

approaches they endorse. For example, the authors who attempt to categorise general ethical attitudes employ different classification schemes with different terminology. There is apparent disagreement among some of the authors about whether students should play the predominant role in raising questions and articulating answers, or whether faculty should play the major role, and if so what kind of role. The essays also differ, sometimes markedly, regarding the extent to which students should be exposed to primary philosophical sources in animal bioethics. I have my own criticisms of some of the concepts and teaching methodologies described in these chapters, and other readers will doubtlessly have their own. Moreover, those of us who teach bioethics or animal welfare know that the kinds of courses we can offer and the issues we can cover sometimes depend highly on the existing general structure of our curricula, and on what we are allowed to do by our faculties and students. (For example, although I agree with several of the authors that considering ethics and welfare cases ideally should be accompanied by having students study philosophers like Descartes, Regan, and Singer, I do not have enough time to do this in my courses in veterinary ethics. Nor am I confident that many of my veterinary students would tolerate more than the superficial treatment of animal ethics that I have the time to give them). If one views these chapters not as presenting the final word on how to teach animal bioethics or animal welfare – but as contributions to a hopefully growing process of collegial discussions among a variety of teachers – one can gain a great deal from this portion of the book. Although I have taught animal ethics to veterinary students and undergraduates for well over 20 years, I discovered in these chapters many new possible teaching methods that I will now consider incorporating into my courses. This is the highest compliment an instructor can offer a book on the subject of teaching courses in his or her field.

An important feature of the book is that it is directed intentionally at issues relating to animal bioethics and animal welfare in Europe. European cultural values, laws, husbandry practices, and educational institutions form the background for all of the chapters. This means that some of the discussions may not be easily applied in other lands. For example, the authors of the chapter on stockpersons concede that large farms in the United States have too many animals to allow for some of the techniques discussed in their chapter. And some of the suggestions for governmental promotion of animal welfare may (at least at present) fall on deaf ears in the US and other countries in which legal regulation of farm animal welfare is minimal. However, its European emphasis is not a weakness of the book by any means. Indeed, I strongly urge instructors of courses in animal bioethics and animal welfare in Canada, the United States, and other countries to read the volume to learn more about developments in teaching these subjects in European universities.

In conclusion, this book is well worth the attention of educators and scientists with a serious interest in the teaching of animal bioethics or animal welfare.

*Jerrold Tannenbaum*  
*School of Veterinary Medicine and School of Law*  
*University of California at Davis, USA*

### **Cognitive Science: An introduction to Mind and Brain**

Edited by D Kolak, W Hirstein, P Mandik and J Waskan (2006). Published by Routledge, Abingdon, Oxon, OX14 4RN, UK. 233 pp Hardback (ISBN 9780415221009). Price £18.99.

Sentience is the fundamental aspect of animal welfare. As such, it is of merit for the animal welfarist to make acquaintance with issues of the mind and brain, of consciousness and cognition, and the title of this book tempts to offer this.

*Cognitive Science* is a human-oriented text which undertakes to examine “the various forms of cognitive activity that make human beings stand out so starkly against the backdrop of other biological entities”. Covering, however, such areas as ‘perception’ and ‘action and emotion’, it is here reviewed for its possible relevance to non-human animals and their welfare. It is authored by four professors of philosophy and neuroscience from institutions in the USA. The present reviewer has taken a basic course in consciousness and cognition as part of postgraduate studies in animal welfare, so would likely be amongst those who would benefit from an introductory text on the subject. A commendation on the book’s cover claims that it is “easy to follow” and will appeal to “undergraduates and experts alike”.

The book begins by introducing the new discipline of cognitive science that has emerged in recent years, and celebrates its value as a collaborative, interdisciplinary field of endeavour; an approach that will be familiar to those in the animal welfare field. Encompassing such areas as cognitive neuroscience, artificial intelligence, linguistics, philosophy, cognitive neuropsychology, cognitive psychology and anthropology, the new science is hailed for having generated understanding that has “toppled traditional disciplinary paradigms and taken the academic community by storm”. In the introduction, neuroscience receives special attention as cognitive science’s “driving force”, and the representational theory of mind is identified by the authors as the theme behind the arrangement of the chapters.

