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**Resumé**

See also:

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

<http://www.cs.bham.ac.uk/~axs/shortcv.html>

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# 1 SHORT BIOGRAPHY (all links below are clickable)

Born in Que Que (now KweKwe), Southern Rhodesia (now Zimbabwe), 1936.

Went to school there till 1948 then school (SACS) and university (UCT) in Cape Town  
BSc mathematics and physics 1956 1st class. 9 Class medals in 10 courses.

Obtained a Rhodes Scholarship (SACS constituency) and went to Oxford (Balliol College, October 1957) to study mathematics. Switched to mathematical logic for a while (registered for a D.Phil with Hao Wang as supervisor), but was eventually seduced by philosophy, finishing a DPhil thesis in 1962 (*Knowing and Understanding*) now online:  
<http://www.cs.bham.ac.uk/research/projects/cogaff/sloman-1962>)

Started teaching Philosophy at Hull University in 1962, then moved to Sussex in 1964. Spent 1972-3 in Edinburgh as Senior Visiting Fellow, funded by SRC, and was converted to “AI as the best way to do philosophy.”  
I think I learnt more in that year than in any other year of my life since about the age of 4.

Returned to Sussex October 1973, and helped (with Max Clowes, Margaret Boden, Alistair Chalmers, then later Steve Hardy, John Lyons, Gerald Gazdar and others) to develop a Cognitive Studies Programme in the School of Social Sciences which eventually grew into the internationally known Sussex School of Cognitive and Computing Sciences (COGS).

Over the years I dabbled in vision (still the hardest unsolved problem in AI, psychology and neuroscience), the study of forms of representation, motivation and emotion, architectures for complete agents, how to build a mathematician (starting at about age 3 or 4), toddler precursors to mathematical cognition, design of robots of the future, the evolution of powerful learning strategies, trajectories in design space and niche space, nature/nurture trade-offs and the evolution of meta-configured competences, philosophical problems about mind, emotion, mathematics, how to address philosophical and scientific problems about consciousness while avoiding the most common muddles, varieties of causation (Humean and Kantian), meta-ethics, and good ways to teach novices programming and AI, and how to make computing the centre of a new kind of liberal education – an aim defeated by politics, economics, lack of suitable teachers, and the presence of the wrong sorts of computer systems in schools all round the world (and the narrow mindedness of most computer scientists). I’ve recently (since 2008) returned to working on links between robotics and philosophy of mathematics. (For more details see my ‘my-doings’ file.)

At Sussex, I managed the development of Poplog, a sophisticated multi-language design environment, for exploratory research and teaching in AI and Cognitive Science, at Sussex between about 1980 and 1991. Find out more about it here: <http://www.cs.bham.ac.uk/research/poplog/poplog.info.html> Poplog won a UK Government ‘SMART’ award for Integral Solutions Ltd around 1991 for achieving sales of over 5 million dollars, and was the basis of the development of the well known Clementine Datamining system, among other commercial products.  
Poplog is now a free open source system, still under development. I manage the web site.  
<http://www.cs.bham.ac.uk/research/poplog/freepoplog.html>.

At Sussex, obtained grants for development of poplog (from SRC), and for research in vision (from SRC). In 1984-6 was awarded a GEC Research Fellowship (not applied for). Grants from the Renaissance Trust also supported my work.

After 27 years at Sussex I wanted a change so moved to Birmingham in 1991 to a research chair. Foolishly allowed myself to be blackmailed into being Head of School of Computer Science, but in 1994 became a research professor, working on architectures for human-like agents, an AI toolkit for exploring agent architectures, motivation, emotion, vision, causation, consciousness, evolution, and related problems.

Passed UK academic retirement age in 2001 but have continued to work full time, as a pensioner.

Since 1991, grants from the UK Joint Council initiative on HCI, the Renaissance Trust, DERA, the Leverhulme trust, and the EC have supported this research. More recent grants are listed here <http://www.cs.bham.ac.uk/~axs/grants.html>

Continued ...

## Honours since 1991:

1991: Elected fellow of American Association for AI <http://www.aaai.org>. (Second wave).

