

# C H A P T E R 5

## Behaviorism at Fifty

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### **EDITOR'S NOTE**

This article was first published in *Science* (1963, 140(3570), 951-958) and later in *Behaviorism and Phenomenology: Contrasting Bases for Modern Psychology*, edited by T.W. Wann (Chicago: University of Chicago Press, 1964, pp. 79-97). An abbreviated version appears as Chapter 8 in Skinner's *Contingencies of Reinforcement* (1969, pp. 221-242). The latter also includes extensive addenda (pp. 242-268) in the form of 11 titled "Notes" on topics such as private stimuli, awareness, and feelings. The title commemorates Watson's seminal paper on behaviorism, "Psychology as the Behaviorist Views It," published in 1913.

Skinner contrasts behaviorism with traditional mentalistic views of humankind. Traits and states of mind, argues Skinner, "offer no real explanation" of human behavior and "stand in the way of a more effective analysis." Though the traditional point of view still receives strong support, an effective science of behavior has now emerged, thanks to the efforts of Darwin, Lloyd Morgan, E.L. Thorndike, John B. Watson, and others. Even Freud "contributed to the behavioristic argument by showing that mental activity did not, at least, *require* consciousness." Some forms of behaviorism, Skinner notes, dealt with the problem of mind by simply ruling it out of the realm of scientific study. His own version, *radical behaviorism*, does not. Private events, argues Skinner, can be considered part of behavior itself and can be interpreted in terms of what we know about public events in behavior. Certain contingencies of reinforcement allow us to respond discriminatively with respect to the world around us; they also allow us to respond discriminatively with respect to events inside of us, though the discriminations are necessarily less precise. "Conscious content," usually considered some sort of copy of the world, may also be considered behavior—the behavior of seeing in the absence of the object seen, hearing in the absence of the object heard, and so on.

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Mental "way stations," such as cognitions and expectancies, may also be interpreted in behavioral terms.

Private events are further discussed in "Why I Am Not a Cognitive Psychologist" (1977; Chapter 8 of this book), in Chapters 16 and 17 of *Science and Human Behavior*, extensively in *About Behaviorism* (1974), in Chapter 19 of *Verbal Behavior* (1957), in a classic paper, "The Operational Analysis of Psychological Terms" (1945), in "The Problem of Consciousness—A Debate" (1967, with B. Blanshard), and elsewhere.

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Behaviorism, with an accent on the last syllable, is not the scientific study of behavior but a philosophy of science concerned with the subject matter and methods of psychology. If psychology is a science of mental life—of the mind, of conscious experience—then it must develop and defend a special methodology, which it has not yet done successfully. If it is, on the other hand, a science of the behavior of organisms, human or otherwise, then it is part of biology, a natural science for which tested and highly successful methods are available. The basic issue is not the nature of the stuff of which the world is made or whether it is made of one stuff or two but rather the dimensions of the things studied by psychology and the methods relevant to them.

Mentalistic or psychic explanations of human behavior almost certainly originated in primitive animism. When people dreamed of being at distant places in spite of incontrovertible evidence that they had stayed in their beds, it was easy to conclude that some parts of them had actually left their bodies. A particularly vivid memory or a hallucination could be explained in the same way. The theory of an invisible, detachable self eventually proved useful for other purposes. It seemed to explain unexpected or abnormal episodes, even to the people behaving in an exceptional way because they were thus "possessed." It also served to explain the inexplicable. The human organism is so complex that it often seems to behave capriciously. It is tempting to attribute the visible behavior to another organism inside—to a little man or homunculus. The wishes of the little man become the acts of the person observed by others. The inner idea is put into outer words. Inner feelings find outward expression. The explanation is successful, of course, only so long as the behavior of the homunculus can be neglected.

Primitive origins are not necessarily to be held against an explanatory principle, but the little man is still with us in relatively primitive form. He was recently the hero of a television program called "Gateways to the Mind," one of a series of educational films sponsored by the Bell Telephone Laboratories and written with the help of a distinguished panel of scientists. The viewer learned, from animated cartoons, that when a person's finger is

pricked, electrical impulses resembling flashes of lightning run up the afferent nerves and appear on a television screen in the brain. The little man wakes up, sees the flashing screen, reaches out, and pulls a lever. More flashes of lightning go down the nerves to the muscles, which then contract, as the finger is pulled away from the threatening stimulus. The behavior of the homunculus was, of course, not explained. An explanation would presumably require another film. And it, in turn, another.

The same pattern of explanation is invoked when we are told that the behavior of a delinquent is the result of a disordered personality or that the vagaries of a patient under analysis are due to conflicts among the superego, ego, and id. Nor can we escape from the primitive features by breaking the little man into pieces and dealing with his wishes, cognitions, motives, and so on, bit by bit. The objection is not that these things are mental but that they offer no real explanation and stand in the way of a more effective analysis.

It has been about 50 years since the behavioristic objection to this practice was first clearly stated, and it has been about 30 years since it has been very much discussed. A whole generation of psychologists has grown up without really coming into contact with the issue. Almost all current textbooks compromise: Rather than risk a loss of adoptions, they define psychology as the science of behavior *and* mental life. Meanwhile the older view has continued to receive strong support from areas in which there has been no comparable attempt at methodological reform. During this period, however, an effective experimental science of behavior has emerged. Much of what it has discovered bears on the basic issue. A restatement of radical behaviorism would therefore seem to be in order.

