BOOKS (TECHNICAL) by Steve Coles

1. What Computers Can't Do: A Critique of Artificial Reason
by Hubert L. Dreyfus (Harper and Row, New York, 1972) 260 pp. $8.95

In spite of the fact that it has been reviewed extensively elsewhere,[1,2,3] I feel that this book needs to be cited in these pages, since it will probably assume a definitive role as the document of choice for those outside the field seeking to refute the possibility of artificial intelligence. Moreover, it is difficult to review a book with any kind of perspective when one has been so personally close to its controversies. I have had friendly arguments with Bert on many occasions about the contents of his book--in our respective classrooms at Berkeley, at cocktail parties, in lengthy correspondence. I have followed the evolution of his thinking since 1965,[4] his loss to the Greenblatt Chess Program,[5] his controversy with Papert,[6] and have read several of his other papers as well as manuscripts for the book under review while it was still in the draft stage. Subsequently, as a term project, two of my graduate students wrote a definitive critique of his arguments.[7]

---

1. Robert K. Lindsay, Science, Vol. 176, pp. 630-31 (May 12, 1972).

2. E. A. Weiss, Computing Reviews, #26,463, pp. 304-5 (July 1972).

3. Michael Scriven, The Berkeley Book Review (Spring 1972).

4. Hubert L. Dreyfus, "Alchemy and Artificial Intelligence," RAND Paper P3244, RAND Corporation, Santa Monica, California (1965).

5. SIGART Newsletter #6, pp. 8-9 (October 1967).

6. Seymour Papert, "The Artificial Intelligence of Hubert L. Dreyfus: A Budget of Fallacies," Artificial Intelligence Memo 154, Project MAC, MIT, Cambridge, Massachusetts (January 1968).

7. K. Tachibana and P. M. Look, University of California, Berkeley, California (June 1972).

Nevertheless, I will try and make a few brief comments:

1. Dreyfus' thinking has actually evolved considerably since his early days. He is no longer as dogmatic, although he still holds as tenaciously as ever to the proposition that "artificial intelligence is impossible in principle."

2. His proof contains several fallacies, although the thread of his logic is difficult to extract, being embedded in a considerable body of prose.

3. The principal fallacy concerns the notion of "infinity," whether the seeming unquantifiability of human thought or the seemingly infinite regress of world-contexts can ever be bounded, and thus dealt with by a finite machine. The major distinction here between arguments in principle and arguments in practice is that "large" does not equal "infinite."

4. A major contribution of the book in my judgment is his requirement that truly intelligent machines have bodies, i.e., that there can be no such thing as a disembodied intelligence.

As a footnote, however, I should mention that Dreyfus recently watched the SRI robot in action at a showing of our latest film in his own classroom. When asked whether he thought that Shakey had a body, he replied, "No." I guess this ignominious conclusion was forced by the need to preserve internal consistency with his earlier arguments.

2. The Metaphorical Brain by Michael A. Arbib (Wiley-Interscience, 1972) 243 pp. illus.

Michael Arbib's "The Metaphorical Brain: An Introduction to Cybernetics as Artificial Intelligence and Brain Theory," is a fine sequel to his "Brains, Machines, and Mathematics"* although the present volume requires no special mathematical background. It should be accessible to anyone who reads Scientific American and is fairly self-contained. The Chapters include:

Brains, Behavior, and Metaphor
Action-Coding and Neural Networks
An Introduction to System Theory
Artificial Intelligence and Robotics
Neural Control of Movement
Memory and Perception in a Layered Computer
Resolving Redundancy of Potential Command
Where do we go from here?

---

*McGraw-Hill, 1964

The concluding chapter contains such insights as "... We must beware, when we use the metaphor 'humans and machines,' of the fallacy that we have reduced men to the machines that we currently know. When the Darwinian Theory of Evolution made it possible to say that 'humans are animals' there was a violent reaction because many people were convinced that they were not just animals. The point is of course, that evolution did not reduce us to the level of other animals. Rather it broadened our concept of animal to indicate that there was an essential continuity in all living things on earth, and that man was not apart from this continuity."

The book ends in a flight of poetry "... Whether we are religious or not, in a cathedral our senses soar, as we feel the rise of the building, and bathe in the beauty of light playing through stained glass. And yet, if the builders of that cathedral hadn't been brilliant engineers, it would have fallen down three hundred years ago. As we reshape our own society, we must use our knowledge to achieve this aesthetics, this joy."

