THE COMPUTER REVOLUTION IN PHILOSOPHY:

Philosophy Science and Models of Mind

AARON SLOMAN

Reader in Philosophy and Artificial Intelligence,
Cognitive Studies Programme, The University of Sussex

THE HARVESTER PRESS

Since 1991 the author has been Professor of Artificial Intelligence and Cognitive Science in the School of Computer Science at the University of Birmingham, UK.

---

corrections have been added. Not all the most recent changes are indicated below.

PDF VERSIONS NOW AVAILABLE

A PDF file of the whole book, can be downloaded
containing everything listed below (apart from news items in this file) in a single file.
(Size about 3 MBytes.)

This is also available from the EPRINTS repository of
ASSC (The Association for the Scientific Study of Consciousness)
See http://eprints.assc.caltech.edu/247/

A PDF version of this file is available (it is not kept up to date, so may not have everything that is in this html file).

See further information about downloads below.

ONLINE CONTENTS

Remaining contents of this file

Some Reviews and Other Comments on this Book

NOTE added: 4 Oct 2007
I have discovered that a review by Douglas Hofstander is available online: here.

BULLETIN (New Series) OF THE AMERICAN MATHEMATICAL SOCIETY
Volume 2, Number 2, March 1980
Copyright 1980 American Mathematical Society
0002-9904/80/0000-0109/$03.75 The computer revolution in philosophy: Philosophy, science and models of mind
by Aaron Sloman, Harvester Studies in Cognitive Science Humanities Press, Atlantic Highlands, N. J., 1978, xvi + 304 pp., cloth, $22.50.
Reviewed by Douglas R. Hofstadter
(The review rightly criticises some of the unnecessarily aggressive tone and throw-away remarks, but also gives the most thorough assessment of the main ideas of the book that I have ever seen.
Like many researchers in AI (and probably most in philosophy) he regards the philosophy of science in the first part of the book, e.g. Chapter 2, as relatively uninteresting, whereas I still think understanding those issues is central to understanding how human minds work as they learn more about the world and themselves. Some of my recent work is still trying to get to grips with those issues in the context of a theory of varieties of learning and development in biological and artificial systems, e.g. in connection with the CoSy robotic project.)

Older entries:

Comments on the historical significance (or non-significance!) of this book can be found in the introduction to Luciano Floridi's textbook "Philosophy of information" referenced on Blackwell's site.

Several of the reviews published in response to the original book are now available online, e.g. Donald Mackay's review in the British Journal for the Philosophy of Science Vol 30 No 3 (1979), which castigated me for not reviewing previous relevant work by Craik, Wiener and McCulloch.

An excellent survey of their work and others is now available in Margaret Boden's two volume *Mind as Machine: A History of Cognitive Science* published by Oxford University Press 29th June 2006
(see also http://www.cs.bham.ac.uk/research/projects/cogaff/misc/boden-mindasmachine.html)

Perhaps the earliest published reference to this book is

Shallice, T., & Evans, M. E. (1978). The involvement of the frontal lobes in cognitive estimation. Cortex, 14, 294-303, available at:
http://www-personal.umich.edu/~evansem/shallice-evans.doc

JUMP TO TABLE OF CONTENTS

Philosophical relevance

Some parts of the book are dated whereas others are still relevant both to the scientific study of mind and to philosophical questions about the aims of science, the nature of theories and explanations, varieties of concept formation, and to questions about the nature of mind.

In particular, Chapter 2 analyses the variety of scientific advances ranging from shallow discoveries of new laws and correlations to deep science which extends our ontology, i.e. our understanding of what is possible, rather than just our understanding of what happens when.

Insofar as AI explores designs for possible mental mechanisms, possible mental architectures, and possible minds using those mechanisms and architectures, it is primarily a contribution to deep science, in contrast with most empirical psychology which is shallow science, exploring correlations.

This "design stance" approach to the study of mind was very different from the "intentional stance" being developed by Dan Dennett at the same time, expounded in his 1978 book *Brainstorms*, and later partly re-invented by Alan Newell as the study of "The knowledge Level" (see his 1990 book *Unified Theories of Cognition*). Both Dennett and Newell based their methodologies on a presumption of rationality, whereas the design-stance considers functionality, which is possible without rationality, as insects and microbes demonstrate well, Functional mechanisms may provide limited rationality, as Herb Simon noted in his 1969 book *The Sciences of the Artificial*.

Relevance to AI and Cognitive Science

In some ways the AI portions of the book are not as out of date as the publication date might suggest because it recommends approaches that have not yet been explored fully (e.g. the study of human-like mental architectures in Chapter 6); and some of the alternatives that have been explored have not made huge amounts of progress (e.g. there has been much vision research in directions that are different from those recommended in Chapter 9).

I believe that ideas about "Representational Redescription" presented in Anette Karmiloff-Smith's book *Beyond Modularity* summarised in her BBS 2004 article with pre-print here are illustrated by my discussion of some of what goes on when a child learns about numbers in Chapter 8. That chapter suggests mechanisms and processes involved in learning about numbers that could be important for developmental psychology, philosophy and AI, but have never been properly developed.

Some chapters have short notes commenting on developments since the time the book was published. I may add more such notes from time to time.

