

Book Reviews

Verbal Behavior. B. F. Skinner. Appleton-Century-Crofts, New York, 1957. x + 478 pp. \$5.50.

This important book examines complex verbal behavior with an objective, functional, or causal analysis that has no use for "ideas," "images," or "meanings."

The basic model for language production is a simple one and is derived from the author's extensive investigation of the operant conditioning of infrahuman organisms. The pecking of a pigeon is an *operant* (it operates on the environment), and its rate and pattern of occurrence can be brought under the control of various stimuli—kind and schedule of reinforcement, drive states, colored lights, and so forth. The question for the present analysis, simply put, is: What determines the strength—simple occurrence, frequency, energy level, and so forth—of particular kinds of verbal behavior?

The *verbal operant* becomes the dependent variable in this account and is set apart in that its reinforcement is socially rather than mechanically mediated. The system is, in short, a taxonomy of the controlling variables and controlling relations for verbal operants. Several kinds of verbal operants are distinguished, but they must be defined not by their form but by their controlling variables and controlling relations. A most important type he has called the *mand*, a term with a certain mnemonic value for demands ("Let me go!"), requests ("Be a good fellow and get me a drink"), and so forth. Mands are specific to their reinforcement and are under the control of deprivation or aversive stimuli. Other verbal operants—*echoic*, *textual*, and *intra-verbal*—are under the control of verbal stimuli. The *tact* is the most important of verbal operants, and its capacity for "naming," "announcing," or "describing" has been the exclusive concern of many traditional formulations. In contrast to the *mand*, reinforcement is not specific to the response: It may be a nod, a warm smile, or even a softly voiced "umhm." It is by generalizing the reinforcement that control comes to be concentrated in the stimulus object or some property of that object. *Audiences* constitute an obvious kind of control over style, tone, topic, and so forth. The basic

model is extended and gains generality in chapters on multiple causation, supplementary stimulation, and combining of fragmentary responses.

Skinner's approach to language is not one that gains a degree of success from excessively modest aims. He has accepted the challenge of ordinary conversation, composition, self-editing, and even scientific discourse. His discussions of metaphor, literary style, and verbal wit persuasively argue for the generality of the model. No psychologist has ventured an account of verbal behavior of this complexity, and with certain qualifications, it is a remarkably plausible account. Though structural linguists will wonder why Skinner finds their contributions of so little use, all should be impressed by the ingenuity of his discussion of grammar and syntax.

There is, however, something puzzling about the author's spirited rejection of "ideas," "images," "intentions," and "meanings" as "fictional causes" (page 5) and "explanatory fiction(s)" (pages 6-7). Though this position is maintained throughout, he acknowledges that "some verbal behavior [for example, "I feel depressed"], however, is under the control of stimuli to which the speaker alone is able to react" (page 30). These instances are not at all uncommon but range from "heartburn to Weltschmerz" (page 132).

After an expressed reluctance to deal with such private controls, there follows a brilliant analysis (pages 130-138) of the reinforcement conditions under which private control is established—an analysis that might well be extended to "ideas" and the like. Apparently, however, the acknowledged private controls are substantively more "emotional," and "ideas" are all too "mentalistic." It will be difficult for many to see why emotions, which are not less a challenge to operational treatment, are less objectionable as intervening constructs than cognitions. This seems a peculiar ontological distinction to make when the position is defended throughout on methodological grounds. There are repeated instances of hesitant, almost wistful, recognition of private control, but they are never given full status in the system. In a final chapter, Skinner is pressed by the thoroughness of his own analysis to acknowledge nonemotional, nonverbal, covert proc-

esses (pages 448-449), but they are not specified further. Nor is there a discussion of the implication of this acknowledgment for the behaviorist manifesto of earlier chapters.

Skinner's reluctance to give systematic recognition to private control leaves him hard put to give a testable explanation of verbal behavior when the hypothesized controls are long-ago or far away. Since the system provides no means by which prior stimulation can be stored, control must necessarily be remote, and this seems very unlike the control of a blue light over the pecking of a pigeon. Granting the methodological difficulty of assessing private controls, an adequate account of the more interesting verbal operants would seem to require biographical data of an exactness extremely difficult to obtain.

The listener is accorded comparatively slight treatment in this book on the grounds that "... an adequate account of verbal behavior need cover only as much of the behavior of the listener as is needed to explain the behavior of the speaker" (page 2). It is Skinner's particular point to propose alternatives to the traditional view that language arouses some kind of private meaning reaction in the listener. Again it is not entirely clear whether the real objection is the methodological one or a metaphysical bias that is unnecessary to the account. There is, in this context, no need even to discuss the ultimate reality of ideas and images, but their phenomenological existence is difficult to dispute. As I read a page of Skinner's book it arouses numerous ideas and images which I am accustomed to call "meaning." In a changing and complicated world, of what can I be more certain? Common sense alone is never a firm base for ultimate positions, but we should not, without very good reason, begin by flaunting it. It is Skinner's implication that reason enough would be found in the difficulty of assessing meaning reactions if they existed. Yet the problems raised by Skinner's proposed criteria of understanding will seem to many at least as great. A message is said to be "understood" if the listener is led to say the same things or if his behavior is at some future time appropriate to it. But surely we often comprehend speech or writing without being moved to say anything of the same kind, and no dependent variable is very satisfactory if we must watch and wait for it an indefinite period of time and then identify it by its "appropriateness."

