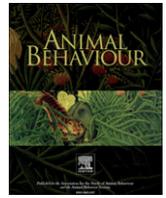


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## Book Review

**Cognition, Evolution, and Behavior. 2nd edn. By Sara J. Shettleworth. Oxford: Oxford University Press (2009). Pp. xiii+700. Price \$59.95 paperback.**

What does a butterfly think about? I was pondering this question on a recent trip to South America, looking at the dozens of species of butterflies fluttering about, seemingly without a care in the world. At first glance, butterflies do not seem to face many of the challenges that would require what we might categorise as ‘thinking’. Like many animals, they have to find food and mating partners and subsequently reproduce, both of which can be achieved by the relatively simple act of sampling different chemical signals from the air, then matching those signals to a neural template for what represents a good meal and a potentially successful romantic encounter. That’s about it: they have no need to think – to reason or predict another’s behaviour, consider their own past experiences and plan for the future, form concepts about number and time, or understand the properties of physical objects, such as tools. But what about the other animals I encountered on my trip, such as lizards, swifts, plush-crested jays, coatis and capuchin monkeys? When their continued existence also depends on finding food and mating partners, why do these animals need minds when animals such as butterflies may get along without them? This is the subject of Shettleworth’s book.

The first edition of *Cognition, Evolution & Behavior* (Shettleworth 1998) has been the essential handbook for all would-be adventurers of the animal mind for the last decade. It delivered a new foundation for the study of behaviour and cognition based on evolution and ecology. Knowing how and why a cognitive ability may have evolved has certainly revitalised this field, even if some researchers disagree about the importance of evolution as a tool for disentangling brains, minds and behaviour. For example, Bolhuis & Wynne (2009) recently suggested that comparative cognition was rife with anthropocentrism, had failed to take into account the role of convergent evolution when comparing the cognitive abilities of both closely and distantly-related species, and suggested that evolutionary interpretations of cognitive traits would never enhance our knowledge of the underlying mechanisms. These notions are dispelled in the pages of Shettleworth’s book.

Those who have used Shettleworth (1998) for their own teaching and research will find that the second edition is even better, not just because it has been thoroughly updated based on the exciting new findings about the animal mind since the first edition, but because Shettleworth also has something important to say about these findings within philosophical, neuroscientific, and ecological contexts. This book is perhaps unique in doing so, and the approach that she has adopted makes it much more than just another textbook. It is in fact

a monograph, covering a vast amount of literature (some 86 pages of references), but presenting Shettleworth’s distinct take on what may be going on inside an animal’s head when it faces the world.

Although the last edition was filled with examples from across the animal kingdom, especially those chapters concerning learning, foraging and navigation, studies of more complex aspects of comparative cognition, such as theory of mind, self recognition and physical cognition were restricted largely to primates. However, the field has finally embraced a truly comparative approach. This is certainly reflected in this second edition, which now reports on studies in invertebrates, fish, reptiles, dogs, elephants, cetaceans and particularly birds, such as corvids and parrots when discussing complex cognition. Shettleworth has also rearranged some of the chapters to reflect current thinking, such as placing the discussion of tool use with planning and goal-directed behaviour in a chapter on the consequences of behaviour. Initially I was sceptical of this, but it works well. There is also a new chapter on social intelligence including discussions on the hot topics of cooperation and theory of mind and removing the maligned term ‘cognitive ethology’ as a chapter title. The chapter on social learning has expanded to now include reports on the controversial subjects of animal culture and teaching. The chapters on traditional forms of learning are now easier to follow, as there is no longer the difficulty as in the first edition in getting all information on learning in one place. As in the first edition, the book is filled with the simple yet elegantly informative line-drawn illustrations of Margaret Nelson.

Shettleworth has spent her career exploring the animal mind, making seminal contributions to the topics of spatial memory, caching and metacognition, but this book will be seen as her crowning achievement. Although I disagree with many of her conclusions, and I’m sure she disagrees with many of mine; I cannot think of a better source book to initiate discussions of nonhuman mental states. Although I would recommend this book to my third year undergraduate and graduate students, more junior undergraduates will find many of the issues raised in this book difficult to follow. If only Shettleworth would also write a ‘lite’ version for first-year students, covering the same areas of comparative psychology and behavioural ecology but with fewer complex details. There would be few competitors for this market, as the other textbooks in this area, such as the excellent Pearce (2009) and Wynne (2001), focus more specifically on comparative psychology without discussing its relationship with ecology, ethology, and evolution.

We are finding out more about the animal mind every day, as evidenced by the wealth of discoveries reported in the daily press, papers published in the best journals, and that the field attracts some of the very best students. However, comparative cognition is facing a poor future. Funding across the world is at an all-time

low. In the U.K., the costs of keeping animals in captivity are prohibitively high. Stricter regulations on how animals should be kept in captivity and studied are having detrimental effects on even noninvasive behavioural and cognitive research. The beauty and tragedy of Shettleworth's book is surveying not just how much we have already learned, but also how much there is left to learn and whether we shall be in a position to add to our knowledge in the future.

Lewontin (1998) suggested that cognitive evolution was not a valid field for study, as cognition doesn't fossilize. He went on to question why we should be interested in whether birds or monkeys or dogs or butterflies think in the first place, as this question is impossible to even attempt to answer. If he were to study Shettleworth's book, he would see that this question is not an empty one and that we have made great progress in this endeavour. But there is a long way to go. It will not be an easy task and there will continue to be many differences of opinion and interpretation. It will demand experimental rigor, creativity, an appreciation of the natural world, an open mind, and I would add Shettleworth's book as a guide. We are some way from

knowing what a butterfly might be thinking, but finding out is going to be fun.

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