behavioural research on non-human animals. It includes a brief box on ethical considerations in behavioural research in which the authors make some general remarks about the importance of complying with regulations regarding the use of human or non-human species, and of obtaining necessary approvals from relevant regulatory bodies. However, the fact that the book is focused around research on humans should not put off those interested in animal behaviour. Much of the advice given is generic, and equally applicable to studies of both humans and other animals.

The emphasis of the authors' approach is very much on within-subjects designs. They advocate the benefits of obtaining very detailed data on the behaviour of a few individuals, as opposed to few data on many. As a consequence of this emphasis, the book contains particularly good discussions of the pros and cons of different types of within-subjects designs that are often lacking in more general texts on experimental design. It also contains a whole chapter tackling the importance of behavioural stability and how to determine whether you have measured your subjects for long enough, which are problems faced by all those involved in training animals.

Some of the advice provided may appear quirky to those coming from other branches of the behavioural sciences. For example, the authors are somewhat unconventional in actively discouraging the use of inferential statistics in data analysis. Instead, they favour a descriptive, graphical approach based on examining the behaviour of individual subjects. They argue that because changes in behaviour occur within individuals, orderly relationships between environmental variables and behaviour can only be seen by looking at the behaviour of individuals. Whatever your views on the value of inferential statistics, there is no doubt that many students of animal behaviour would benefit from being trained to look more carefully at individual data. The authors provide a very clear explanation of why summarising the data from several subjects using a single statistic, such as an average, can, in some circumstances, provide an extremely misleading picture of what individuals are doing.

So which readers of *Animal Welfare* do I think would benefit from reading this book? The book has clear relevance to practitioners using behaviour analysis methods in behavioural therapy. The strategies and tactics discussed are directly applicable to those using a scientific approach to understand the environmental factors involved in the performance of abnormal or antisocial behaviours and in devising appropriate strategies for altering problematic behaviour. The other group for whom the book appears relevant are researchers, like myself, who use the theories and methods of operant psychology as a tool for asking animals questions about their welfare. For example, the widespread application of consumer demand theory for asking animals what they want (Dawkins 1983), and the recent use of 'cognitive bias' as a novel measure of affective state in animals (Harding *et al* 2004; Matheson *et al* 2008), both make use of operant techniques. Researchers in these fields can differ in their use of operant terminology, and

could benefit from the clear definitions provided in this book. For example, in her recent attempt to provide a scientific definition of animal suffering Dawkins (2008) defines suffering as the emotional state caused by negative reinforcers. From what she writes, it is quite clear that she equates negative reinforcers with punishers, and is therefore arguing that suffering occurs when animals are exposed to stimuli that they will work to avoid. However, strictly speaking, as we learn from this book, negative reinforcers are, "A class of stimuli that are terminated immediately following responding, resulting in an increase in some aspect of the response class over baseline levels", and, therefore, like positive reinforcers, something that we would expect animals to work to obtain. Whilst I doubt that Dawkins' misuse of a term will detract from the point that she is trying to make, it would be a shame if the next generation of animal welfare researchers was not exposed to the rigorous language and techniques developed in the behaviour analysis literature.

In summary therefore, I believe that anyone engaged in analysing of the behaviour of individual animals could gain something from reading this book. As well as containing much sound generic advice, and some thought-provoking essays on specific issues, this book also provides a clear introduction to the terminology and approach of modern behaviour analysis.

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Why Dissection? Animal Use in Education

At the very beginning of this book the reader is asked to recollect school animal dissection from our own pasts. I still feel queasy at the memory of the sacrifice of a female rat to the greater understanding of reproduction by 13-year old boys in the late 1970s. The heavy-jowled, harrumphing biology master demonstrating the mammalian method of coition on a formaldehyde-reeking carcass, with the aid of a blunt needle. Did this help our understanding? Maybe there was some util-

itarian benefit in stunting our own development, I can recall no teenage pregnancies from my school year.