A rough history of the idea is not hard to trace. An occasional phrase in classic Greek writings which seemed to foreshadow the point of view need not be taken seriously. We may also pass over the early bravado of a La Mettrie who could shock the philosophical bourgeoisie by asserting that Man was only a machine. Nor were those who simply preferred, for practical reasons, to deal with behavior rather than with less accessible, but nevertheless acknowledged, mental activities close to what is meant by behaviorism today.<sup>1</sup>

The entering wedge appears to have been Darwin's preoccupation with the continuity of species. In supporting the theory of evolution, it was important to show that Man was not essentially different from the lower animals—that every human characteristic, including consciousness and reasoning powers, could be found in other species. Naturalists like Romanes began to collect stories which seemed to show that dogs, cats, elephants, and many other species were conscious and showed signs of reasoning. It was Lloyd Morgan, of course, who questioned this evidence with his *Canon of Parsimony*. Were there not other ways of accounting for what looked like signs of consciousness or rational powers? Thorndike's experiments at the

end of the 19th century were in this vein. He showed that the behavior of a cat in escaping from a puzzle-box might seem to show reasoning but could be explained instead as the result of simpler processes. Thorndike remained a mentalist, but he greatly advanced the objective study of behavior which had been attributed to mental processes.

The next step was inevitable: If evidence of consciousness and reasoning could be explained in other ways in animals, why not also in Man? And if this was the case, what became of psychology as a science of mental life? It was John B. Watson who made the first clear, if rather noisy, proposal that psychology should be regarded simply as a science of behavior. He was not in a very good position to defend it. He had little scientific material to use in his reconstruction. He was forced to pad his textbook with discussions of the physiology of receptor systems and muscles and with physiological theories which were at the time no more susceptible to proof than the mentalistic theories they were intended to replace. A need for "mediators" of behavior which might serve as objective alternatives to thought processes led him to emphasize subaudible speech. The notion was intriguing, because one can usually observe oneself thinking in this way, but it was by no means an adequate or comprehensive explanation. He tangled with introspective psychologists by denying the existence of images. He may well have been acting in good faith, for it has been said that he himself did not have visual imagery; but his arguments caused unnecessary trouble. The relative importance of a genetic endowment in explaining behavior proved to be another disturbing digression.

All this made it easy to lose sight of the central argument—that behavior which seemed to be the product of mental activity could be explained in other ways. Moreover, the introspectionists were prepared to challenge it. As late as 1883 Francis Galton<sup>2</sup> could write: "Many persons, especially women and intelligent children, take pleasure in introspection, and strive their very best to explain their mental processes" (p. 87). But introspection was already being taken seriously. The concept of a science of mind in which mental events obeyed mental laws had led to the development of psychophysical methods and to the accumulation of facts which seemed to bar the extension of the principle of parsimony. What might hold for animals did not hold for people because people could see their mental processes.

Curiously enough, part of the answer was supplied by the psychoanalysts, who insisted that, although we might be able to see some of our mental life, we could not see all of it. The kind of thoughts Freud called "unconscious" took place without the knowledge of the thinker. From an association, verbal slip, or dream it could be shown that a man must have responded to a passing stimulus, although he could not tell you that he had done so. More complex thought processes, including problem solving and verbal play, could also go on without the thinker's knowledge. Freud had devised, and

never abandoned faith in, one of the most elaborate mental apparatuses of all time. He nevertheless contributed to the behavioristic argument by showing that mental activity did not, at least, *require* consciousness. His proofs that thinking had occurred without introspective recognition were, indeed, clearly in the spirit of Lloyd Morgan. They were operational analyses of mental life—even though, for Freud, only the unconscious part of it. Experimental evidence pointing in the same direction soon began to accumulate.

But that was not the whole answer. What about the part of mental life which one can see? It is a difficult question, no matter what one's point of view, partly because it raises the question of what seeing means and partly because the events seen are private. The fact of privacy cannot, of course, be questioned. Each person is in special contact with a small part of the universe enclosed within the skin. To take a noncontroversial example, each person is uniquely subject to certain kinds of proprioceptive and interoceptive stimulation. Though two people may in some sense be said to see the same light or hear the same sound, they cannot feel the same distention of a bile duct or the same bruised muscle. (When privacy is invaded with scientific instruments, the form of stimulation is changed; the scales read by the scientists are not the private events themselves.)

Mentalistic psychologists insist that there are other kinds of events which are uniquely accessible to the owner of the skin within which they occur but which lack the physical dimensions of proprioceptive or interoceptive stimuli. They are as different from physical events as colors are from wave lengths of light. There are even better reasons, therefore, why two people cannot suffer each other's toothaches, recall each other's memories, or share each other's happinesses. The importance assigned to this kind of world varies. For some, it is the only world there is. For others, it is the only part of the world which can be directly known. For still others, it is a special part of what can be known. In any case, the problem of how one knows about the subjective world of another must be faced. Apart from the question of what "knowing" means, the problem is one of accessibility.

