The operant behaviorism of B. F. Skinner

Of all contemporary psychologists, B. F. Skinner is perhaps the most honored and the most maligned, the most widely recognized and the most misrepresented, the most cited and the most misunderstood. Some still say that he is a stimulus–response psychologist (he is not); some still say that stimulus–response chains play a central role in his treatment of verbal behavior (they do not); some still say that he disavows evolutionary determinants of behavior (he does not). These and other misconceptions are common and sometimes even appear in psychology texts (e.g. Todd & Morris 1983). How did they come about, and why do they continue? Although the present BBS treatments will probably not provide an answer, they may help to clarify some of the misunderstandings.

The articles sampled here represent a range of Skinner’s work (in the treatments, each article is referred to by its abbreviated title). The first but most recent, “Selection by Consequences” (“Consequences,” Skinner 1981), relates operant theory to other disciplines, and in particular to biology and anthropology. The second, “Methods and Theories in the Experimental Analysis of Behavior” (“Methods”), outlines some of the basic concepts of operant theory in the context of a discussion of methodological and theoretical issues; it is an amalgamation of revised versions of “The Flight from the Laboratory” (Skinner 1961) and “Are Theories of Learning Necessary?” (Skinner 1950) and a portion of the preface to Contingencies of Reinforcement (Skinner 1969). “The Operational Analysis of Psychological Terms” (“Terms,” Skinner 1945) is the earliest work treated; its central concern is with the language of private events, and many features of Skinner’s analysis of verbal behavior are implicit in it. “An Operant Analysis of Problem Solving” (“Problem Solving,” Skinner 1966a), continues the interpretation of verbal behavior in distinguishing between rule-governed and contingency-shaped behavior. “Behaviorism at Fifty” ("Behaviorism-50," Skinner 1963) addresses the status of behaviorism as a philosophy of science, and points out some of the difficulties that must be overcome by any science of behavior. “The Phylogeny and Ontogeny of Behavior” (“Phylogeny,” Skinner 1966b), the last of the works sampled, considers how evolutionary variables combine with those operating within an organism’s lifetime to determine its behavior.

Biography

Burrhus Frederic Skinner was born on March 20, 1904, in Susquehanna, Pennsylvania. After majoring in English at Hamilton College, he tried a career at writing but gave it up after finding he had nothing to say. Having a long-standing interest in human and animal behavior and some familiarity with the writings of Watson, Pavlov, and Bertrand Russell, he then entered the graduate program in psychology at Harvard University (Skinner 1976). There he began a series of experiments that led to more than two dozen journal articles and culminated in The Behavior of Organisms (1938). In the manner of The Integrative Action of the Nervous System (Sherrington 1906) and Behavior of the Lower Organisms (Jennings 1906), the work presented a variety of novel research findings and provided a context for them. The extensive data illustrated many properties of reinforcement and extinction, discrimination and differentiation; the concept of the three-term contingency was to become the cornerstone for much else that would follow.

In 1936, after three years as a Junior Fellow in the Harvard Society of Fellows, Skinner moved to the University of Minnesota. His basic research continued, but during World War II he also worked on animal applications of behavior principles, including the training of pigeons to guide missiles (Skinner 1960; 1979). Although the project never got beyond demonstrations, a major fringe benefit was the discovery of shaping, the technique for creating novel forms of behavior through the differential reinforcement of successive approximations to a response.

Another product of those days was the Aircrib, which Skinner built for his wife and his second daughter (Skinner 1945). It was a windowed space with temperature and humidity control that improved on the safety and comfort of the ordinary crib while making the care of the child less burdensome. It was not used for conditioning the infant (contrary to rumor, neither of Skinner’s daughters developed emotional instability, psychiatric problems or suicidal tendencies). Soon after came the utopian novel, Walden Two (1948). Some who later criticized the specifics of that planned society failed to observe that its experimental character was its most important feature.
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Any practice that did not work was to be modified until a more effective version was found.

In 1945, Skinner assumed the chairmanship of the Department of Psychology at Indiana University. Then, after delivering the 1947 William James Lectures at Harvard University on the topic of verbal behavior, he returned permanently to the Harvard Department of Psychology (Skinner 1983). There he completed his book Verbal Behavior (1957) and, in collaboration with Charles B. Ferster, developed the subject matter of schedules of reinforcement (Ferster & Skinner 1957). Much else has been omitted here (e.g. Science and Human Behavior [1953] and teaching machines); the articles and books Skinner has since written are too numerous to list. All but one of the articles treated (“Terms”) are drawn from those later pieces; they constitute a sample of his most seminal works. Many others are cited in the course of the treatments.