The book is well illustrated and the only distraction, aside from a few typographical errors, is Arbib's idiosyncrasy of systematically referring to arbitrary humans in the feminine gender. For example, "... in the newborn baby if she is to develop...", "... each individual can express herself...," etc. Can Mike be accused of being a "female" chauvinist?

3. Understanding Natural Language by Terry Winograd (Academic Press, New York, 1972) 192 pp. $8.95.

See Abstract in SIGART Newsletter No. 24, p. 10 (October 1970).

****

NOVELS by Steve Coles

The following four novels were read by your editor during the summer--

1. The Terminal Man by Michael Crichton (Alfred A. Knopf, New York, 1972) $6.95.

If you liked Andromeda Strain, an earlier novel by the same author (or saw and liked the movie), then you certainly will enjoy his current best-selling* effort. To briefly relate the plot--the terminal man is actually Harry Benson, a computer scientist with Autotronics, a hypothetical Los Angeles based think tank, engaged in secret artificial intelligence research for the Department of Defense to devise a ping-pong playing robot!

---

*"The terminal Man" has been on the New York Times Best Seller List for the last 18 weeks and has also been chosen as a Book-of-the-Month Club selection.

Apparently, he suffers from an unusual form of psychomotor epilepsy. A miniaturized computer is surgically implanted in his brain to control his fleeting bursts of uncontrollable rage, but due to unforeseen positive feedback in the control circuit his condition becomes more acute. This in turn leads to a fast paced adventure story and superb entertainment.

Chicton's background in medicine (recent M.D. from Harvard Medical School) has certainly added much credibility to his novel. For example, this is the first novel I've ever seen with an annotated bibliography of technical papers or such a substantial use of graphs, charts, and anatomical diagrams of the human brain to support the story. His knowledge of computer science, however, leaves much to be desired. I counted at least five errors--three flagrant ones (concerning power requirements, reliability, and miniaturization) and two conceptual ones. Nevertheless, I can recommend it highly. By the way--if you don't like to read novels, Warner Bros. has bought the film rights and you can see the movie in about two years.

2. Who is Julia? by Barbara S. Harris (David McKay Company, Inc., New York 1972) $6.95.

If you really liked the Terminal Man, a good sequel is Who is Julia? Mary Frances suffers a cerebral hemorrhage, just as Julia North is struck down in an automobile accident. The two injured women reach the emergency room of the local university hospital within minutes of each other. There,a team of surgeons discover a medical situation for which they have spent years preparing. Julia's body is destroyed, but her brain is intact; Mary Frances' brain has been hopelessly damaged, but her body continues to function. You guessed it: After the most hazardous of neurosurgical operations, Julia wakes up in the body of the other woman!

This is Ms. Harris' first novel and is based on extensive research in medical libraries and scientific journals. (It has been rumored that it may be serialized in Cosmopolitan Magazine.)

3. Cyborg by Martin Caidin (Arbor House, New York, 1972) $6.95

There is no more case-hardened, chrome-finished, science-fiction writer than Martin Caidin, especially in the aerospace field. His Destination Mars, Marooned, The Cape, and his recent Mary Jane Tonight at Angels Twelve are probably his best known efforts of this game. A Cyborg (cybernetic organism), as defined by Manfred Clynes at Rockland State Hospital in 1960, is an artificially-extended, biological organism that incorporates various exogenous, electro-mechanical components, functioning unconsciously as a homeostatic control system, to better adapt the organism to a wider variety of environments. In this case the cyborg is Lt. Col. Steve Austin, a test pilot and former astronaut (member of the crew of Apollo XVII, the last mission to the moon). As his experimental, NASA-M3F3 test plane crashed against the desert floor in a flash of searing metal, much of Austin's body is mutilated. Near death, he is literally reconstructed: artificial, computer-controlled limbs powered by a miniature nuclear reactor, but indistinguishable from the originals and articulated by normal brain impulses, together with advanced super-human sensors for hearing, seeing, heat-sensing, etc.

Money for the reconstruction, however, comes from a CIA-type organization and the novel settles down about the half-way point to a James Bond adventure story of international spying and cold war conflict. Nevertheless, it still makes fun reading. Again if you're willing to wait, it too is promised as a movie, and possibly even the basis for television series.

4. Wildsmith by Ron Goulart (Ace Books, New York, 1972) 75¢ Paper

The subtitle of this escapist drivel is "What does one do with a willful robot?" Yet what Goulard really means is how does one prevent Wildsmith, an android author with absurdly human qualities, from periodically unscrewing his hands and mailing them around the country to his female admirers. Judging by the quality of the writing, he probably turned this trash out of his typewriter in 48 hours. Don't waste your eyesight.