

Self-conscious asides

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Animal Thought. By Stephen Walker.
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FIFTEEN years ago, my interest in comparative psychology made it necessary to keep a number of different animals. A distinguished worker in artificial intelligence happened to visit me and asked: "Haven't you got anything better to do than keep a zoo?". Although at the time his remark seemed to lack a proper appreciation of the scientific spirit, the subsequent history of comparative psychology suggests that he may have had more sense than I credited him with.

At that time comparative psychologists were painstakingly measuring the performance of different groups of animals on a large number of learning tasks. They were trying to construct a two-by-two table on which the axes represented tasks and groups, and the cell entries represented performance. Apart from keeping themselves busy, they had two aims. First, by discovering sets of tasks in which any species that could perform one task could perform all the others, they hoped to infer the nature of the skill needed for all the tasks in the set. Second, by examining the neuroanatomical differences between the species that could and could not perform a given task, they hoped to learn about the brain mechanisms underlying successful performance. For several reasons this laborious approach to the problem of comparative intelligence proved a failure. It turned out that in many cases whether or not an animal could be trained to perform a task reflected not its own native wit, but the ingenuity of the experimenter in devising training appropriate to the animal's natural way of life. Moreover, the assumption that the same anatomical part of the brain, as defined by its evolutionary origin, has the same role in all species is false. Removing the hippocampus in a rat has very different effects on behaviour from those produced by removing it in man. Finally, there is often as wide a range of ability on a given task within a group as between groups.

Although Stephen Walker sets out to answer the question how far animal and human thought are similar, he is thoroughly aware of the difficulties that beset comparative psychology. He starts with a historical review of the opinions of earlier authorities, which is more interesting in its asides than in its main theme. Thus, it is of little consequence that Descartes thought animals (and machines) could never have knowledge or language, but it is of interest that Locke formulated the recently rediscovered concept of "working memory" (only a small number of ideas can be simultaneously manipu-

lated in consciousness) and that far from inventing the association of ideas as a general explanatory principle, he thought it was a thoroughly bad thing and was the explanation of the "madness, found in most men". Darwin was curiously soft on animals, ascribing to dogs a sense of humour and a belief in the supernatural. As to the behaviourists, they denied thought to both man and animals thus placing them on the same level.

Walker concludes that little reliance can be placed on the authorities and that one can only decide whether animals think like man by examining how far their behaviour and neuroanatomy are similar to our own. The idea that similarities in neuroanatomy are relevant to consciousness is not new. Walker quotes Charles Kingsley satirising Thomas Huxley who is made to declare that apes have "hippopotamus majors" in their brains just like men:

You may think that there are more important differences between you and an ape, such as being able to speak, and make machines, and know right from wrong, and say your prayers, and other little matters of that kind; but that is a child's fancy, my dear. Nothing is to be depended on but the great hippopotamus test.

Walker gives a clear account of comparative neuroanatomy, in which he displays a pleasing cynicism about the specious generalizations often drawn in that field. Much effort has been wasted measuring brain size and wholly useless equations have been produced, such as the formula governing the (approximate) ratio of brain weight to body weight, which for mammals and birds is $E = 0.07^{0.67} P$ (where E is the expected ratio and P is the body weight). Some intelligent species such as man, the crow and the porpoise have a brain weight considerably in excess of that predicted by this formula, but measuring brain size is no more likely to tell us anything significant about how the brain works than measuring the size of computers is to reveal the programs they can run. Moreover, the appearance of body weight in the ratio is curious. Birds, for obvious reasons, are very light, and so are sharks which have a cartilaginous skeleton and therefore turn in a high brain/body-weight ratio, although they are regarded as a primitive order of fish. Neanderthal man probably had a higher ratio than modern man, though he may of course have been more intelligent. As Walker remarks, since nobody has succeeded in assessing the intelligence of animals (or man come to that) objectively, there is no good evidence for an association

between intelligence and the brain/weight ratio.

He is equally scathing on the doctrine of encephalization of function, that is that in vertebrate evolution the locus of behavioural functions moves progressively forward in the brain, particularly into the forebrain, and neocortex. He points out that the hypothalamus is present in teleost fishes and can be regarded in all vertebrates as the head-ganglion of the autonomic system: its functions do not seem to have shifted. Moreover, although they only have a rudimentary cortex, birds display learning abilities in no way inferior to those of many mammals.

After an interesting but speculative chapter on the survival value of intelligence, Walker concludes with a survey of perception and memory in animals and an account of monkeys' use of knowledge and their ability to learn to use signs. He is somewhat preoccupied with the notion of conscious thought, and takes as evidence for it the finding that many animals can be trained to wait for a minute or more after having received a signal to respond, and can still make the correct reaction. But this surely does not imply that the animal has a conscious memory of the signal. Again, recent work on animal learning proves that animals do not learn merely to make responses on the basis of rewards and punishments — they learn what sequences of events occur, but this does not demonstrate that they have conscious expectancies, even though they act as though they do. Indeed one of the main problems with consciousness is that nobody has been able to suggest any evolutionary advantage for it. Men can learn and carry out highly skilled and complex motor patterns without being conscious of how the movements are executed and it is not apparent why taking certain decisions or using language should involve consciousness.

Walker is in fact concerned that consciousness may be bound up with language, in which case one would have to deny animals conscious thought. But we do not deny consciousness to infants and on her own account Helen Keller, who was deaf, dumb and blind, was conscious before she learned to communicate. Regardless of language, the similarity between human and animal behaviour and neuroanatomy surely justifies Walker in ascribing conscious thought to primates and other higher animals, but neither he nor anyone else is ever likely to penetrate the thoughts of a lamprey.

Animal Thought is a well-written and stimulating book, containing occasional flashes of wit. But it is interesting more for its *obiter dicta* and for its way of dealing with hallowed nonsense than for its main message which will surprise few readers. ††

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