### **PUBLIC AND PRIVATE EVENTS**

One solution, often regarded as behavioristic, is to grant the distinction between public and private events and rule the latter out of scientific consideration. This is a congenial solution for those to whom scientific truth is a matter of convention or agreement among observers. It is essentially the line taken by logical positivism and physical operationism. Hogben<sup>3</sup> has recently redefined "behaviorist" in this spirit. A subtitle of his *Statistical Theory* is "an examination of the contemporary crises in statistical theory from a behaviourist viewpoint," and this is amplified in the following way:

The behaviourist, as I here use the term, does not deny the convenience of classifying *processes* as mental or material. He recognises the distinction between personality and corpse: but he has not yet had the privilege of attending an identity parade in which human minds without bodies are by common recognition distinguishable from living human bodies without minds. Till then, he is content to discuss probability in the vocabulary of *events*, including audible or visibly recorded assertions of human beings as such. (p. 9)

The behavioristic position, so defined, is simply that of the publicist and "has no concern with structure and mechanism" (p. 7).

The point of view is often called operational, and it is significant that P.W. Bridgman's physical operationism could not save him from an extreme solipsism even within physical science itself. Though he insisted that he was not a solipsist, he was never able to reconcile seemingly public physical knowledge with the private world of the scientist.<sup>4,5</sup> Applied to psychological problems, operationism has been no more successful. We may recognize the restrictions imposed by the operations through which we can know of the existence of properties of subjective events, but the operations cannot be identified with the events themselves. S.S. Stevens has applied Bridgman's principle to psychology, not to decide whether subjective events exist, but to determine the extent to which we can deal with them scientifically.<sup>6</sup>

Behaviorists have, from time to time, examined the problem of privacy, and some of them have excluded so-called sensations, images, thought processes, and so on, from their deliberations. When they have done so not because such things do not exist but because they are out of reach of their methods, the charge is justified that they have neglected the facts of consciousness. The strategy is, however, quite unwise. It is particularly important that a science of behavior face the problem of privacy. It may do so without abandoning the basic position of behaviorism. Science often talks about things it cannot see or measure. When you toss a penny into the air, it must be assumed that you toss the earth beneath you downward. It is quite out of the question to see or measure the effect on the earth, but the effect must be assumed for the sake of a consistent account. An adequate science of behavior must consider events taking place within the skin of the organism, not as physiological mediators of behavior, but as part of behavior itself. It can deal with these events without assuming that they have any special nature or must be known in any special way. The skin is not that important as a boundary. Private and public events have the same kinds of physical dimensions.

In the 50 years since a behavioristic philosophy was first stated, facts and principles bearing on the basic issues have steadily accumulated. For one thing, a scientific analysis of behavior has yielded a sort of empirical epistemology. The subject matter of a science of behavior includes the

behavior of scientists and other knowers. The techniques available to such a science give an empirical theory of knowledge certain advantages over theories derived from philosophy and logic. The problem of privacy may be approached in a fresh direction by starting with behavior rather than with immediate experience. The strategy is certainly no more arbitrary or circular than the earlier practice, and it has a surprising result. Instead of concluding that we can know only our subjective experiences—that we are bound forever to our private world and that the external world is only a construct—a behavioral theory of knowledge suggests that it is the private world which, if not entirely unknowable, is at least not likely to be known well. The relations between organism and environment involved in knowing are of such a sort that the privacy of the world within the skin imposes more serious limitations on personal knowledge than on the accessibility of that world to the scientist.

An organism learns to react discriminatively to the world around it under certain contingencies of reinforcement. Thus, a child learns to name a color correctly when a given response is reinforced in the presence of the color and extinguished in its absence. The verbal community may make the reinforcement of an extensive repertoire of responses contingent on subtle properties of colored stimuli. We have reason to believe that the child will not discriminate among colors—will not see two colors as different—until exposed to such contingencies. So far as we know, the same process of differential reinforcement is required if a child is to distinguish among events occurring inside the skin.

Many contingencies involving private stimuli need not be arranged by a verbal community, for they follow from simple mechanical relations among stimuli, responses, and reinforcing consequences. The various motions which comprise turning a handspring, for example, are under the control of external and internal stimuli and subject to external and internal reinforcing consequences. But the performer is not necessarily “aware” of the stimuli controlling the behavior, no matter how appropriate and skillful it may be. “Knowing” or “being aware of” what is happening in turning a handspring involves discriminative responses, such as naming or describing, which arise from contingencies necessarily arranged by a verbal environment. Such environments are common. The community is generally interested in what we are doing, have done, or are planning to do and why, and it arranges contingencies which generate verbal responses which name and describe the external and internal stimuli associated with these events. It challenges us by asking “How do you know?” and we answer, if at all, by describing some of the variables of which our verbal behavior was a function. The “awareness” resulting from all this is a social product.