In chapter 1, ‘Beginning concepts’, the origins of cognitive science are considered, and short historical accounts provided therein of philosophy, neuroanatomy and physiology, experimental psychology, linguistics and artificial intelligence. The representational theory of mind is introduced and some theories of mental representation are described. The chapter is not always easy to understand, and fails in places to maintain the tone and level of detail of an introductory text.

Chapter 2, ‘Windows on the brain and mind’, examines some of the methods available to study the brain and mind, including neuroanatomy and neurophysiology, cognitive psychology and computer science. Approaches such as

brain lesion studies and functional neuroimaging will be familiar to those in the animal welfare field, but cognitive psychology and computer science may be less so.

Perception, the subject of chapter 3, is described by the authors as “the gateway to cognition”, and is of great relevance to animal welfarists on account of the variety of perceptual abilities held by the many animal species they study. Accounts of the neurophysiology of vision and hearing are followed by topics such as sensory memory, philosophical theories of perception and the theory-ladenness of perception. Amongst the philosophical theories, direct (‘naive’) realism – the “common sense view of perception”, whereby we see the world as it really is – seems the most relevant to considerations of animal perception, whereas idealism – claiming that nothing exists independently of our minds – whilst interesting, seems more theoretical and difficult to relate practically to the animal field. A discussion on “seeing” in the section on the theory-ladenness of perception, by contrast, is relevant to animals; the example of a newborn baby being shown a cathode-ray tube and considering what the baby “sees” can equally be applied to non-human animals. The chapter is fascinating, but again could be criticised for failing to maintain lucidity.

Chapters 4 and 5 cover ‘Thought’, and ‘Action and Emotion’, respectively. The chapter on Thought covers memory, reasoning and knowledge, whilst the Action and Emotion chapter examines “how we move and what moves us”. The latter chapter examines the neurophysiology of emotion and discusses some of the philosophical and psychological views of emotions, and their relationship with cognitive function, that have led to the view of emotions as being essential to learning theory: a familiar message from animal trainers and behaviourists who cite the inhibitory influence of fear on learning.

Language receives attention in a chapter of its own, chapter 6, and its relevance, unsurprisingly, is largely restricted to humans. An interesting comparative aspect is, however, included in a short section on language-use by non-humans, which describes the early efforts to teach apes to talk and use American Sign Language, and more recently the

insights offered by the bonobo, Kanzi, and his use of a lexigram system at Georgia State University.

The final chapter, ‘Consciousness’, should arguably be the most relevant to animal welfare, if we recall and accept the opening statement of this review that sentience is the fundamental aspect of animal welfare concern. Different kinds of consciousness – ‘creature’, ‘transitive’ and ‘state’ - are discussed, the question “is consciousness physical?” is posed and examined, and the chapter ends with “the binding problem” – how functions achieved by different parts of the brain combine their output into a single conscious percept. This remains an unanswered question.

The subject matter covered by this book is fascinating, but my fear is that the book doesn’t wholly achieve that to which it claims. I find myself disagreeing that it is a “clear... introduction to the subject”, and that it is “easy to follow”. That this analysis should be shared by other readers will depend on the readers’ knowledge of the subject (and intellect!), but pre-existing knowledge should not be a requisite to acquiring optimal benefit from an introductory text. The book’s cover promises illustrations and examples to aid the student, and these are plentiful and in many cases useful. Some, however, such as a diagram of visual pathways in a monkey brain are complicated and, more importantly, ill-explained. My feeling is that would-be readers would have also benefited from chapter summaries.

In the book’s defence, it is unlikely that it was intended to be read from cover-to-cover, nor to be divorced from an accompanying lecture course. Above all, it makes no claim to be of relevance to animals or their welfare and for those, like me, who appreciate more direct insights into the application of this fascinating and important field to animals, time would be better spent reading an alternative text that offers this; ‘*Consciousness, Cognition and Animal Welfare*’ (Kirkwood *et al* 2001), being an example that comes to mind.

Sean Wensley  
Bristol, UK

### Reference

Kirkwood JK, Hubrecht RC, Wickens S, O’Leary H and Oakeley S 2001 *Consciousness, Cognition and Animal Welfare. Animal Welfare 10: Supplement 1*