More recent work by the author

A draft sequel to this book was partly written around 1985, but never published because I was dissatisfied with many of the ideas, especially because I did not think the notion of "computation" was well defined. More recent work developing themes from the book is available in the

Cognition and Affect Project directory

and also in the slides for recent conference and seminar presentations here:

http://www.cs.bham.ac.uk/research/cogaff/talks/

and in the papers, discussion notes and presentations related to the CoSy robotic project here:

http://www.cs.bham.ac.uk/research/projects/cosy/papers/

A particularly relevant discussion note is my answer to the question 'what is information?' -- in the context of the notion of an information-processing system (not Shannon's notion of information):

http://www.cs.bham.ac.uk/research/projects/cogaff/misc/whats-information.html

A more complete list of things I have done, many of which which grew out of the ideas in this book, can be found in

http://www.cs.bham.ac.uk/~axs/my-doings.html

JUMP TO TABLE OF CONTENTS

Information about the online version

The book has been scanned and converted to HTML. This was completed on 29 Sep 2001. I am very grateful to Manuela Viezzer for photocopying the book and to Sammy Snow for giving up so much time to scanning it in. Thanks also to Chris Glur for reporting bits of the text that still needed cleaning up after scanning and conversion to html.

The OCR package used had a hard task and very many errors had to be corrected in the digitised version. It is likely that many still remain. Please report any to me at A.Sloman@cs.bham.ac.uk.

It proved necessary to redo all the figures, for which I used the TGIF package, freely available for Linux and Unix systems from these sites:

http://bourbon.cs.umd.edu:8001/tgif/
ftp://ftp.cs.ucla.edu/pub/tgif/

The HTML version has several minor corrections and additions, and a number of recently added notes and comments, especially the long note at the end of Chapter 9 (on vision).

JUMP TO TABLE OF CONTENTS

NOTE About PDF versions

PDF versions were produced by reading the html files into odt format in OpenOffice, then making minor formatting changes and exporting to PDF. OpenOffice is freely available for a variety of platforms from http://www.openoffice.org

---

JUMP TO TABLE OF CONTENTS

Download everything at once

- **In HTML and PDF format**
  The individual files may be accessed online via the table of contents above or the whole book fetched as one PDF file (about 1.7MByes).

  Alternatively, the complete set of separate HTML and PDF files can be downloaded for local use packaged in a zip file: http://www.cs.bham.ac.uk/research/cogaff/crp.zip
  or a gzipped tar file:
  http://www.cs.bham.ac.uk/research/cogaff/crp.tar.gz

- **In CHM format (out of date version)**
  For users of Windows, Michael Malien kindly converted the html files (as they were on 8th June 2003) to CHM format, also packaged in a zip file:
  http://www.cs.bham.ac.uk/research/cogaff/crp-chm.zip
  NB: the chm files are now out of date as there have been many corrections and notes added since 2003.

  CHM files (Compiled HTML files) are explained at http://www.techscribe.co.uk/techw/compiled_html.htm and at this Microsoft web site

  Nils Valentin kindly informed me that a tool for extracting html files from a chm file is obtainable here
  http://66.93.236.84/~jedwin/projects/chmlib/
  Instructions for compiling and using the chmlib package are available here:
  http://www.linux-magazine.com/issue/31/OpenOfficeConverters.pdf

  For most readers and especially users of linux/unix systems it will normally be more convenient to fetch the whole book as one pdf file, or fetch the crp.tar.gz or the crp.zip files mentioned above. These are more up to date.

Anyone who wishes is free to print local copies of the book.

Please see the 'creative commons' licence at the end of this file.

JUMP TO TABLE OF CONTENTS

NOTE on educational predictions

The world has changed a lot since the book was published, but not enough, in one important respect.

In the Preface and in Chapter 1 comments were made about how the invention of computing was analogous to the combination of the invention of writing and of the printing press, and predictions were made about the power of computing to transform our educational system to stretch minds.

Alas the predictions have not yet come true: instead computers are used in schools for lots of shallow activities. Instead of teaching cooking, as used to happen in 'domestic science' courses we teaching them 'information cooking' using word processors, browsers, an the like. We don't teach them to design, debug, test, analyse, explain new machines and tools, merely to use existing ones as black boxes. That's like teaching cooking instead of teaching chemistry.

In 2004 a paper on that topic, accepted for a UK conference on grand challenges in computing education referred back to the predictions in the book and how the opportunities still remain. The paper, entitled 'Education Grand Challenge: A New Kind of Liberal Education --- Making People Want a Computing Education For Its Own Sake' is available in HTML and PDF formats here
http://www.cs.bham.ac.uk/research/cogaff/misc/gc-ed.html
Additional comments were made in 2006 in this document Why Computing Education has Failed and How to Fix it

---

JUMP TO TABLE OF CONTENTS

Hardcopy version available

You may still be able to find second hand versions of the original book via Amazon and other booksellers, though it will not, of course, include the notes and additions now in this online version.

A rather messy copy of the original book with some pencilled annotations I made around 1985 when thinking about a second edition, was photocopied by Manuela Viezzer several years ago (two pages side by side per A4 sheet) and may be ordered from the librarian in the School of Computer Science for UK £10(GBP), to cover photocopying, binding and posting in the EU.

For airmail postage to other countries add £2(GBP).

NOTE: it is a messy photocopy as the pencilled comments have not come out very clearly. It is probably better to print the online version, which has the pencilled annotations integrated and also a number of new notes, comments, and references. All of the chapters are now available in PDF format, which is more suited to printing than the HTML versions.

Anyone paying by cheque/check should make it payable to *The University of Birmingham*, NOT to me.

Please send orders to:
Ms Ceinwen Cushway, Librarian,
School of Computer Science,
The University of Birmingham, B15 2TT, UK
EMAIL: C.Cushway AT cs.bham.ac.uk

Links

- I found this site recommended by Iraq Museum International Museum Open Directory
- The "Conceptanalysis, Language and Logic"-site
- Buried in a page of chinese?
- Google's directory of Cognitive Science
- The PsyPlexus Directory of Cognitive Science (A portal for mental health professionals)

Last updated: 26 Sep 2009