In attempting to set up such a repertoire, however, the verbal community works under a severe handicap. It cannot always arrange the

contingencies required for subtle discriminations. It cannot teach a child to call one pattern of private stimuli "diffidence" and another "embarrassment" as effectively as it teaches him or her to call one stimulus "red" and another "orange," for it cannot be sure of the presence or absence of the private patterns of stimuli appropriate to reinforcement or lack of reinforcement. Privacy thus causes trouble, first of all, *for the verbal community*. The individual suffers in turn. Because the community cannot reinforce self-descriptive responses consistently, a person cannot describe or otherwise "know" events occurring within the skin as subtly and precisely as events in the world at large.<sup>7</sup>

There are, of course, differences between external and internal stimuli which are not mere differences in location. Proprioceptive and interoceptive stimuli have a certain intimacy. They are likely to be especially familiar. They are very much with us; we cannot escape from a toothache as easily as from a deafening noise. They may well be of a special kind; the stimuli we feel in pride or sorrow may not closely resemble those we feel in sandpaper or satin. But this does not mean that they differ in physical status. In particular, it does not mean that they can be more easily or more directly known. What is particularly clear and familiar to the potential knower may be strange and distant to the verbal community responsible for the knowledge.

### CONSCIOUS CONTENT

What *are* the private events to which, at least in a limited way, a person may come to respond in ways we call "perceiving" or "knowing"? Let us begin with the oldest, and in many ways the most difficult, kind represented by "the stubborn fact of consciousness." What is happening when people observe the conscious contents of their minds, when they "look at their sensations or images"? Western philosophy and science have been handicapped in answering these questions by an unfortunate metaphor. The Greeks could not explain how people could have knowledge of something with which they were not in immediate contact. How could they know an object on the other side of the room, for example? Did they reach out and touch it with some sort of invisible probe? Or did they never actually come in contact with the object at all but only with a copy of it inside their bodies? Plato supported the copy theory with his metaphor of the cave. Perhaps, he said, we never see the real world at all but only shadows of it on the wall of the cave in which each of us is imprisoned. Copies of the real world projected into the body could compose the experience which we directly know. A similar theory could also explain how one can see objects which are "not really there," as in hallucinations, afterimages, and memories. Neither explanation is, of course, satisfactory. How a copy may arise at a distance is at least as puzzling as how one may know an object at a distance. Seeing things



which are not really there is no harder to explain than the occurrence of copies of things not there to be copied.

The search for copies of the world within the body, particularly in the nervous system, still goes on, but with discouraging results. If the retina could suddenly be developed, like a photographic plate, it would yield a poor picture. The nerve impulses in the optic tract must have an even more tenuous resemblance to "what is seen." The patterns of vibrations which strike our ear when we listen to music are quickly lost in transmission. The bodily reactions to substances tasted, smelled, and touched would scarcely qualify as faithful reproductions. These facts are discouraging for those who are looking for copies of the real world within the body, but they are fortunate for psychophysiology as a whole. At some point the organism must do more than create duplicates. It must see, hear, smell, and so on, as forms of *action* rather than of *reproduction*. *It must do some of the things it is differentially reinforced for doing when it learns to respond discriminatively.* The sooner the pattern of the external world disappears after impinging on the organism, the sooner the organism may get on with these other functions.

The need for something beyond, and quite different from, copying is not widely understood. Suppose someone were to coat the occipital lobes of the brain with a special photographic emulsion which, when developed, yielded a reasonable copy of a current visual stimulus. In many quarters this would be regarded as a triumph in the physiology of vision. Yet nothing could be more disastrous, for we should have to start all over again and ask how the organism sees a picture in its occipital cortex, and we should now have much less of the brain available in which to seek an answer. It adds nothing to an explanation of how an organism reacts to a stimulus to trace the pattern of the stimulus into the body. It is most convenient, for both organism and psychophysicologist, if the external world is never copied—if the world we know is simply the world around us. The same may be said of theories according to which the brain interprets signals sent to it and in some sense reconstructs external stimuli. If the real world is, indeed, scrambled in transmission but later reconstructed in the brain, we must then start all over again and explain how the organism sees the reconstruction.

An adequate treatment of this point would require a thorough analysis of the behavior of seeing and of the conditions under which we see (to continue with vision as a convenient modality). It would be unwise to exaggerate our success to date. Discriminative visual behavior arises from contingencies involving external stimuli and overt responses, but possible private accompaniments must not be overlooked. Some of the consequences of such contingencies seem well established. It is usually easiest for us to see a friend when we are looking at him, because visual stimuli similar to those present when the behavior was acquired exert maximal control over the

response. But mere visual stimulation is not enough; even after having been exposed to the necessary reinforcement, we may not see a friend who is present unless we have reason to do so. On the other hand, if the reasons are strong enough, we may see him in someone bearing only a superficial resemblance or when no one like him is present at all. If conditions favor seeing something else, we may behave accordingly. If, on a hunting trip, it is important to see a deer, we may glance toward our friend at a distance, see him as a deer, and shoot.

It is not, however, seeing our friend which raises the question of conscious content but "seeing that we are seeing him." There are no natural contingencies for such behavior. ~~We learn to see that we are seeing only~~ because a verbal community arranged ~~to see to do so~~. We usually acquire the behavior when we are under appropriate visual stimulation, but it does not follow that the thing seen must be present when we see that we are seeing it. The contingencies arranged by the verbal environment may set up self-descriptive responses describing the *behavior* of seeing even when the thing seen is not present.