1997: Elected honorary life fellow of AISB (one of the first group of three fellows) See <http://www.aisb.org.uk>

1999: Elected fellow of ECCAI, European Coordinating Committee on AI (first wave). <http://www.eccai.org/>

2004: Made Fellow of: The World Innovation Foundation <http://www.thewif.org.uk/>  
(I still don't know how or why they came to select me and whether I should take this seriously.)

2005: Elected member of UK Computing Research Committee (UKCRC) <http://www.ukcrc.org.uk/>

2006: Honorary DSc, awarded July 2006 Sussex University.

Expanded graduation speech: <http://www.cs.bham.ac.uk/research/projects/cogaff/misc/dsc.html>

**Celebration** 2011: 75th Birthday symposium organised by Jeremy Wyatt and David Hogg, in Birmingham.

[http://www.cs.bham.ac.uk/~j1w/symposium\\_2011.html](http://www.cs.bham.ac.uk/~j1w/symposium_2011.html)

## Talks/Presentations (mostly invited) since 2001

Listed in reverse chronological order in this updated web page: <http://www.cs.bham.ac.uk/~axs/talks.html>

## Additional points.

Wrote *The Computer Revolution in Philosophy: Philosophy, Science and Models of Mind* in 1978. Now freely available online since Sept 2001 <http://www.cs.bham.ac.uk/research/cogaff/crp/>

Fragments of a sequel to that book are in a growing collection of papers, notes and slide presentations in various web pages:

Talks presented over the years: <http://www.cs.bham.ac.uk/research/cogaff/talks/>

The Cognition and Affect papers: <http://www.cs.bham.ac.uk/research/cogaff/>

The IJCAI'01 tutorial with Matthias Scheutz:

<http://www.cs.bham.ac.uk/research/cogaff/ijcai01/>

Papers in the CoSy research Project:

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

Miscellaneous online papers, discussion notes and postings to bulletin boards, etc.:

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/>

I maintain the Free Poplog software distribution, at

<http://www.cs.bham.ac.uk/research/poplog/freepoplog.html>

This includes the SimAgent Toolkit

<http://www.cs.bham.ac.uk/research/poplog/packages/simagent.html>

Since about November 2002 I have been actively involved in helping to define and promote one of the research Grand Challenges [http://www.ukcrc.org.uk/grand\\_challenges/](http://www.ukcrc.org.uk/grand_challenges/) selected by the UKCRC, namely Grand Challenge 5 (GC5): Architecture of Brain and Mind (<http://www.cs.bham.ac.uk/research/cogaff/gc/>),

## Things I have done

In 2005 Linda World asked me several questions about my work as she was writing an article about me for the 'Histories and Futures' section of *IEEE Intelligent Systems* (published in July/August 2005), <http://www.cs.bham.ac.uk/research/cogaff/misc/linda-world-ieee-0508.pdf>

That prompted me to attempt to produce a web-site summarising things I have done and worked on. <http://www.cs.bham.ac.uk/~axs/my-doings.html>

More detailed CV follows.

## 2 Evidence of Recognition

1991 to present: invited several times a year (expenses paid) to give seminars, talks at conferences and workshops etc., often as keynote speaker, in academe and sometimes in industry (e.g. HP, BT, IBM, Nokia, Toyota, Honda), including overseas universities, e.g. Princeton, Columbia, MIT, Tufts, Umass at Amherst, Notre Dame, Stanford, UIUC.

Recent examples: Invited speaker at symposium on Machine Consciousness at AISB'06 Bristol 5-6 April, 2006, and invited speaker (with Marvin Minsky and five others) at symposium on 50 years of AI at KI2006 (Major German AI conference) in Bremen June 2006 (<http://www.ki2006.fb3.uni-bremen.de/>) Included being interviewed in large press conference. Peter König interviewed me privately at length and wrote a 2 page article about me in the German computer magazine C'T in July, also online here: <http://www.heise.de/ct/06/15/062/>

Additional invited or keynote talks listed in

<http://www.cs.bham.ac.uk/~axs/talks.html>

1991: Elected Fellow of American Association for Artificial Intelligence (second wave),  
(See <http://www.aaai.org>)

1994 to about 1998: DERA asked me to help them learn about AI and develop tools to model intelligent agents. Without my asking, they offered funding for equipment and staff which helped me develop and demonstrate the SimAgent toolkit, which they used. It remained freely available as open source.

