10.html#sab

Various PDF presentations on virtual machinery, supervenience, and consciousness
http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#talk84
http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#talk86
http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#talk85
(Dennett on virtual machines.)

What are virtual machines? Are they real? (PDF Seminar Slides, 2000)
http://www.cs.bham.ac.uk/research/projects/cogaff/00-02.html#65

With Ron Chrisley: Virtual machines and consciousness (JCS 2003)
http://www.cs.bham.ac.uk/research/projects/cogaff/03.html#200302

Moved to another file. 12 Mar 2018
Title: Introduction to Panel Discussion: Under What Conditions Can A Machine Attribute Meanings To Symbols?
Authors: Aaron Sloman et al.,

Filename: sloman-evo-devo.pdf
Title: Evolved Cognition and Artificial Cognition:
Some Genetic/Epigenetic Trade-offs for Organisms and Robots
Author: Aaron Sloman
Date Installed: 6 Mar 2011

Where published:

Draft -- In preparation.

Abstract:

Some researchers assume that a machine can acquire human-like intelligence if it initially has (a) a large but empty information store, (b) a very powerful general-purpose learning mechanism, (c) a rich environment in which to learn, and possibly also (d) a teacher to guide the learning; with learning occurring at speeds comparable to learning in humans, rather than requiring evolutionary time-scales, despite the absence of any specific innate knowledge about the environment initially, nor any innate concepts (an ontology) specific to the environment. This assumption is closely related to the ancient empiricist "tabula rasa" theory of knowledge acquisition. That theory can be contrasted with alternative hypotheses regarding starting points for various kinds of learning about the world in diverse animals and, by implication, future intelligent robots, including the approach proposed in (McCarthy, 2008), making use of a Design-based, environmentally informed, nativist meta-knowledge theory. An extended version of McCarthy's approach, applied across species, can lead to deeper and more powerful explanatory theories of information processing in organisms than the alternatives, and can also provide new ideas about both requirements for future intelligent machines and also possible new designs, linking AI and Biology in new ways.

(To be expanded).

See also http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#piaget
Talk 90: Piaget (and collaborators) on Possibility and Necessity And the relevance of/to AI/Robotics

BACK TO CONTENTS LIST

NOTE

Older files in this directory (pre 2011) are accessible via the main index

RETURN TO MAIN COGAFF INDEX FILE

See also the School of Computer Science Web page.

This file is maintained by Aaron Sloman, and designed to be lynx-friendly, and viewable with any browser.
Email A.Sloman@cs.bham.ac.uk