If seeing does not require the presence of things seen, we need not be concerned about certain mental processes said to be involved in the construction of such things—images, memories, and dreams, for example. We may regard a dream, not as a display of things seen by the dreamer, but simply as the behavior of seeing. At no time during a daydream, for example, should we expect to find within the organism anything which corresponds to the external stimuli present when the dreamer first acquired the behavior now being exhibited. In simple recall we need not suppose that we wander through some storehouse of memory until we find an object which we then contemplate. Instead of assuming that we begin with a tendency to *recognize* such an object once it is found, it is simpler to assume that we begin with a tendency to *see* it. Techniques of self-management which facilitate recall—for example, the use of mnemonic devices—can be formulated as ways of strengthening behavior rather than of creating objects to be seen. Freud dramatized the issue with respect to dreaming when asleep in his concept of dreamwork—an activity in which some part of the dreamer played the role of a theatrical producer while another part sat in the audience. If a dream is, indeed, something seen, then we must suppose that it is wrought as such; but if it is simply the behavior of seeing, the dreamwork may be dropped from the analysis. It took a long time to understand that when one dreamed of a wolf, no wolf was actually there. It has taken much longer to understand that not even a representation of a wolf is there.

Eye movements which appear to be associated with dreaming are in accord with this interpretation, since it is not likely that the dreamer is actually watching a dream on the undersides of the eyelids. When memories are aroused by electrical stimulation of the brain, as in the work of Wilder

Penfield, it is also simpler to assume that it is the behavior of seeing, hearing, and so on which is aroused rather than some copy of early environmental events which the subject then looks at or listens to. Behavior similar to the responses to the original events must be assumed in both cases—the subject sees or hears—but the reproduction of the events seen or heard is a needless complication. The familiar process of response chaining is available to account for the serial character of the behavior of remembering, but the serial linkage of stored experiences (suggesting engrams in the form of sound films) demands a new mechanism.

The heart of the behavioristic position on conscious experience may be summed up in this way: Seeing does not imply something seen. We acquire the behavior of seeing under stimulation from actual objects, but it may occur in the absence of these objects under the control of other variables. (So far as the world within the skin is concerned, it always occurs in the absence of such objects.) We also acquire the behavior of seeing-that-we-are-seeing when we are seeing actual objects, but it may also occur in their absence.

To question the reality or the nature of the things seen in conscious experience is not to question the value of introspective psychology or its methods. Current problems in sensation are mainly concerned with the physiological function of receptors and associated neural mechanisms. Problems in perception are, at the moment, less intimately related to specific mechanisms, but the trend appears to be in the same direction. So far as behavior is concerned, both sensation and perception may be analyzed as forms of stimulus control. The subject need not be regarded as observing or evaluating conscious experiences. Apparent anomalies of stimulus control, which are now explained by appealing to a psychophysical relation or to the laws of perception, may be studied in their own right. It is, after all, no real solution to attribute them to the slippage inherent in converting a physical stimulus into a subjective experience.

The experimental analysis of behavior has a little more to say on this subject. Its techniques have recently been extended to what might be called the psychophysics of lower organisms. Blough's adaptation of the Békésy technique—for example, in determining the spectral sensitivity of pigeons and monkeys—yields sensory data comparable with the reports of a trained observer.<sup>8,9</sup> Herrnstein and van Sommers have recently developed a procedure in which pigeons "bisect sensory intervals."<sup>10</sup> It is tempting to describe these procedures by saying that investigators have found ways to get nonverbal organisms to describe their sensations. The fact is that a form of stimulus control has been investigated without using a repertoire of self-observation or, rather, by constructing a special repertoire, the nature and origin of which are clearly understood. Rather than describe such experiments with the terminology of introspection, we may formulate them

in their proper place in an experimental analysis. The behavior of the observer in the traditional psychophysical experiment may then be reinterpreted accordingly.

### MENTAL WAY STATIONS

So much for "conscious content," the classical problem in mentalistic philosophies. There are other mental states or processes to be taken into account. Moods, cognitions, and expectancies, for example, are also examined introspectively, and descriptions are used in psychological formulations. The conditions under which descriptive repertoires are set up are much less successfully controlled. Terms describing sensations and images are taught by manipulating discriminative stimuli—a relatively amenable class of variables. The remaining mental events are related to such operations as deprivation and satiation, emotional stimulation, and various schedules of reinforcement. The difficulties they present to the verbal community are suggested by the fact that there is no psychophysics of mental states of this sort. That fact has not inhibited the use of such states in explanatory systems.

In an experimental analysis, the relation between a property of behavior and an operation performed upon the organism is studied directly. Traditional mentalistic formulations, however, emphasize certain way stations. Where an experimental analysis might examine the effect of punishment on behavior, a mentalistic psychology will be concerned first with the effect of punishment in generating feelings of anxiety and then with the effect of anxiety on behavior. The mental state seems to bridge the gap between dependent and independent variables and is particularly attractive when these are separated by long periods of time—when, for example, the punishment occurs in childhood and the effect appears in the behavior of the adult.