1997: Elected honorary life fellow of SSAISB (Society for Study of Artificial Intelligence and Simulation of Behaviour) (first wave) (See <http://www.aisb.org.uk/>)

1999: Elected fellow of ECCAI (European Coordinating Committee for Artificial Intelligence) (first wave).  
(See <http://www.eccai.org/c/fellows>)

Invited presenter at DARPA Cognitive Systems planning workshop Virginia, Nov 2002, and DARPA workshop on Consciousness, Washington 2004.

Invited keynote speaker (with Marvin Minsky and John McCarthy) at IBM conference at IBM Watson Research Centre, New York, Feb 2002, and at a conference on Architectures at St Thomas, Virgin Islands, April 2002.

Invited to small European Commission planning groups (Robotics and Cognitive Systems) June 2003, November 2004, October 2005.

2005: Elected as member of UKCRC (UK Computing Research Committee)  
(<http://www.ukcrc.org.uk/>)

and chaired the committee of UKCRC Grand Challenge 5: Architecture of Mind and Brain, from May 2003 to Jan 2004, and again from 2008.

Feature article about me in 'Histories and Futures' section of IEEE Intelligent Systems (July/August 2005).  
<http://www.cs.bham.ac.uk/research/cogaff/misc/linda-world-ieee-0508.pdf>

2006: EPSRC Computing College. (I have been reviewing grant proposals for research councils, Leverhulme, and some overseas bodies for some time.)

2006: Visiting Senior Research Fellow, Centre for Research in Cognitive Science, Sussex University.

2006: Honorary DSc, 21st July 2006 at Sussex University.

(Expanded acceptance speech: <http://www.cs.bham.ac.uk/research/projects/cogaff/misc/dsc.html>)

I have also been interviewed for radio, television, and various newspapers and journals.

See <http://www.cs.bham.ac.uk/~axs/press.html>

I have been on editorial boards or advisory boards of several journals including:

*Computational Intelligence*  
*Artificial Intelligence*

### 3 Web sites

I believe the future of academic publishing in most fields lies in free, open access (in accordance with ideals of the 'Creative Commons' initiative) with retrospective evaluation and peer review based on ongoing critical comment and debate — which, cumulatively, will often be more objective and considered than the hasty evaluations produced by referees for journals, conferences and workshops – and will also give different evaluations for different classes of readers, instead of the current practice of evaluating publications only from the viewpoint of narrow specialisms.

Moreover results of research funded by tax-payers should be freely available to anyone, not just specialists in the field – including people in poorer countries whom we exploit by employing their expensively trained professionals.

Accordingly, all my papers, presentations, and discussion notes are freely available online. I no longer rush to get things 'published' but let them stew and grow, while publicly visible, benefitting from comments and criticisms, until I think they are ready to be put in some archival format (or someone requests a contribution to a collection or special issue, as happens from time to time).

I also maintain an extensive web site of free, open source, software developed here and elsewhere based on the Poplog system (originally developed at Sussex University and marketed by ISL until 1998).

See <http://www.cs.bham.ac.uk/research/poplog/freepoplog.html>

My past and recent publications are all available online (including my 1978 book with recent annotations), along with discussion papers, presentations, tutorials, and workshop reports

<http://www.cs.bham.ac.uk/research/cogaff/>

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

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

The last is a steadily growing collection of presentations on various topics related to philosophy, cognitive science, biology and AI, some at a tutorial level, others presenting new research ideas.

August 2006: Open letter to my MP (Lynne Jones) about the iSoft/NHS fiasco, along with letters received in response, mostly from heads and professors of computer science in the UK, mostly strongly supportive:

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/isoft/>

(The letter proposes a new analysis of why large monolithic IT projects inevitably fail, and makes suggestions for an alternative approach for government projects. Includes a short history of the internet since about 1971.)

