must re-establish his position in a society of specialists if we are to survive.

Finally, I would like to return to purpose and philosophical structure—not to project a personal point of view but rather to suggest that future conferences of this kind would benefit greatly by opening their doors wider to include contemporary creative philosophers of the calibre of Oliver Reiser, Krishnamurti, D. Suzuki, R. Buckminster Fuller and J. G. Bennett, together with an eminent representative of the work of Teillard de Chardin. The sooner we attempt the major task of understanding the crew of this "Space Ship Earth" or, if you prefer the analogy, our biological interdependence on this space organism Earth, the better for all.

KEITH CRITCHLOW

RE-ENACTED CYBERNETICS

Purposive Systems

Edited by Heinz von Foerster, John D. White, Larry J. Peterson and John K. Russell. (Proceedings of the First Annual Symposium of the American Society for Cybernetics.) Pp. xvi + 179. (Spartan Books: New York, 1968. Distributed in Europe and the British Commonwealth by Macmillan: London, June 1969.) 100*s*.

THE great vision of Norbert Wiener and his early associates was to foresee a fully interdisciplinary science of control. They all recognized that this would need the support of a new language "sufficiently sophisticated to solve complex human problems, and sufficiently abstract . . . to cross disciplinary boundaries", as Margaret Mead says in her opening paper here. But, Dr Mead roundly declares, it didn't work. Judging by this book, she has good reason; on the other hand, the book is on the whole strangely anachronistic.

These writings are part of the proceedings of the first symposium held by the new American Society for Cybernetics. The occasion seems to me to have been a kind of ritual re-enactment of the Macy symposia held twenty years ago (the sixth conference happened in 1949, the tenth and last in 1953). The book is dedicated to the Macy convenor of those days; the chief editor is the original editor; at least four of the twelve authors were original participants. Above all, there is the same halting, tentative, we-are-on-the-verge-of-discovery atmosphere. Can it be that events have passed some of these people by? Can it be that modern workers, many of them too young to have shared the original excitements, have not joined the new Society? It is a puzzle, and it is also sad.

One of the signs of immaturity in a scientific topic is a lack of cohesion: the almost wild heuristic leaping about which may stumble on what is significant. We have this here too, in spite of a neat (and I suspect *post hoc*) classification of papers into three sections. Man as purposive, machines as purposive, and the man-machine as purposive: this looks good. Yet we range in fact quite arbitrarily from the problems of curve-generating displays for matrix multiplication using the RAND Tablet, to an account of Hans Storm's paper of 1953 on "Eolithism and Design"—by a friend. The Storm paper itself was fascinating; but Storm himself was already dead those sixteen years ago.

By far the most interesting contribution is by Nicolai Amosov of the Russian Institute of Cybernetics in Kiev. It concerns the simulation of thinking processes, and displays all the characteristics one looks for in a piece of good cybernetic research. It links brain and mind, energy requirements and information flows, the spatial and the temporal, the short term and the long, reinforcement and inhibition, movement and feeling. All this is in aid of the realization of a computer-simulated automaton, which walks round an environment of a forest inhabited by beasts and food. It constructs a plan for the walk, and adapts this plan to a different actual trajectory as further data become available and its own mental processes operate. This program does seem to reproduce purposive behaviour, and to use a general language which scientists can understand. Perhaps, then, Margaret Mead was wrong.

For the rest, and in all honesty, we know more about purposive systems than this. We were already further ahead than this in 1946, with the Conference on Teleological Mechanisms held by the New York Academy of Science in that year.

STAFFORD BEER

ENVIRONMENTAL HISTORY

The Architecture of the Well-Tempered Environment

By Reyner Banham. Pp. 295. (Architectural Press: London, March 1969.) 56*s*.

THE author has two reputations neither of which may be familiar to readers of *Nature*. His most recent reputation, and the one to which this book adds, is that of Dr Banham the historian of the modern movement in architecture. His earlier and more stimulating reputation is that of Reyner Banham the swashbuckling, concept-inventing, mind-bending, generalist who has kept up a continuous display of anti-architectural fireworks for the past ten or twenty years. In his first role he questions the functionalist assumptions of his masters, Messrs Herbert Read and Nicolaus Pevsner; in his second role, he seizes upon all aspects of technology as parts of one delectable whole (many years before the more famous or notorious examples of Tom Wolfe and Marshall McLuhan), and, with a plethora of zippy Banhamite phrases, he shows us how to throw away the blinkers of specialization which have prevented us seeing the popular world of mass-produced culture for what it is: the mainstream art of our times and the light-hearted but powerful determinant of our intellectual and physical way of life. I am thinking, for example, of his article "City as Scrambled Egg" (in *Cambridge Opinion*, 17, 1959) in which he showed how irrelevant, to the fast-emerging world of freeways, drive-in cinemas and universal car ownership, is the mechanical/classical idea of a city as the centre of obsoletely everything!

This book, from the pen of Dr Banham the historian, is in many ways the most helpful academic work that he has written. It lacks, however, the uninhibited advance-on-all-fronts strategy that is characteristic of his anti-architectural warfare and also of that remedy-for-all-modern-ills, the systems approach.

But it is time that I explained the relevance of these remarks to the book in question and that I translated its unfamiliar and intriguing title. "The Architecture of the Well-Tempered Environment" is a phrase that Dr Banham has coined to refer to an aspect of architecture of which he is undoubtedly the first historian. By well-tempered environment he means the successful use of roofs, walls, windows, revolving doors, chimneys, ventilators, central heating, air conditioning, lighting fittings and even camp fires to create the right conditions for human living. The main theme of his book is that modern architects have been blind to the non-visual problem of thermal comfort and, with some honourable exceptions, have never learnt the principles of what Banham describes as "environmental management". A simple review of these principles, too simple perhaps for scientists but immensely useful to architects and to building users, appears in his introductory and final chapters. Here we are told that there are three modes of tempering the indoor atmosphere: conservative, selective and regenerative. "Conservative" refers to