The practice is widespread. In a demonstration experiment, a hungry pigeon was conditioned to turn around in a clockwise direction. A final, smoothly executed pattern of behavior was shaped by reinforcing successive approximations with food. Students who had watched the demonstration were asked to write an account of what they had seen. Their responses included the following: (1) The pigeon was conditioned to ~~expect~~ reinforcement for the right kind of behavior; (2) the pigeon walked around, ~~hoping~~ that something would bring the food back again; (3) the pigeon ~~observed~~ that a certain behavior seemed to produce a particular result; (4) the pigeon ~~felt~~ that food would be given it because of its action; and (5) the pigeon came to ~~associate~~ its action with the click of the food-dispenser. The observed facts could be stated respectively as follows: (1) Reinforcement was delivered *when* the pigeon emitted a given kind of

behavior; (2) the pigeon walked around *until* the food container again appeared; (3) a certain behavior *produced* a particular result; (4) food was given to the pigeon *when* it acted in a given way; and (5) the click of the food-dispenser *was temporally related* to the pigeon's action. These statements describe the contingencies of reinforcement. The expressions "expect," "hope," "observe," "feel," and "associate" go beyond them to identify effects on the pigeon. The effect actually observed was clear enough: The pigeon turned more skillfully and more frequently; but that was not the effect reported by the students. (If pressed, they would doubtless have said that the pigeon turned more skillfully and more frequently *because* it expected, hoped, and felt that if it did so food would appear.)

The events reported by the students were observed, if at all, in their own behavior. They were describing what they would have expected, felt, and hoped for under similar circumstances. But they were able to do so only because a verbal community had brought relevant terms under the control of certain stimuli, and this was done *when the community had access only to the kinds of public information available to the students in the demonstration*. Whatever the students knew about themselves which permitted them to infer comparable events in the pigeon must have been learned from a verbal community which saw no more of their behavior than they had seen of the pigeon's. Private stimuli may have entered into the control of their self-descriptive repertoires, but the readiness with which they applied them to the pigeon indicates that external stimuli had remained important. The extraordinary strength of a mentalistic interpretation is really a sort of proof that in describing a private way station one is, to a considerable extent, making use of public information. (The speed and facility with which the mental life of a pigeon or person is reported are suspicious. Nothing is easier than to say that people do things "because they like to do them" or that they do one thing rather than another "because they have made a choice." But have we the knowledge about private lives which statements of that sort imply, or at least ought to imply? It is much more likely that we are employing a standard set of explanations which have no more validity—and in the long run are no more useful—than a standard set of metaphors.)

The mental way station is often accepted as a terminal datum, however. When a man must be trained to discriminate between different planes, ships, and so on, it is tempting to stop at the point at which he can be said to *identify* such objects. It is implied that if he can identify an object, he can name it, label it, describe it, or act appropriately in some other way. In the training process he always behaves in one of these ways; no way station called "identification" appears in practice or need appear in theory. (Any discussion of the discriminative behavior generated by the verbal environment to permit a man to examine his conscious content must be qualified accordingly.)

Cognitive theories stop at way stations where the mental action is usually somewhat more complex than identification. For example, subjects are said to *know* who and where they are, what something is, or what has happened or is going to happen—regardless of the forms of behavior through which this knowledge was set up or which may now testify to its existence. Similarly, in accounting for verbal behavior, a listener or reader is said to understand the *meaning* of a passage, although the actual changes brought about by listening to, or reading, the passage are not specified. In the same way, schedules of reinforcement are sometimes studied simply for their effects on the *expectations* of the organism exposed to them, without discussing the implied relation between expectation and action. Recall, inference, and reasoning may be formulated only to the point at which *an experience is remembered or a conclusion reached*, behavioral manifestations being ignored. In practice, the investigator always carries through to some response, if only a response of self-description.

On the other hand, mental states are often studied as causes of action. A speaker thinks of something to say before saying it, and this explains what is said, although the source of the thought is not examined. An unusual act is called "impulsive," without inquiring further into the origin of the unusual impulse. A behavioral maladjustment shows anxiety, the source of which is neglected. One salivates upon seeing a lemon because it reminds one of a sour taste, but why it does so is not specified. The formulation leads directly to a technology based on the manipulation of mental states. To change voting behavior, we "change opinions"; to induce action, we "strengthen belief"; to make a baby eat, we make it feel hungry; to prevent wars, we reduce "warlike tensions in the minds of men"; to effect psychotherapy, we alter troublesome "mental states." ~~In practice, all these ways of changing minds reduce to manipulating environments, verbal or other~~

In many cases we can reconstruct a complete causal chain by identifying the mental state which is the effect of an environmental variable with the mental state which is the cause of action. But this is not always enough. In traditional mentalistic philosophies various things happen at the way station which alter the relation between the terminal events. The psychophysical functions and the perceptual laws which distort the physical stimulus before it reaches the way station have already been mentioned. Once the station is reached, other effects are said to occur. Mental states alter one another. A painful memory may never affect behavior, or may affect it in a different way, if another mental state succeeds in repressing it. Conflicting variables may be reconciled before reaching behavior if we engage in the mental action called "making a decision." Dissonant cognitions generated by conflicting conditions of reinforcement will not be reflected in our behavior if we can "persuade ourselves" that one condition was actually of a different magnitude or kind. These disturbances in simple causal linkages between

environment and behavior can be formulated and studied experimentally as interactions among variables; but the possibility has not been fully exploited, and the effects still provide a formidable stronghold for mentalistic theories designed to bridge the gap between dependent and independent variables in the analysis of behavior.

