

Educating Sarah

Richard Passingham

The Mind of an Ape. By David Premack and Ann James Premack.
W. W. Norton: 1983. Pp.165. \$14.95.

COMPARATIVE psychology has proved a dull science. Its efforts have been directed mainly to the rank ordering of vertebrate species according to their ability to learn. To this end a restricted number of tests have been applied, none of which greatly taxes the mind of an intelligent animal such as a chimpanzee.

The history of the subject has been enlivened by two minds. In 1917 Kohler pointed out that there was little point in seeking evidence for insight if the tests were of the sort that could be solved only by rote trial and error. And in 1949 Harlow suggested that rather than killing animals after a single experiment, it would be of interest to study them over a long time to see to what extent they benefited from a general education.

In recent times David Premack has made the subject very much more interesting. He has taken note of Harlow's suggestion and has trained a chimpanzee, Sarah, for three to four hours a day, five days a week for over ten years. Also, he has heeded Kohler's insistence that it is more important to know whether an ape understands the nature of a problem than whether it can be drilled to produce the right answer. For each type of problem Sarah is first taught the answers for a training series and then tested for her understanding on a new set of problems that are formally similar. If she can give the correct answer on the first trial of such problems she must have an intelligent understanding.

What are Sarah's achievements? This book summarizes in popular form some years of work by David Premack and his associates (Woodruff, Gillan and others), much of which has already been reported in the technical literature. In Chapter 2 they claim that Sarah can master the abstract idea of similarity, recognizing that two bananas are like two apples rather than an apple and a banana. And they report that Sarah can also draw simple analogies; thus tin opener is to can as key is to lock. Chapter 3 describes Sarah's efforts to supply the correct solution to problems that she sees people tackling on the television screen. It is argued that her ability to produce the correct solutions suggests that she understands the problems the people are facing and their goals or intentions. The next chapter looks at her understanding of her physical world; does she appreciate that events have causes or that matter can be conserved in amount from one physical transformation to another?

But there is more to this account than a simple listing of achievements. Earlier in her life, Sarah was drilled in the use of a system of visual signs. Could it be that her later successes were promoted by this previous training in a symbolic system? Not in the sense that she solved the problems by mentally operating with these symbols, since she lacked symbols for many of the essential operations. But, David Premack argues, perhaps the earlier training taught her to look for abstract relationships. And indeed there is evidence for this, since three other chimpanzees were also taught the symbolic system and four other chimpanzees, now juvenile, are being tested on the logical problems

without having had the benefit of the early training with symbols.

The reader may wish to carp, however. Has it not turned out that some of the early claims for language learning in chimpanzees were inflated? Perhaps there are alternative and rather less interesting explanations of Sarah's performance. Perhaps some of the explanations can be translated into the stultifying jargon of behaviourism.

It is worth haggling over these questions because for once there is something worth haggling about. Of course there are alternatives and Premack frequently mentions them and tries to rule them out. But this is a small book and does not give the detail that is needed to allay the sceptic's fears. *The Mind of an Ape* is nonetheless full of imaginative questions and ingenious experiments. If children have their Piaget, chimpanzees have their Premack. □

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Power and politics

John Chesshire

World Nuclear Energy: Toward a Bargain of Confidence.

Edited by Ian Smart.

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EISENHOWER'S "Atoms for Peace" declaration of December 1953 heralded a period of impressive and largely untroubled nuclear cooperation, offering assistance in the development of peaceful uses of atomic energy in exchange for the promise that such assistance would not be diverted for military purposes. Verification was to be undertaken through a system of safeguards enforced by an inspectorate, a principle that was enshrined in the creation of the International Atomic Energy Agency in 1959. The emerging bargain of confidence was taken a significant stage further with the Non-Proliferation Treaty of 1968.

By the early 1970s, therefore, not only was an international framework for nuclear power development evolving satisfactorily, but an increasing number of countries had embarked on sizeable nuclear power programmes and few had mastered more sensitive technologies such as enrichment and reprocessing. Thus the period between 1953 and 1973 can now be viewed as the golden era of cooperation — although, with hindsight, optimism within the nuclear community probably led to a glossing over of incipient tensions and an underestimation of the fragility of international nuclear diplomacy.

When India exploded a nuclear device in

1974 this community was shocked, perhaps more than anything at its own naive complacency. Amongst many other responses were the creation of the "London suppliers club" in 1975 and a hardening of US policy evidenced in the Nuclear Non-Proliferation Act of 1978. Further, at the same time the economic ground of nuclear power was shifting. The oil "crisis" of 1973 had led to huge increases in planned nuclear generating capacity, an unseemly scramble for uranium supplies and calls for greater expenditure to support the rapid development of fast reactor and fusion technologies. But the late 1970s witnessed reduced forecasts of economic growth and electricity demand, lengthening construction lead times, cost escalation, patchy plant operating performance and the incident at Three Mile Island. Both the diplomatic and economic bargains were in doubt.

These looming uncertainties were important factors leading to the formation of the International Consultative Group on Nuclear Energy (ICGNE) in 1977, under the co-sponsorship of the Rockefeller Foundation and the Royal Institute of International Affairs. Almost contemporaneously, the International Nuclear Fuel Cycle Evaluation (INFCE) exercise was launched to undertake an essentially technical assessment of the relationships between civil nuclear power and nuclear weapons proliferation.

In contrast to the large-scale and official intergovernmental nature of INFCE, the ICGNE group comprised some twenty individuals only, meeting privately and in their personal capacities. As such, its deliberations were far less inhibited, ranging over many of the vexed international, political and economic issues