Feb 2007: proposed a new A-level and AS-level modules introducing Artificial Intelligence and and Cognitive Science, in order to counter the narrowly focused teaching of IT in schools

<http://www.cs.bham.ac.uk/~axs/courses/alevel-ai.html>

Made several contributions to the euCognition web site including the *Controversies in Cognitive Systems Research* page

[http://www.eucognition.org/wiki/index.php?title=Controversies\\_in\\_Cognitive\\_Systems\\_Research](http://www.eucognition.org/wiki/index.php?title=Controversies_in_Cognitive_Systems_Research)

### 4 Current Research Preoccupations

Although formally retired, I work nearly full time on research (while contributing informally to teaching, software support, and management in the School).

My research has several strands all related to the long term goal of trying to understand how human minds work in the context of their evolutionary history (implying that much is shared with other species). Much of this work includes a new kind of design-based philosophical analysis, informed by AI, psychology, neuroscience, biology and other disciplines. For example, when scientists are discussing experimental observations, instead of asking questions using language that evolved for informal discourse among people engaged in every day social interaction, like this:

*What does the infant/child/adult/chimp/crow perceive/understand/learn/intend (etc)?  
What is he/she/it conscious of?*

*What does he/she/it experience/enjoy/desire?  
What is he/she/it attending to?*

we should ask questions like

*Which parts of the architecture are involved? What are their functions? What kinds of information do they acquire and use? How do they do this? What is the total architecture in which they function? How is the information represented? (It could be represented differently in different subsystems of the same organism). What kinds of manipulations and uses of the information occur? What mechanisms make those processes possible? How are the internal and external behaviours selected/controlled/modulated/coordinated? How many different virtual machine levels are involved and how are they related (e.g. physical, chemical, neural, subsymbolic, symbolic, cognitive,...)?*

See also <http://www.cs.bham.ac.uk/research/projects/cogaff/misc/design-based-approach.html>

A result of asking questions like that within the CoSy (and later CogX) Robotics projects has been development of a new theory of vision which has ramifications for psychology (including developmental psychology), philosophy, neuroscience, animal behaviour studies, AI and robotics. Papers on this, and related ideas relating to learning about causation, and a new theory about kinds of learning in altricial species (e.g. humans) can be found on the Birmingham CoSy web site (<http://www.cs.bham.ac.uk/research/projects/cosy/>).

In 2011, partly as a result of reading *Beyond Modularity* by Annette Karmiloff-Smith, partly as a result of being asked to contribute papers to a volume on Alan Turing, began to re-organise my ideas within the framework of Met-Morphogenesis.

I expect to go on working on these topics, in collaboration with colleagues in three schools at Birmingham and elsewhere, for several years.

## 5 Past and Ongoing Research & Research-Related Activities

Around 1969 I met Max Clowes, who deeply influenced my thinking. I decided that doing AI, in particular attempting to design and construct increasingly complex *working* fragments of human minds, was the best way to do philosophy – and psychology. My 1978 book presented ideas on which I am still working, including ideas (in ch. 6) about the need for an *architecture* integrating multiple concurrent components, and ideas (in ch. 9) about vision as involving perception of structures at different levels of abstraction.

### **Inspiration from human spatial cognition**

My IJCAI'71 paper, was the first of several attempting to show that the logicist approach (described in 1969 manifesto of McCarthy and Hayes) was too narrow, and multiple forms of representation and reasoning are required, e.g. spatial visualisation (including imagining physically impossible structures and processes (53)). This recently led to an argument that children (and some other animals) learning about causation are not only discovering Humean causation (conditional probabilities) but also Kantian causation, which is structure-based and deterministic, as argued in this presentation on the child as scientist

<http://www.cs.bham.ac.uk/research/projects/cosy/papers/#pr0506>

Another, closely related, development of that idea, explained below, arose recently in an EC-funded Cognitive Systems project attempting to design a robot combining many human-like capabilities.

Those ideas are closely related to my work on how a child learns about numbers in chapter 8 of (17).