### METHODOLOGICAL OBJECTIONS

The behavioristic argument is nevertheless still valid. We may object, first, to the predilection for unfinished causal sequences. A disturbance in behavior is not explained by relating it to felt anxiety until the anxiety has in turn been explained. An action is not explained by attributing it to expectations until the expectations have in turn been accounted for. Complete causal sequences might, of course, include references to way stations, but the fact is that the way station generally interrupts the account in one direction or the other. For example, there must be thousands of instances in the psychoanalytic literature in which a thought or memory is said to have been relegated to the unconscious because it was painful or intolerable, but the percentage of those offering even the most casual suggestion as to why it was painful or intolerable must be very small. Perhaps explanations could have been offered, but the practice has discouraged the completion of the causal sequence.

A second objection is that a preoccupation with mental way stations burdens a science of behavior with all the problems raised by the limitations and inaccuracies of self-descriptive repertoires. We need not take the extreme position that mediating events or any data about them obtained through introspection must be ruled out of consideration, but we should certainly welcome other ways of treating the data more satisfactorily. Independent variables change the behaving organism, often in ways which survive for many years, and such changes affect subsequent behavior. The subject may be able to describe some of these intervening states in useful ways, either before or after they have affected behavior. On the other hand, behavior may be extensively modified by variables of which, and of the effect of which, the subject is never aware. So far as we know, self-descriptive responses do not alter controlling relationships. If a severe punishment is less effective than a mild one, it is not because it cannot be "kept in mind." (Certain behaviors involved in self-management, such as reviewing a history of punishment, may alter behavior; but they do so by introducing other variables rather than by changing a given relation.)

Perhaps the most serious objection concerns the order of events. Observation of one's own behavior necessarily follows the behavior. Responses which seem to be describing intervening states alone may embrace behavioral effects. "I am hungry" may describe, in part, the strength

of the speaker's on-going ingestive behavior. "I was hungrier than I thought" seems particularly to describe behavior rather than an intervening, possibly causal, state. More serious examples of a possibly mistaken order are to be found in theories of psychotherapy. Before asserting that the release of a repressed wish has a therapeutic effect on behavior, or that one who undertands a neurotic illness will recover, we should consider the plausible alternative that a change in behavior resulting from therapy has made it possible for the subject to recall a repressed wish or to understand the illness.

The importance of behaviorism as a philosophy of science naturally declines as a scientific analysis becomes more powerful, because there is then less need to use data in the form of self-description. The mentalism that survives in the fields of sensation and perception will disappear as alternative techniques are proved valuable in analyzing stimulus control, and similar changes may be anticipated elsewhere. Cognitive psychologists and others still try to circumvent the explicit control of variables by describing contingencies of reinforcement to their subjects in "instructions." They also try to dispense with recording behavior in a form from which probability of response can be estimated by asking their subjects to evaluate their tendencies to respond. But people rarely respond to descriptions of contingencies as they would under direct exposure to them, nor can they accurately predict their rates of responding, particularly the course of the subtle changes in rate which are a commonplace in the experimental analysis of behavior. These attempts to short-circuit an experimental analysis can no longer be justified on grounds of expedience, and there are many reasons for abandoning them. Much remains to be done, however, before the facts to which they are currently applied can be said to be adequately understood.

### BEHAVIORISM AND BIOLOGY

Elsewhere, the scientific study of Man has scarcely recognized the need for reform. The biologists, for example, begin with a certain advantage in studying the behaving organism, for the structures they analyze have an evident physical status. The nervous system is somehow earthier than the behavior for which it is largely responsible. Philosophers and psychologists alike have, from time to time, sought escape from mentalism in physiology. When we see red, we may be seeing the physiological effect of a red stimulus; when we merely imagine red, we may be seeing the same effect re-aroused. Psychophysical and perceptual distortions may be wrought by physiological processes. What we feel as anxiety may be autonomic reactions to threatening stimuli. And so on. This may solve the minor problem of the nature of subjective experience, but it does not solve any of the methodological problems with which behaviorism is most seriously



concerned. A physiological translation of mentalistic terms may reassure those who want to avoid dualism, but inadequacies in the formulation survive translation.

When writing about the behavior of organisms, biologists tend to be more mentalistic than psychologists. Adrian could not understand how a nerve impulse could cause a thought. A recent article on the visual space sense in *Science*<sup>11</sup> asserts that "the final event in the chain from the retina to the brain is a psychic experience" (p. 763). Another investigator reports research on "the brain and its contained mind." Pharmacologists study the "psychotropic" drugs. Psychosomatic medicine insists on the influence of mind over matter. And psychologists join their physiological colleagues in looking for feelings, emotions, drives, and pleasurable aspects of positive reinforcement in the brain.