It is Skinner's position on the status of intervening constructs that will draw the most controversy, although a cognitive meaning construct could be incorporated without disturbing the bulk of the system. Some may question his decision to illustrate with "[facts] well known to every educated person" (page 11) and

largely to ignore the extensive and often relevant experimental literature, particularly the research bearing on the question of mediational meaning processes. His delightful literary examples, though, not only reflect the impressive range of his reading but exercise the model in a way that the usual oversimplified experimental material could not. Whatever the point of view, readers will recognize that this is a distinguished book that makes an enormous contribution to the psychology of language. It is a rich and difficult book. But there is material here to influence all of the disciplines with a claim to the study of language.

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The Principles of Biological Control.

Interrelation of hosts and pests and utilization in regulation of animal and plant populations. Harvey L. Sweetman. Brown, Dubuque, Iowa, 1958. xii + 560 pp. Illus. \$8.75.

It is the purpose of this book to acquaint the reader with life histories, habits, methods of handling, and methods of utilizing the organisms that might be used or now are being used for the control of insects and other pests. It is thus a survey and analysis of the world literature, in so far as such a survey is feasible, covering the broad field of biological control of plants and animals. For this purpose choice has been made of species that are well known or that show common variations in the biology of the various groups of organisms. General principles of biological control are stressed wherever feasible.

This is a revision and extension of a work entitled *Biological Control of Insects*, by Sweetman, published in 1936. An extensive bibliography, arranged by chapters, for reference and documentary purposes is included at the end of the text. The book will be especially useful to teachers, graduate students, and research workers.

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Mirror to Physiology. A self-survey of physiological science. R. W. Gerard. American Physiological Society, Washington, D.C., 1958. xi + 372 pp. \$5.

The stupendous task of surveying a field of science is emphasized in this book. The detailed study, sponsored by the National Science Foundation, was started early in 1952 with the expectation that it would be completed in ap-

proximately two years. Numerous difficulties encountered in this pioneering venture delayed completion until late in 1957. Several intended goals could not be reached but are indicated in the text as worthy of further investigation. There is danger that survey data may become obsolete if there is delay in publication. The information on incomes in chapter 5 demonstrates this hazard.

The first chapters briefly summarize the survey and describe its origin, objectives, and operation. Difficulty is encountered in defining physiology because of its relation to biochemistry, biophysics, and many other fields of science. Perhaps a better name for this division of science would be "dynamic biology." Other chapters discuss occupational motivations, satisfaction, and mobility of physiologists; research programs, facilities, and support; publications and societies; training and recruitment; and the public and physiology. The final chapter is devoted to recommendations based on the interpretation of the survey findings. The appendixes (107 pages) are a useful conclusion to the book.

In reviewing this text, one is impressed with the great effort spent in collecting, clarifying, and interpreting data and ideas for a better understanding and appreciation of physiology. It should prove a very useful reference source for administrators and students.

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Relativity for the Layman. James A. Coleman. (A Mentor book.) The New American Library, New York, 1958. 127 pp. Illus. \$0.50.

This is a paperback edition of the 1954 book of the same title, which was reviewed in the *Scientific Monthly* in September 1955.

A great deal of allowance must undoubtedly be made for the necessity for using the popular form of scientific writing. One wonders, however, whether the author should not be criticized for suggesting (page 118) that it may be possible at some time in the future for an astronomer with a powerful telescope to look around the finite universe and see the back of his own head. Mention of the time required for light to travel through such a distance appears to be in order.

Must we not also call it an error to say (page 24) that the sun actually rises eight minutes before it appears to rise? Is the author forgetting that it is the rotation of the earth which brings about the rising of the sun? After the earth has

turned to the proper position for sunrise, no further eight-minute waiting period is necessary.

These errors are minor, however, when compared with the author's handling of the "clock paradox"—an error that did not appear in the first edition, which made no attempt to answer the question. He is quite correct in saying that there is no paradox, but wrong in his implication that there is no difference in the ages of twins after one of them has taken a round trip to a star. As d'Abro has said in *The Evolution of Scientific Thought from Newton to Einstein*, "this particular consequence of the theory has been one of the stumbling blocks of practically every lay writer who has devoted his time to criticising the theory of relativity." And we must enlarge the group to include others who profess belief in the theory but have not made a thorough study of it. There is no room for opinion in the matter, and, as a result, mathematical physicists are virtually unanimous in their acceptance of the age difference. On the basis of both experiment and theory we have every reason to believe that travel will help to preserve youth.

Coleman has made a few improvements in the new edition—for instance, in the historical accuracy of his account of Roemer's measurement of the velocity of light through observations of Jupiter's moons.

After cautioning them against the author's treatment of the "clock paradox," I shall gladly recommend the book to my students. Inexpensive popular books on science are doing a great deal to familiarize our young people with scientific concepts. This is especially true when the reading is as palatable as it is in Coleman's little book.

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Scientists' Choice. A portfolio of photographs in science selected and described by leading scientists. F. M. Branley, Ed. Basic Books, New York, 1958. \$4.95.

This is a collection of excellently reproduced photographs—self-matted, 11 by 14 inches in size, and suitable for hanging on the walls of a laboratory, study, library, or office. The subject matter ranges from the microcosmic to the macrocosmic.

In the microcosmic field are an electron micrograph of bacteriophage, an x-ray diffraction pattern of an ice crystal, and a living cell seen through a phase-contrast microscope. The macrocosm is represented by photographs of the fantastic Horsehead nebula, in the