### **Work on vision**

Vision research over the last few decades is disappointing. In the 1978 paper of Barrow and Tenenbaum and other work at that time, some important ideas about the perception of spatial structure and motion were beginning to be explored, that were later abandoned mostly in favour of work on recognition, tracking, localisation. Perception of structure was demonstrated by projection of images from new viewpoints, not by

its used in *action* (e.g. through affordances). I tried to present a broader view of vision in (26; 51), expanding on chapter 9 of the 1978 book (written before I encountered Gibson's ideas).

More recently, analysing detailed requirements for a robot manipulating 3-D objects (including its own hand) revealed the need to understand multi-strand relationships (relationships between parts of different things, and parts of parts) and how changes in such relationships (at different levels of abstraction) amounted to multi-strand *processes* (at different levels of abstraction. So, using vision to understand what is going on involves something like *simulating* geometrical and topological changes at different levels of abstraction, in partial registration with the optic array, as explained in this presentation on vision:

<http://www.cs.bham.ac.uk/research/projects/cosy/papers/#pr0505>

This idea requires new ideas about how vision works (and poses great challenges for neuroscience). Since October 2005 I have given at least ten talks on various parts of this. See also (61).

### **Ought, Better, Semantics**

I did some work over 30 years ago on the meaning of 'better' e.g. (15) and how words like 'ought' and 'should' in various uses including non-ethical uses can be explained in terms of that. This work has recently been rediscovered by theoretical linguists at MIT, Kai von Fintel and Sabine Iatridou, and used to analyse 'Anankastic Conditionals'.

See <http://semantics-online.org/blog/2005/08/> (entry for 22 Aug)

### **Philosophy and AI and how machines can mean**

(16) (17) (25), Long critical review of Penrose in AIJ in 1992. (34) (87) (77)

### **Turing machines – and their irrelevance to AI**

(36) (55)

### **Representation, ontology and study of possibilities**

(16), chapters 2 & 7 of (17)

Online: <http://www.cs.bham.ac.uk/research/projects/cogaff/crp/>  
(31), (35), (39), (47),

<http://www.cs.bham.ac.uk/research/projects/cosy/papers/#tr0507>  
(DR.2.1 Requirements study for representations)

### **How machines can understand**

(18) (22) (25) (23) (28) (33)

<http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#models>  
(Getting meaning off the ground: symbol grounding vs symbol attachment/tethering)

### **Evolution of language: Inner Generalised Languages**

(18) <http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#glang>

### **Motivation, emotion and other kinds of affect**

(80) (19) (24) (41) (45) (54) (50) (78)

Critique of fashionable Damasio-inspired emotion theory

<http://www.cs.bham.ac.uk/research/cogaff/talks/#cafe04>  
(Do machines, natural or artificial, really need emotions?)

### **A framework for thinking about architectures, and the H-Cogaff architecture**

Chapter 6 of (17) (21) (29) (46) (83) (52) (8) (9)

Invited presentation at 50 Years of AI symposium, KI'2006 (June 2006)

<http://www.cs.bham.ac.uk/research/cogaff/talks/sloman-ki2006.pdf>

### **Invited talk on meta-cognition at AAI'08 workshop**

(66)

### **Virtual machines, supervenience and the nature of information**

<http://www.cs.bham.ac.uk/research/cogaff/talks/#super>  
<http://www.cs.bham.ac.uk/research/cogaff/talks/#inf>

(55) (65)

Other talks and papers in <http://www.cs.bham.ac.uk/research/projects/cogaff/talks/>  
<http://www.cs.bham.ac.uk/research/projects/cogaff/>

### **Philosophy of Mathematics: in defence of kant**

(13) (14) (17) (62) (64)

<http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#math-robot> <http://www.cs.bham.ac.uk/research/projects/cogaff/talks/#toddler>

### **Space of possible minds, and trajectories in it**

(20) (48) (59)

<http://www.cs.bham.ac.uk/research/projects/cogaff/>

(Other work on this topic is subsumed by other topics.)

### **Altricial, Precocial, Evolutionary trajectories**

On-going work, with Dr. Jackie Chappell, Biosciences.

(32) (48) (73) (72) (59)

Invited paper for a special issue of the *International Journal of Unconventional Computation*, and related papers:

(3) (74) Related BBS commentary:

### **Other aspects of biologically inspired robotics**

(Overlapping with Developmental Psychology.)