The facts uncovered in such research are important, both for their own sake and for their bearing on behavior. Physiologists study structures and processes without which behavior could not occur. They are in a position to supply a "reductionist" explanation beyond the reach of an analysis which confines itself to terminal variables. They cannot do this well, however, so long as they accept traditional mentalistic formulations. Only an experimental analysis of behavior will define their task in optimal terms. The point is demonstrated by recent research in psychopharmacology. When the behavioral drugs first began to attract attention, they were studied with impromptu techniques based on self-observation, usually designed to quantify subjective reports. Eventually the methods of an experimental analysis proved their value in generating reproducible segments of behavior upon which effects of drugs could be observed and in terms of which they could be effectively defined and classified. For the same reasons, brain physiology will move forward more rapidly when it recognizes that its role is to account for the mediation of behavior rather than of mind.

### BEHAVIORISM IN THE SOCIAL SCIENCES

There is also still a need for behaviorism in the social sciences, where psychology has long been used for explanatory purposes. Economics has had its Economic Man. Political science has considered Man as a Political Animal. Parts of anthropology and sociology have found a place for psychoanalysis. The relevance of psychology to linguistics has been debated for more than half a century. Studies of scientific method have oscillated between logical and empirical analyses. In all these fields, "psychologizing" has often had disappointing results and has frequently been rejected by turning to an extreme formalism emphasizing objective facts. Economics confines itself to its own abundant data. Political scientists limit themselves to whatever may be studied with a few empirical tools and techniques and

confine themselves, when they deal with theory, to formalistic analyses of political structures. A strong structuralist movement is evident in sociology. Linguistics emphasizes formal analyses of semantics and grammar.

Strait-laced commitments to pure description and formal analysis appear to leave no place for explanatory principles, and the shortcoming is often blamed on the exclusion of mental activities. For example, a recent symposium on "The Limits of Behaviorism in Political Science"<sup>12</sup> complains of a neglect of subjective experience, ideas, motives, feelings, attitudes, values, and so on. This is reminiscent of attacks on behaviorism. In any case, it shows the same misunderstanding of the scope of a behavioral analysis. In its extension to the social sciences, as in psychology proper, behaviorism means more than a commitment to objective measurement. No entity or process which has any useful explanatory force is to be rejected on the ground that it is subjective or mental. The data which have made it important must, however, be studied and formulated in effective ways. The assignment is well within the scope of an experimental analysis of behavior, which thus offers a promising alternative to a commitment to pure description on the one hand and an appeal to mentalistic theories on the other. To extend behaviorism as a philosophy of science to the study of political and economic behavior, of the behavior of people in groups, of people speaking and listening, teaching and learning—this is not "psychologizing" in the traditional sense. It is simply the application of a tested formulation to important parts of the field of human behavior.

### REFERENCES AND NOTES

- <sup>1</sup>The doctrine of parallelism may have prepared the ground with its acknowledgment that the physical aspects of behavior might be accounted for without referring to mental aspects.
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- <sup>4</sup>Bridgman, P. *The nature of some of our physical concepts*. New York: Philosophical Library, 1952.
- <sup>5</sup>Bridgman, P. *The way things are*. Cambridge: Harvard University Press, 1959.
- <sup>6</sup>Stevens, S.S. The operational basis of psychology. *American Journal of Psychology*, 1935, 47, 323-330.
- <sup>7</sup>For an analysis of the ways in which the verbal community may partly resolve its problem, see "The Operational Analysis of Psychological Terms" (1945). Although the private world is defined anatomically as "within the skin," the boundaries are the limits beyond which the reinforcing community cannot maintain effective contingencies.
- <sup>8</sup>Blough, D.S., & Schrier, A.M. Scotopic spectral sensitivity in the monkey. *Science*, 1963, 139, 493-494.

<sup>9</sup>Blough, D.S. Dark adaptation in the pigeon. *Journal of Comparative and Physiological Psychology*, 1956, 49, 425-430.

<sup>10</sup>Herrnstein, R.J., & van Sommers, P. Method for sensory scaling with animals. *Science*, 1962, 135, 40-41.

<sup>11</sup>Ogle, K.N. The visual space sense. *Science*, 1962, 135, 763-771.

<sup>12</sup>Charlesworth, J.C. (Ed.). *The limits of behavioralism in political science*. Philadelphia: American Academy of Political and Social Sciences, 1962.

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### **POSTSCRIPT**

All modern languages—but perhaps English most of all—are heavily mentalistic. It is almost impossible to discuss a simple exchange between two people without invoking minds, thoughts, feelings, intentions, and so on. Almost all scholarly treatments of human behavior—philosophy, theology, logistics, political science, economics, and so on—use terms which imply that a person is a creative, initiating agent. For certain purposes the terms work well enough, just as our everyday physical vocabulary works well enough even though it is at variance with physics as a science. It is therefore not surprising that when the first revolutionary wave of behavioristic thought receded in the thirties and forties, psychology should return to its old ways. As a result the central argument of behaviorism began to be overlooked and misunderstood. Textbook accounts became more and more simplified, and were illustrated by stereotyped reports of old experiments, such as Pavlov's conditioned reflex.

Those who remained behavioral scientists reported their experiments for their behavioral colleagues without relating them to the philosophical issues. Philosophers—such as Gilbert Ryle, A.J. Ayer, and those associated with the Vienna Circle—came close to behaviorism but offered no experimental support for their theories. When I was invited to give a paper at a symposium on “Behaviorism and Phenomenology” at Rice University I took the opportunity to restate what seemed to me to be the central theme of radical behaviorism, and I wrote the present paper.