The Continuing Evolution of Animal Learning

Michael Domjan and Barbara Burkhard
The Principles of Learning and Behavior
405 pp. $21.95

Roger M. Tarpy
Principles of Animal Learning and Motivation
Glencoe, Ill.: Scott, Foresman, 1982.
403 pp. $19.95

Review by
William Timberlake

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Animal learning is no longer the crown jewel of psychology. The heady time is gone when philosophers, theorists, empiricists, and practitioners gathered at lunch over forgotten sandwiches to debate the new age of behavioral therapy. In fact, it has become popular in some areas to view the field as on the way to extinction. Its subject matter and discoveries are old hat; the exciting research and new topics are elsewhere. As these two books emphasize, however, the last fifteen years of research in animal learning have witnessed a continuing series of quiet revolutions related to topics such as cognitively based conceptions of contingencies, evolutionary and ecological theories of learning and performance, the definition of reinforcers, behavioral regulation and optimality theories, and choice theories. In many ways the field has never been healthier, though this health is expressed in an enormous diversity of emphases, sharp conflicts over basic assumptions, and a lack of connection between researchers at the changing edge of the field and the main body of consumers.

The stress and uncertainties of summarizing these changes have been reflected in undergraduate learning texts. Previous texts could organize the field around a series of obvious problem areas and long-standing arguments. Though there were classic battles as to particulars, the nature of the basic problems seemed clear. What is now at stake is agreement about the fundamental problems and subject matter appropriate to the study of learning. Put another way, it has become difficult to agree on the mix of classic and new problems that defines the field and guides research. It has become even more difficult for a single person (or even two people) to explain with clarity the diverse areas of research that make up the field.

Given the diversity of current research, these two books show surprising agreement in their coverage. Both maintain the basic paradigm organization of learning (Pavlovian versus instrumental conditioning) while adding strong emphases on two more recent areas of interest: cognition in animals and the evolutionary and ecological bases of learning. The books differ considerably, however, in how they approach the newer material. Tarpy provides the clearer and more sophisticated arguments that "learning functions and is expressed within the constraints of the animal's biological makeup" (preface); but he follows this point of clarity by largely relegating research on the evolutionary and ecological bases of learning to a separate chapter, isolated from the classic general law approach reflected in the remainder of the book. Thus, the potential power and integrative aspects of the evolutionary approach are blunted.

What Tarpy does try to thread through the book is the classic cognitive concept of expectancy. He defines learning as "fundamentally a cognitive or mental activity by which organisms come to predict or expect future events" (preface); in other words, "learning is the acquisition of expectancies" (p. 7). I recognize that intuitions based on cognitive concepts like expectancy have strongly influenced recent research and theorizing, and I appreciate Tarpy's attempt to provide a general framework for animal learning. Still I do not think the concept of expectancy is sufficiently well defined and powerful to capture the essence of the field. The more restricted notion of stimulus expectancy works very well in areas where it is clearly defined and limited in application, but in other circumstances it is grafted onto the data by appeal to more complex functions such as response expectancies and degraded representations, and in some performance areas it makes no predictions at all.

Let me make clear that part of my reaction is a matter of taste. Tarpy is neither doctrinaire nor simplistic in his arguments, and the book is not dominated by his position. Expectancies, as they are frequently used, however, are not really complete explanations of behavior but phenomena to be established and explained. In many cases Tarpy follows others in using expectancies simply as catchall descriptions of effects that appear to require a level of organization that is more complex than a peripheral representation of the instrumental response. But proof that a simple peripheral explanation is inadequate does not require that we accept the importance of expectancies and their efficacy as causal concepts. Put most succinctly, the broad use of expectancies and cognitions as general explanations of behavior remains entirely too grounded in our own (demonstrably faulty and quirky) experience (e.g., Nisbett & Ross, 1980; Tversky & Kahneman, 1981) and too little connected to more careful analyses of controlling variables.

The Domjan and Burkhard book takes a more conservative tack with respect to cognition and a more satisfying tack with respect to the role of ecological variables in learning. In the latter case, rather than isolating biological and species-relevant learning to a unique chapter, the authors considered examples under appropriate topics. In the case of the former, they also included cognitive material throughout the chapters under appropriate topics,
though several interesting developments were grouped in a separate chapter.