A recent addition to this work is a collection of ideas relevant to evolution of mind, developmental psychology and intelligent robotics, concerning the need for certain sorts of animals and robots to move beyond sensorimotor ontologies to include representations of an ‘exosomatic’ reality (an idea that goes back to Kant), along with a partial analysis of how learning about this involves developing a collection of nearly orthogonal recombinable competences, in which the child or learning robot acquires more and more knowledge about two kinds of causation: Humean, probabilistic, correlational causation, and Kantian structure-based, deterministic causation. The latter is intimately connected with the ability to do mathematics. E.g. see

<http://www.cs.bham.ac.uk/research/projects/cosy/papers/#dp0601>

(79) (76) (89)

(85) (75)

Criticising extreme theories of embodiment (68).

### **Discussions related to Meta-Morphogenesis**

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/meta-morphogenesis.html>

### **Virtual machines produced by biological evolution**

(77) (65) (69) (Sloman)

### **Methodology for reintegrating AI**

(30) (49) (58) (56) (57) (63)

<http://www.cs.bham.ac.uk/research/projects/cosy/papers/#tr0503>

### **Freewill, counterfactual conditionals and causation**

<http://www.cs.bham.ac.uk/research/cogaff/misc/four-kinds-freewill.html>

### **Philosophy of Mind and Scientific study of Consciousness**

(27) (28) (37) (43) (4) (77) (75)

### **A New Criterion for Evaluating Research on Consciousness**

(60)

### **Tools for AI research: The SimAgent toolkit, Simulations, Games**

(5) (10) (86) (40) (2) (84) (81) (42) (82) (12) (11)

### **Complex planning tasks with multiple criteria**

(Work done with Brian Logan) (7)

[More details of research activities can be found in] <http://www.cs.bham.ac.uk/~axs/my-doings.html>

### **Admin, Education and Tutorial Events**

Helped to build up two internationally recognised UK AI centres almost from nothing, first COGS at Sussex University (1973-1991), then AI at University of Birmingham (1991-present).

Organised ‘Philosophical Encounter’ at IJCAI’95 in Montreal, with Marvin Minsky and John McCarthy as co-presenters. (34),

Tutorial on *Philosophical Foundations of AI* with Matthias Scheutz, at IJCAI’01, Seattle. (87) See <http://www.cs.bham.ac.uk/research/cogaff/ijcai01/>

With Bernt Schiele organised the two-day *Interdisciplinary tutorial on Representation and Learning in Animals and Machines*, at IJCAI’05 in July 2005, funded by BT, IBM and INFERMED. (88)

See <http://www.cs.bham.ac.uk/research/projects/cosy/papers/#tr0504>

Organised two-day interdisciplinary symposium on *UKCRC Grand Challenge 5: Architecture of Brain and Mind: Integrating high level cognitive processes with brain mechanisms and functions in a working robot*, funded by euCognition.

See <http://www.cs.bham.ac.uk/research/cogaff/gc/aisb06/>

Helped to organise three day interdisciplinary symposium in Paris, Sept 2007, with Kevin O’Regan and Jacqueline Fagard, for the CoSy project: “Cosy Meeting of Minds”

<http://www.cs.bham.ac.uk/research/projects/cosy/conferences/mofm-paris-07/>

## **6 Tools for AI research and teaching**

Helped to design and implement various features of the Pop11 language and extensions to it in the form of powerful libraries. I managed the development of the Poplog system at Sussex University between 1980 and 1991. It later earned the company distributing it (ISL) a ‘SMART’ Government award for exceeding sales of \$5M. (ISL let me keep the plaque. Poplog has played an important role in AI/Cognitive Science teaching and research at Birmingham, since I came here in 1991.