The practice of dissection ought to be of interest to those of us working in animal science education, particularly perhaps those of my own generation who were at school and university in the UK when compulsory dissection in biology classes was beginning to be rejected. Indeed, braver souls than myself as an undergraduate simply refused to attend such classes, I being too feebly concerned for my grades, cowardice that was quite rightly not rewarded alas. Currently, in my experience, some students want it and some don't.

There is plenty in this subject for extended discourse that a book of this sort could provide, but unfortunately this is not quite the book to do it. Controversy regarding the use of dissection is alluded to but there is little or no exploration or analysis of this. There is almost nothing on the ethics of using animals in this way. The utilitarian calculus of possible benefits and costs, by the animals in this case, is unreported. Likewise, no discussion of the Kantian view of the possible damage to students' self worth through cutting and dismembering animals that have been slaughtered for their use, and the effect on their future behaviour towards living animals and humans. Oddly, Hogarth's 'four stages of cruelty' is included as an illustration, but as an example of something more mundane. Indeed, a book on this subject ignoring not only Kant, but Bentham and even Peter Singer is surely leaving gaps that are not trivial.

There is no discussion, or so tiny as to be negligible, of how other societies and religions might prevail on student behaviour and actions. There is a chapter on student perceptions of, and emotional responses to, animals, and this is interesting. It provides some, to me at least, new information that pulls examples from outside the American experience (more on this later). But there is still no analysis of the ethics of using animals for dissection.

There is an interesting review of the history of dissection as an educative tool, from Aristotle onward, but this discussion is in isolation, with little attempt to put it into the context of modern educative practice. This is not an isolated instance, the chapter titled 'The context for dissecting: educational testing' fails to put dissection into context, it even admits that "dissection… will scarcely be mentioned… in this chapter" which is a little odd. What therefore is the sense of the title? Nevertheless, the authors are right that opponents of dissection in the classroom assume that there is a plentiful and easily-available supply of alternatives which is not necessarily the case, in part because of cost. Examples are given of suitable sources, and these are useful. Practical advice for teachers is provided with lists of suppliers of alternatives and information providers, while seeming to suggest throughout that dissection in the classroom as an educative tool remains desirable, and that it is, at least in America, the norm. But the book doesn't really address the problem of how to ensure parity and equality of experience and opportunity for the taught. If students choose not to take part in the dissection of animals how can educators ensure that will they be at no disadvantage to those that do? The days of sending recalcitrant students off to the library to find out for themselves, while concentrating efforts on the more malleable members of a class, are over.

A sharper editor might have helped with some of the text structure. There are several enormously long tables, more than one sprawling over seven pages, that might have been better off in an appendix. This presentation is proposed as an aid to accessing information. I am not sure that this is so, and it interrupts any flow that the reader may have. Indeed ,one table, covering five pages, interrupts a single sentence. The tables could also have been edited to make more pleasing use of the page, some have significant blank areas that make the tables look as if their presentation has not been considered important.

This book is primarily written for schoolteachers, and although presumably intended for an international audience is hugely parochial. The crisis of science in America is discussed, as is teaching practice, course design, assessment and legislation. It is as if what happens elsewhere is of no importance, although there is a nod to a Norwegian database and some figures from UK and Australia (both 15-years old) regarding the prevalence of dissection in schools. Four-of-the-eleven chapters are exclusively about the American experience. American readers might also feel that Californian interests are over-represented, a four-page chart informs the reader of learning outcomes for science in education lifted directly from that state's Board of Education. Again, little effort is made to integrate this into the wider topic of the book's title.

The literature and resources suggested lean heavily towards sources from the internet, which is perhaps to be expected. But the unfortunate consequence of internet sources is that they soon become unaccessible; indeed, the first of the listed databases' addresses is already listed as unavailable. Thankfully, the website companion to the book remains active.

So what would current biology/animal science educators gain from this text? They may find such a book interesting for some of the access to ideas for replacements for animal dissection, and for those employed in America useful tips on course design and assessment of science education in their country. But their opinions would not have been challenged and questioned, which is a pity. Why dissection? Why indeed?

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