Operant behaviorism

Operant behaviorism (or radical behaviorism) is the variety of behaviorism particularly identified with Skinner's work. It provides the systematic context for the research in psychology sometimes referred to as the experimental analysis of behavior. Behavior itself is its fundamental subject matter; behavior is not an indirect means of studying something else, such as cognition or mind or brain.

A primary task of an experimental analysis is to identify classes of behavior on the basis of their origins. Some classes of responses, respondents, originate with the stimuli that elicit them (as illustrated by the stimulus–response relations called reflexes). Others, called operants, are engendered by their effects on the environment; because they do not require eliciting stimuli, they are said to be emitted rather than elicited. Admitting the possibility that behavior could occur without eliciting stimuli was a critical first step in operant theory. Earlier treatments had assumed that for every response there must be a corresponding eliciting stimulus. The rejection of this assumption did not imply that emitted responses were uncaused; rather, the point was that there are other causes of behavior besides eliciting stimuli. Adding operants to respondents as behavior classes did not exhaust the possibilities, but it was critical to recognize that the past consequences of responding are significant determinants of behavior.

The consequences of a response may either raise or lower subsequent responding. Consequences that do so are respectively called reinforcers and punishers (punishment has sometimes been confused with negative reinforcement, but positive and negative reinforcement both involve increases in responding; they differ in whether the consequence of responding is the addition to or removal of something from the environment, as in the difference between appetitive procedures and those involving escape or avoidance). The particular relations that can be established between responses and their consequences are called contingencies of reinforcement or punishment.

But the consequences of responding are also typically correlated with other features of the environment (some consequences of stepping on the brake pedal or the gas pedal, for example, depend on whether the traffic light is red or green). When a stimulus sets the occasion on which responding will have a particular consequence, the stimulus is said to be discriminative. If responses then come to depend on, or come under the control of, this stimulus, the response class is called a discriminated operant. Both respondents and discriminated operants involve an antecedent stimulus, but the distinction between them is crucial and depends on the consequences of responding play a role. A response that depends only on the presentation of a stimulus, as in a reflex relation, is a member of a respondent class. One that depends on the relations among the three terms – stimulus, response, consequence – is a member of a discriminated operant class. Thus, discriminated operants are said to be defined by a three-term contingency. The three-term contingency is often neglected by those who think of behavior change only in terms of the instrumental and classical procedures of earlier conditioning theories.

Much of the research that helped to establish this vocabulary was conducted in the experimental chamber that for a while was known as the Skinner box (that term was more often used by those outside than by those within the experimental analysis of behavior). Simple stimuli (lights, sounds), simple responses (lever presses, key pecks), and simple reinforcers (food, water) were arranged for studying the behavior of rats or pigeons. Many responses automatically have particular consequences (to see something at eye level, for example, we look down rather than up). But natural environments do not ordinarily include levers on which presses produce food pellets only when lights are on. Operant chambers were designed to create arbitrary contingencies; they were arbitrary, but only in this sense. As for responses such as the pigeon's key peck:

Such responses are not wholly arbitrary. They are chosen because they can be easily executed, and because they can be repeated quickly and over long periods of time without fatigue. In such a bird as the pigeon, pecking has a certain genetic unity; it is a characteristic bit of behavior which appears with a well-defined topography. (Ferster & Skinner 1957, p. 7)

Given this recognition of genetic determinants in the specification of operant classes, it is ironic that some species-specific characteristics of lever presses and key pecks later became the basis for criticisms of operant theory. Perhaps these responses were not arbitrary enough. But given that the concern was to study the effects of the consequences of responding, it would hardly have been appropriate to have sought out response classes so highly determined in other species-specific ways that they would have been insensitive to their consequences.

There are "natural lines of fracture along which behavior and environment actually break" (Skinner 1935, p. 40). "We divide behavior into hard and fast classes and are then surprised to find that the organism disregards the boundaries we have set" (Skinner 1953, p. 94). Operant theory is not compromised by demonstrations that some response classes are more easily established than others, or that some discriminations can be more easily established with some reinforcers than with others. Consequences are important, but they do not operate to the
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