Since 1999, when Poplog became a free open source system, I have managed the web site (with help of an international community of users and developers):

<http://www.cs.bham.ac.uk/research/poplog/freepoplog.html> (90),

and tools built on poplog, such as the RCLIB Package and SimAgent toolkit

(86) (38) (82)

<http://www.cs.bham.ac.uk/research/poplog/packages/simagent.html>

<http://www.cs.bham.ac.uk/research/poplog/primer/> *Pop11 Primer* (44)

In August 2006 I was invited to produce more detailed documentation of the development of e-learning techniques at Sussex University in the 1970s and 1980s as part of a campaign against a ‘moronic’ US patent recently granted. So I wrote a brief summary of the history:

<http://www.cs.bham.ac.uk/research/projects/cogaff/poplog-learning-environment.html>

Also referenced under 1976 in this wikipedia history of e-learning environments.

[http://en.wikipedia.org/wiki/History\\_of\\_virtual\\_learning\\_environments](http://en.wikipedia.org/wiki/History_of_virtual_learning_environments)

## 7 Educational philosophy

In my 1978 book, I made some important recommendations and predictions about how computing can change education by stretching the minds of children (and others) in new ways.

This did not happen because teachers, politicians, industrialists, parents and computer manufacturers all misguidedly thought that what children need is simply to learn to *use* the computer-based tools and packages that they are likely to need in future jobs. As a result they have grown up thinking computing as more like cooking than like chemistry and a whole generation has been cheated of a great educational opportunity.

This point was made in a paper for the Grand Challenges in Computing Education conference, March 2004, available here <http://www.cs.bham.ac.uk/research/cogaff/misc/gc-ed.html>

I fear this is an irreversible disaster, partly because so few people understand the point, and partly because there are so few people who could do the teaching required: teaching children to analyse, design, test, debug, develop, document, compare, and explain complex *working* systems – the modern equivalent of playing with Meccano sets, which taught me and many others deep things our teachers never could.

(A Professor of philosophy of Law in Norway has recently discovered this work and has written to me about it.)

Some related comments about our educational dreams in the 1970s and why they failed because of bad decisions made by politicians, educationalists, teachers, parents and others can be found in the third section of an expanded version of my acceptance speech for an honorary DSc given to me by Sussex University in July 2006.

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/dsc.html>

See also my proposal for a new multidisciplinary collection of modules for A-level and AS-level:

<http://www.cs.bham.ac.uk/~axs/courses/alevel-ai.html>

## 8 Contribution to national debate on large IT projects

News reports and public criticism of the Government's long term IT project and iSoft, one of the contractors, led me to offer a deeper diagnosis than I had seen elsewhere of what such monolithic, long term IT projects will *inevitably* fail (because of the astronomically huge search spaces involved and because of the impossibility of predicting requirements at the time contracts are placed). On the basis of that diagnosis, using the development of the internet since about 1971 as an example I proposed a new model for large scale government projects. In August 2006 I posted this analysis as an open letter to my MP, Dr. Lynne Jones, here:

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/isoft-government-projects.html>

It has attracted a substantial amount of comment from some leading members of the UK academic computer science community and others. All the non-confidential comments are accessible from the web site.

I've also submitted comments in response to the House of Lords consultation on internet security.

<http://www.cs.bham.ac.uk/research/projects/cogaff/misc/security.html>

## 9 Formal Qualifications

B.Sc. Pure and Applied Mathematics, and Physics, Cape Town, 1956 (first class)

D.Phil. Philosophy, Oxford 1962. Thesis entitled *Knowing and Understanding*.

My first degree was followed by a Rhodes Scholarship in Oxford, where initially I studied mathematics, then transferred to mathematical logic. But I was seduced by philosophy, and my DPhil defended Kant's views on mathematical knowledge, against Hume's claim that all knowledge was either empirical or trivial.

Much of my work since then has been closely related to the DPhil thesis, though it has spanned several disciplines.

## 10 Posts held

1957 (Jan - Sept) Temporary lecturer in Mathematics, Cape Town

1957-1960 Rhodes Scholar, Balliol College, Oxford

1960-1962 Senior Scholar, St Anthony's College, Oxford  
1962-1964 Lecturer in Philosophy, Hull University  
1964-1976 Lecturer in Philosophy, Sussex University  
1972-1973 Senior Visiting Fellow, Edinburgh University (Computational Logic Dept)  
1976-1983 Reader in Philosophy and AI, Sussex University  
1984-1991 Professor of AI and Cognitive Science, Sussex University  
1984-1986 GEC Research Professor, Sussex University (unsolicited grant)  
1991-1994 (Unwilling) Head of School of Computer Science, Birmingham Univ.  
1991-2005 Professor of AI and Cognitive Science, Birmingham Univ  
2005-on Retired  
I was appointed Honorary Professor from October 2005

## 11 Grants Since Coming to Birmingham

(Not all of these were officially channelled through the University.)

