

that income differentials also support his thesis, since the reason pinks can afford more expensive mental health care is that they are genetically more intelligent, and hence, more affluent.)

Rushton wields r- and K-selection as a Procrustean bed, doing what he can to make the available data fit, and in doing so, he ignores alternative interpretations. He even points to the higher frequency of low birth weight babies among black Americans, data that are undeniably consistent with an r-selection regime, but which are more reasonably attributed to poor nutrition and insufficient prenatal care, and which, not coincidentally, have other implications for behaviour, IQ not the least.

I suspect that r- and K-selection does in fact have some relevance to variations in human behaviour, notably the so-called demographic transition, whereby economic development characteristically leads to reduced family size, and, moreover, a greater reliance on a variety of 'K-type' traits. But this is a pan-human phenomenon, a flexible, adaptive response to changed environmental conditions of lowered mortality and greater pay-off attendant upon concentrating parental investment in a smaller number of offspring.

Finally, let me be clear that in my opinion, evolutionarily oriented research on human behaviour is appropriate and worthwhile, provided it is good research, carefully interpreted. 'If the earth actually moves', the devoutly Catholic Blaise Pascal is said to have commented, 'a decree from Rome cannot stop it.' Solar system astrodynamics are indeed independent of whether Church authorities favour a geocentric or heliocentric model, whereas social reality can in fact be changed, and perniciously, by the acceptance of biologically based racism. Rushton is none the less entitled to freedom of inquiry and freedom of speech; indeed, such freedoms are easy to espouse when the quality of inquiry is high and the drift of the speech agrees with one's own thinking. It is far more challenging to defend those such as Rushton.

Given the immense misery already attendant upon sloppy and irresponsible 'studies' of human racial differences, and the great potential for yet more abuse, workers in this area have a special responsibility. It is, furthermore, disingenuous for Rushton to criticize 'opponents of the genetic study of racial differences' for being 'either unable or unwilling to separate their political agendas from the scholarly pursuit of truth' (page 256), since, for one thing, Rushton's work hardly qualifies as the latter, and moreover, his own political agenda can readily be imagined. (At least he honestly acknowledges financial support from the

Pioneer Fund, although not surprisingly he says nothing about that organization's ultra-right wing political agenda.)

Having reached mellow middle age, and written books of my own, I have become correspondingly mellow when reviewing other people's efforts, a benevolence motivated in part, perhaps, by the hope of reciprocal altruism: if I'm nice to yours, maybe you'll be nice to mine. But I draw the line at *Race, Evolution, and Behavior*. Bad science and virulent racial prejudice drip like pus from nearly every page of this despicable book.

DAVID P. BARASH

*Department of Psychology,  
University of Washington,  
Seattle, WA 98195, U.S.A.*

*Animal Minds.* By D. R. GRIFFIN. Chicago: University of Chicago Press (1992). Pp. x+310. Price \$12.95 paperback.

In *Animal Minds*, as in his two earlier texts concerned with animal consciousness (*The Question of Animal Awareness* and *Animal Thinking*), Donald Griffin attempts to convince psychologists and behavioural biologists of the importance of understanding the consciousness (by which Griffin seems to mean the thoughts and feelings) of the animals they study.

Griffin's argument as to why we must consider animal consciousness has three parts. First, as Griffin demonstrates overwhelmingly, the behaviour of animals is flexible. Indeed, most of *Animal Minds* is devoted to recounting classic and contemporary tales of the versatility of the behaviour of animals as they search for food, stalk prey, use tools, communicate with their fellows or communicate in the laboratory with human experimenters via various contrived 'languages'. These concise and informative accounts make accessible to an audience of reasonable sophistication (say senior undergraduates) much elegant work in animal behaviour. Surely, after reading descriptions of the dozens of instances Griffin provides, no one would doubt (if ever they had) that the behaviour of animals is responsive to external conditions.

The second stage in Griffin's argument, that understanding of behavioural versatility in animals can sometimes be facilitated by assuming that animals are cognitive beings capable of forming and executing plans, seeking goals, is also relatively uncontroversial, although Griffin seems to feel that there is a cabal of 'inclusive behaviorists' unwilling to accept evidence of cognitive abilities in animals and therefore unable to accept the third and final stage of his argument.

In fact, it is the third part of Griffin's argument, not the second, that causes all the trouble. Griffin asserts reasonably enough that the cognitive abilities of non-human animals suggest that they, like humans, may have thoughts and feelings. He concludes that we must study these thoughts and feelings if we are to understand other species fully.