Both books are well written and nicely produced. Domjan and Burkhard add an attractive sprinkling of photographs and drawings to their figures, whereas Tarpy sticks largely to graphs (with the notable exception of a few frontispieces to each of the chapters). Domjan and Burkhard also include a number of "boxes" in their chapters, but these boxes are not used consistently. Both books have approximately the same number of chapters and pages, though Domjan's book covers more material because of larger pages (double-column format). Both books are reasonably broad and quite clear in their coverage. Speaking relatively, Domjan and Burkhard's book is slightly broader, simpler, and more eclectic, whereas Tarpy's is slightly more restricted, theoretical, dense, and closely reasoned. These characteristics are correlated with differences in the number of consultants (9 for Domjan and Burkhard vs. 3 for Tarpy) and in the number of references (660 for Domjan and Burkhard vs. 1,050 for Tarpy). The level of scholarship is quite high in both books, and neither shies away from complex material.

In terms of content, both books include chapters on Pavlovian and instrumental conditioning, stimulus control, interactions between Pavlovian and instrumental conditioning, and aversive control. Domjan and Burkhard add chapters on the organization of instinctive behavior, habituation and sensitization, reinforcement, and cognitive aspects of animal behavior. Tarpy adds chapters on extinction, memory, motivation, and biologically specialized learning. Frankly, I expected the extinction chapter to be "dull as dirt," but it was not. Tarpy put together a diverse material in a pleasing way and tried to marshal evidence that extinction is not the same kind of learning as acquisition; the chapter might profit further from more development, including Nevin's notion that resistance to extinction is a fundamental measure of response strength. The memory chapter was slightly thin considering the recent material available, and the motivation chapter was a solid, though perhaps dated, review of neoclassical motivation (with the addition of the opponent process model).

I was impressed by Domjan and Burkhard's chapter on reinforcement. It was a nice integration of classical and modern attempts to specify the nature of reinforcerment and was particularly unusual in its coverage of the behavioral homeostasis approach (e.g., Timberlake, 1980). Having a vested interest in this area, I thought the coverage left something to be desired in its relating of Premack and response deprivation (as well as short-changing the sometimes complex work of Collier, Rachlin, Krebs, and others); but this complaint should be viewed against the fact that this material was not even mentioned in Tarpy's book. I hope this chapter marks the beginning of a clearer consideration of the importance of this general approach with its ties to the definition of reinforcers, optimality theory, economic analyses, and foraging theory.

In contrast, I felt that the Domjan chapter on the structure of innate behavior stuck out as unconnected with the remainder of the book. Unless the information provided is used directly in the analysis of learning (an attractive possibility to me), I think such chapters may confuse students as to what they are studying. I liked the chapter on habituation and sensitization but was surprised to find opponent process theory there; I would have liked more development. Both books might have profited from a final integrative "Where-do-we-go-from-here?" chapter. Finally, there is always a potential problem in fitting together the work of multiple authors. I thought Domjan and Burkhard did a good job in this respect, but I would like to have seen fewer differences among chapters in the styles of diagramming learning effects and more emphasis on parallels between classical and operant conditioning.

As these books attest, animal learning remains a bastion of precise and clever experimentation. We should not forget that animal learning has shaped the way experimental psychology is done in a variety of areas. It is now renewing itself to a great extent with concepts borrowed from other areas, but this exchange is not one-sided. Animal learning still has much to offer in terms of techniques, questions, and answers. The problem has largely been how to convey adequately the techniques, interest, and complexity that characterize this area. These books provide at least a partial solution.

Animal learning has a long history of carefully expunging mentalism and instincts from its world view; it is now in the odd position of attempting to integrate aspects of these viewpoints into a coherent whole. This time around, these viewpoints are much more solidly based in research and theory, but we should not forget entirely the excesses and foibles of their origins. Ultimately, we cannot ground psychology in common sense, hedonism, cognitions, instincts, or enlightened rational behavior. All of the mechanisms referred to by these concepts must operate within evolved structures related to stimulus sensitivity, decisions, and amount and type of behavior. It is these structures that we are after.

References

Behavior Genetics for the Undergraduate

Linda K. Dixon and Ronald C. Johnson
The Roots of Individuality: A Survey of Human Behavior Genetics

Review by
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Throughout its history behavior genetics has had more than its share of problems. Initially, it was the misused tool of elitists and racists. Later it had to contend with the strong experimentalist movement in psychology and its discounting of the im-