Note: my main research is in philosophy. It is not easy to get grants to support this, and not always necessary.

EC-Funded CoSy project (Sept 2004 for four years, approx 7Meuro, of which approx 1M for Birmingham). (I was originally invited to join the consortium in July 2003, and proposed that Jeremy Wyatt be added. So we are Co-PIs for Birmingham.) <http://www.cs.bham.ac.uk/research/projects/cosy/> <http://www.cognitivesystems.org>

EC-Funded large collaborative CogX project (2008-2012) "Cognitive Systems that Self-Understand and Self-Extend":

<http://www.cs.bham.ac.uk/research/projects/cogx/>

Funding provided by euCognition network to support 10 invited speakers for Symposium on Grand Challenge 5, at AISB'06, 3-4 April 2006: up to 10610 euro

1999 - 2006: various travel grants as invited speaker or participant at workshops/conferences/consultations, including Nokia, Toyota, IBM, European Commission (Several times).

Given donations to support an international tutorial on *Representation and Learning in Animals and Machines*, held in Edinburgh at IJCAI'05, July 2005 (BT £3250, IBM \$2530, Inferred £500).

2001. Helped with formulation of EPSRC bid for our first High Performance Cluster (about £46K) with Ela Claridge and Xin Yao. Managed the process of inviting tenders, selecting the winning bid, designing the requirements for the configuration.

October 1999, Three year grant from Leverhulme Trust for £104,340, for a research fellow, on *Evolvable virtual information processing architectures for human-like minds*.

October 1999 PhD Studentship funded by Sony Computer Entertainment Europe for three or four years £30,000 – £40,000 for research on Intelligent Agents in 3-D Virtual Environments.

March 1999 (With Brian Logan) Consultant on a short term contract from DERA via Nottingham University, on Architectures for Intelligent Agents. Approx £450.

Helped Catriona Kennedy (my PhD student) negotiate two grants from DERA/DSTL (Dec 2000 to June 2002).

March-April 1999 Consultation with Psychometrix Associates Inc, Lincoln MA, on Modelling and Analysis of Individual Differences. US\$2,025.

1995-8 3 year Research grant from DERA Malvern, £155,000 (funded by MOD), for collaborative work on Autonomous Intelligent Agents. (Total project included 1 post at Birmingham, 1.5 posts at DERA.)

Helped Riccardo Poli obtain a 3-year grant from DERA, paying for Bill Langdon

1995-6 Collaborative contract with DERA Malvern, about £30,000.

1994-5 Collaborative contract with DRA Malvern on design of agent architectures. £28,000.

1993-6 (With Sophia Langley), Grant from SERC-DTI as part of the “Safety Critical Systems” initiative, for development of computational tools for *Risk Analysis Techniques in Finance and Insurance* (RATIFI). (SERC Ref GR/J18859, DTI Ref IED4/1/9310). Industrial Collaborator: Alexander and Alexander, £274,738. (Transferred to Prof P.Jarratt, Dec 1994, as he was more interested in the work.)

1992-1995 (With Professor Glyn Humphreys), 3 year grant from Joint Research Councils for the *Attention and Affect* project. £50,939

1991-1994 3 year grant from the Renaissance Trust, value £33,000 providing a studentship for work on agent architecture design.

1992 Obtained donation of equipment from HP research labs for teaching and research in Cognitive Science, value £170,000.

1990-1993 With Sussex University, Integral Solutions Ltd, BMT Ltd, SERC-DTI grant for User Interface Design Environment project. (IED ref IED4/1/1577 SERC REF GR/F94439). Academic portion £199,306 (This later led to a CASE studentship. Student supervised by Russell Beale.)

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