There is, however, a long-recognized problem in incorporating the study of animal consciousness into the study of animal behaviour. That problem was described concisely by H. S. Jennings, the great invertebrate zoologist, when, in the penultimate chapter of his classic monograph, *Behavior of Lower Animals*, he considered the question of whether protozoans are conscious. Jennings wrote (1906, page 337): 'If Amoeba were so large as to come into everyday ken, I believe it beyond question that we should find attribution to it of certain states of consciousness a practical assistance in foreseeing and controlling its behavior . . . But such impressions and suggestions of course do not demonstrate the existence of consciousness in lower organisms. Any belief on this matter can be held without conflict with the objective facts. All that experiment and observation can do is to show us whether the behavior of lower organisms is objectively similar to the behavior that in man is accompanied by consciousness . . . But the problem as to the actual existence of consciousness outside of the self is an indeterminate one; no increase of objective knowledge can ever solve it. Opinions on this subject must then be largely dominated by general philosophical considerations, drawn from other fields.'

Many still feel, as did Jennings in 1906, that to use consciousness as a concept to explain or understand the behaviour of animals is a hopeless enterprise. Consequently, to persuade the scientific community of the converse, Griffin has to demonstrate not that the behaviour of animals is flexible or that treating animals as cognitive beings is sometimes useful; a substantial majority are already convinced of both those things. Rather, Griffin's task is either to provide direct evidence that animals are conscious (which I think he would agree is beyond the current state of the art) or to show that treating animals as conscious (not cognitive) beings advances our understanding, prediction or control of their observable behaviour.

Griffin considers data on communicative behaviour in animals the most promising avenue for investigation of animal consciousness and devotes one-fourth of the 12 chapters of *Animal Mind* to the topic. Almost an entire chapter is devoted to the 'symbolic' dances of honey bees. Here the

work of von Frisch, Lindauer and Gould et al. is described elegantly, and then, following a summary of Lindauer's classic descriptions of the dances of scout bees returning to a swarm and indicating the location of potential nest sites, Griffin (page 193) provides his first possible insight into the thoughts of bees while dancing: 'Although we can only speculate about what, if anything, these dancing bees and their sisters who follow the dances on a swarm are thinking, the vigorous communication suggests that they are thinking about a suitable cavity, perhaps similar to the one from which they have recently emerged.' If you find the inference of thoughts of nest cavities from observation of vigorous dancing intellectually engaging, you may well be convinced by the argument of *Animal Minds*. If, on the other hand, you fail to see how such speculations can promote our understanding of animals, you are likely to find Griffin's argument more aggravating than enlightening.

As Griffin admits, it is impossible to decide on the basis of current knowledge whether members of species other than our own are conscious. Griffin seems to believe that the issue can be resolved by further study of the behaviour of animals. However, he provides no clue as to how to go about searching for evidence that animals are in fact conscious that would be acceptable to the scientific community at large, dependent as that community is on the hypothetico-deductive method. Each of Griffin's many examples may suggest that animals have thoughts or feelings, but none proves it, and Griffin does not specify what kind of evidence would be sufficient to establish the existence of conscious thought in other beings. Many would argue, as did Jennings, that, in principle, evidence of conscious thought in animals cannot be obtained, and that unless evidence can be brought to bear on a question, that question lies outside the bounds of scientific inquiry. Griffin provides no satisfactory rejoinder.

In the end, Griffin's book fails to convince not, as Griffin implies it might, because of the narrow-mindedness or insensitivity of those who do not agree with him, but because of his own failure to answer directly and convincingly Jennings' implied, century-old question: how can animal behaviourists embrace the study of animal consciousness while remaining a part of the scientific enterprise?

BENNETT G. GALEF, JR

*Department of Psychology,  
McMaster University,  
Hamilton, Ontario,  
L8S 4K1 Canada*

References

Griffin, D. R. 1976. *The Question of Animal Awareness: Evolutionary Continuity of Mental Experience*. New York: The Rockefeller University Press.

Griffin, D. R. 1984. *Animal Thinking*. Cambridge, Massachusetts: Harvard University Press.  
Jennings, H. S. 1906. *Behavior of the Lower Organisms*. New York: Columbia University Press.

is  
a-  
le  
id  
s,  
le  
g;  
if  
o  
e  
r  
y  
f  
g  
i  
r  
e  
s  
l  
:  
:  
: