

# Methodological Behaviorism from the Standpoint of a Radical Behaviorist

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Methodological behaviorism is the name for a prescriptive orientation to psychological science. Its first and original feature is that the terms and concepts deployed in psychological theories and explanations should be based on observable stimuli and behavior. I argue that the interpretation of the phrase “based on” has changed over the years because of the influence of operationism. Its second feature, which developed after the first and is prominent in contemporary psychology, is that research should emphasize formal testing of a theory that involves mediating theoretical entities from a nonbehavioral dimension according to the hypothetico-deductive method. I argue that for contemporary methodological behaviorism, explanations of the behavior of both participants and scientists appeal to the mediating entities as mental causes, if only indirectly. In contrast to methodological behaviorism is the radical behaviorism of B. F. Skinner. Unlike methodological behaviorism, radical behaviorism conceives of verbal behavior in terms of an operant process that involves antecedent circumstances and reinforcing consequences, rather than in terms of a nonbehavioral process that involves reference and symbolism. In addition, radical behaviorism recognizes private behavioral events and subscribes to research and explanatory practices that do not include testing hypotheses about supposed mediating entities from another dimension. I conclude that methodological behaviorism is actually closer to mentalism than to Skinner’s radical behaviorism.

*Key words:* logical positivism, methodological behaviorism, operationism, radical behaviorism, research methods, verbal behavior

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Historically, psychology has been concerned with two important questions: (a) How should we render the meaning of the terms and concepts we deploy in psychological theories and explanations? (b) In turn, how does that rendering influence research methods and explanatory practices in psychology? Answering these two questions one way, based on particular conceptions of verbal behavior and operationism, leads to methodological behaviorism. Answering a different way, based on different conceptions of verbal behavior and operationism, leads to radical behaviorism. The present review critically examines these two ways of answering these questions.

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The present article draws on themes in other work by the author, and includes revised portions of that work.

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## BACKGROUND

Standard sources in history and systems of psychology typically state that psychology emerged as an independent discipline in the last quarter of the 19th century. During this period, psychology was viewed as the science of mental life, for example, as represented in introspective structuralism and functionalism. Mental phenomena were assumed to belong to a dimension that differs from behavior and environmental stimulation; the dimension of “mind.” Mental phenomena and how they worked were said to be introspectively observable to the participant in an experiment, but admittedly are not publicly observable. Thus, psychology embraced mentalism, which for present purposes I define as explanations of behavior that appeal to causes from a nonbehavioral dimension. Typical cases are explanations in terms of causal mental states and processes.

The problem was that introspective structuralism and functionalism

singularly failed as scientific endeavors, despite their best attempts to follow rigorous experimental protocols. For example, their theories and explanations were ambiguous, vague, did not promote replicable research findings, and in general failed to promote agreement.

The present review suggests that methodological behaviorism is the name for a prescriptive orientation to psychological science that grew out of critical reactions to introspective structuralism and functionalism in the first quarter of the 20th century and that has been influential ever since. Its first and original feature is that the terms and concepts deployed in psychological theories and explanations should be based on events, variables, and relations that are publicly observable. According to this first feature, direct appeals to unobservables, regardless of the ontology or metaphysics of the unobservables, are not allowed. I argue that the interpretation of the phrase "based on" has changed over the years, particularly under the influence of operationism.

The second feature of methodological behaviorism emerged some years later, as events played out in the discipline. This feature is prominent in the later interpretations of "based on" in contemporary psychology. According to this second feature, research should emphasize formal testing of a theory that involves mediating theoretical entities according to the hypothetico-deductive method. These mediating entities serve as proxies or surrogates to justify appeals to mental causes, if only indirectly. Operationism and the hypothetico-deductive method were taken to guarantee the empirical, objective significance of the research and subsequent theorizing.

Taken together, these two features entail a commitment to a particular view of science. This view requires observables and objective procedures to promote agreement and to overcome

earlier problems of ambiguity, vagueness, and nonreplicability. Moreover, psychologists who adopt this point of view assert that if the resulting theories and explanations in terms of observables are formulated correctly, they should be just as good as those that appeal directly to unobservables such as causal mental phenomena. Worth noting is that according to methodological behaviorism, the behavior of participants as well as that of scientists is explained in mental terms, even though the explanatory appeal to causal mental phenomena may be indirect instead of direct.

### VERBAL PROCESSES AND MEANING IN SCIENTIFIC VERBAL BEHAVIOR

As suggested above, the first feature of methodological behaviorism is that all psychological terms and concepts should be based on observables. An important issue in the discussion of methodological behaviorism is how to interpret the phrase "based on." I suggest the phrase has been interpreted in at least three different ways over the years.

#### *Interpretation 1*

Interpretation 1 is that psychologists should remain formally silent on unobservables such as mental phenomena in their theories and explanations. Remaining silent here means certainly ignoring if not denying the relevance of unobservables altogether. According to this interpretation, psychologists could even implicitly accept the same causal sense of mental phenomena as structuralism and functionalism, which many did, but just not speak directly of those phenomena. This interpretation was the original interpretation in methodological behaviorism and became prominent in the first quarter of the 20th century. It is often associated with classical S-R behaviorism, though Watson's (1913) position concerning this matter is more subtle and complex

than often supposed. Other frequently cited examples of this interpretation are Meyer (1922) and Bergmann (1956). To be sure, the examples differ in certain respects from one another. However, they all hold that psychologists should be silent on anything not publicly observable, and should deal with only observable relations between stimuli and responses in the data. Versions of Interpretation 1 that advocate ignoring all unobservables, though not necessarily taking the form of classical S–R behaviorism, continue to be influential in some areas of psychology (e.g., Baum, 2011; Rachlin, 2012).

Despite its seeming advantages, Interpretation 1 raises certain problems. For instance, behavior is more variable and spontaneous than ordinarily recognized by an S–R account expressed purely in terms of publicly observable variables and relations. In addition, how should psychologists account for verbal reports of internal sensations and feelings in terms of publicly observable variables and relations? How should psychologists account for thinking? If psychologists actually remain silent by ignoring or denying such matters, they have an incomplete psychology. But how should they address these matters without embracing dualism? It appears that theories and explanations based on S–R accounts and limited to observables are not actually as good as those that appeal to the mental. Consequently, many psychologists argued that they must include mental elements in their theories and explanations after all. But how can psychologists reconcile appeals to the mental with the particular understanding of science mentioned earlier, namely, that direct appeals to unobservables are not allowed and psychologists should secure agreement by speaking only of observables? How can psychologists reconcile appeals to the mental with their attempts to avoid the problems of structuralism and functionalism?

These questions lead to Interpretation 2.

### *Interpretation 2*

Interpretation 2 is that psychologists should insert unobservable “organismic” variables into the account, thereby producing an S–O–R formulation. This interpretation became prominent at the beginning of the second quarter of the 20th century (Tolman, 1932; Woodworth, 1929). The organismic variables were inferred to have causal properties that allowed psychologists to explain variability, spontaneity, and verbal reports, which they could not explain if they held rigorously to Interpretation 1. Psychologists postulated that the organismic variables had causal properties that ranged from initiating to mediating. The most common causal property was mediating, which I employ in what follows.

According to a mediational approach, some sort of mediator is assumed to be inside the organism in some sense, as part of its psychological makeup. The organismic mediator is neither behavioral nor environmental. Rather, it is an unobservable feature of another dimensional system. Nonetheless, advocates assert that their view is materialistic, not dualistic. At issue concerning the mediator is whether it conforms to behavioral laws that govern observable stimuli and responses (e.g., Zuriff, 1985, pp. 104, 156). Some theorists answered yes, but many ultimately came to answer no for a large number of their proposed mediators. A negative answer implies that the mediator has the status of a functionally autonomous causal entity in a nonbehavioral system that underlies behavior. In a common version of a mediational approach, the environment is held to activate or trigger in some complex but systematic way a mediating organismic variable, which in turn is held to activate or trigger in some complex but systematic way an eventual

response. The mediating organismic variable is causal in the sense that it is what is temporally contiguous with the response. The organism's behavior is therefore understood as a function of the mediating variable, rather than the environmental circumstance that triggers the chain of mediating events.

A suitable example is Hull's (1943) learning theory. Suppose an organism was trained under some specified set of experimental conditions, such as under some specified number of hours of food deprivation, in a maze of specified length, with stimulus cues of specified intensity, with food of specified magnitude in the goal box, and so on. Each of these independent environmental variables could be objectively measured using the instruments of physics. As readers may know, Hull first translated each of these objective measures into theoretical terms, that is, mediating organismic variables. He then combined the organismic variables into a final composite organismic variable: reaction potential. The size of the reaction potential was then said to be reflected in the speed of running the maze, or the number of trials to extinction, or other standard dependent measures. If the predicted values didn't work out, Hull suggested one of the organismic variables, afferent neural interaction, was actually something different from its physical measures. In another case, Hull inserted a randomly fluctuating variable called an oscillating factor, the principal purpose of which according to Skinner (1944) was to account for the failure of the quantitative prediction. Regardless, the causal role of the organismic mediator, such as its architecture and operating characteristics, is taken as the proper focus of psychological science, rather than a functional relation between environmental circumstances and responses. A common name for the mediational approach is mediational S-O-R neobehaviorism.

At this point I need to digress briefly and consider some developments in logical positivism at the end of the first quarter and beginning of the second quarter of the 20th century. At this time, logical positivism began to formally distinguish between observational and theoretical terms. Observational terms referred to entities that were measurable by scientific instruments. In contrast, theoretical terms were taken to refer to unobservables. The meaning of theoretical terms was established by logically connecting them to observables, without remainder. That is, the meaning of a theoretical term was entirely reducible to the language of physics. In this way theorists hoped to avoid any extraneous, nonscientific implications of the term. A common tactic was to render theoretical terms in psychology as "dispositions to behave." In any case, the relevant phrase here is "without remainder." I revisit the significance of this phrase shortly.

For now, let me return to psychology. In light of the developments in logical positivism, psychologists began to incorporate the aforementioned distinction between observational and theoretical terms into their own theorizing during the second quarter of the 20th century. Tolman (1932) was particularly influential. The mediating organismic variables of neobehaviorism were then rendered as theoretical terms rather than as observational terms. They were postulated to be from an unobservable dimension that differed from the one in which behavior takes place, just as were the original mental phenomena of structuralism and functionalism. Some common words for the other dimension are *mental, cognitive, spiritual, psychic, subjective, hypothetical, conceptual*; in a word, the dimension of *mind*. Some common words for the mediating, causal phenomena in the other dimension are *acts, states, mechanisms, processes, entities, structures, faculties, rep-*

*resentations*, and *cognitions*. In short, mentalism had been reinstated.

The problem for psychology was how to be consistent with the particular view of science mentioned earlier: How do we secure agreement about these mediating, unobservable entities? After all, they are unobservable.

In psychology, the solution was operationism. Operationism was proposed by the physicist P. W. Bridgman (1927). As Bridgman put it, the meaning of a theoretical term or concept was "synonymous" with the set of operations entailed in its measurement. According to one interpretation of operationism, psychologists should use observable data as proxies or surrogates to stand for mediating mental entities. By so doing, psychologists could reach agreement about their explanatory concepts. For example, *subjective sensation*, which was unobservable, was defined as differential responding in a discrimination procedure, which was observable. Any appeal to the mental was indirect, not direct. Consequently, the appeal did not violate the principal thesis of methodological behaviorism. Operationism became vitally important as the new approach to psychology developed during the second quarter of the 20th century (e.g., Stevens, 1939).

However, operationism raised its own new question. Readers will recall that early logical positivism advocated a position in which all terms needed to be logically connected to observables without remainder. Should the sense of "synonymous" in an operational definition be consistent with early logical positivism, logical connections, and the "without remainder" phrase? For many early psychologists, the answer was yes. In light of an affirmative answer, many early psychologists argued that in a word, an operational definition should be "exhaustive." An exhaustive definition admits only one meaning and explanatory application for a given theoretical term.

In sum, according to Interpretation 2, mental terms were admitted as mediating theoretical terms in the S–O–R mediational model. The operational definition of such terms was considered to be exhaustive. Explanatory appeals to mental causes were indirect and by virtue of operationism judged not to be in violation of the fundamental thesis of methodological behaviorism, namely, that psychological theories and explanations should be based on observable stimuli and behavior. The stage was now set for Interpretation 3.

### *Interpretation 3*

Interpretation 3 is that psychologists should continue to insert unobservable organismic variables into the account, again producing an S–O–R formulation, but this time the variables need only be partially defined instead of exhaustively defined. This interpretation arose during the 1940s, and was preceded by events in philosophy during the 1930s, as logical positivism worked through its distinction between observational and theoretical terms. During the 1930s, logical positivism faced a problem about the exhaustive interpretation of theoretical terms. If the meaning of a theoretical term was to be established by tracing it to a disposition to behave, the problem was the status of the disposition in the absence of the test condition that demonstrated the disposition. The logical positivist Carnap (1936, 1937) resolved this problem by arguing in favor of partial definitions. Partial definitions allowed more than one explanatory application for a given term, as long as each usage was logically connected to empirical evidence. By so doing, Carnap moved logical positivism from the original principle of direct sensory verification to one of logical confirmation.

Exhaustive operational definitions also created much debate in psychology,

but for different reasons than in philosophy: They were held to limit theory construction and general system building. If a theoretical term was limited to only one explanatory application, how could psychologists develop a general theory or build a general system? A symposium on operationism held in 1945 was symptomatic but failed to resolve the difficulties. A convenient reference point for the appearance of Interpretation 3 is the article by MacCorquodale and Meehl (1948), who formally proposed a type of theoretical term called a *hypothetical construct*. Hypothetical constructs were presumed to refer to phenomena that actually existed, although their properties were only incompletely specified in any particular case. Hence, hypothetical constructs were only partially defined in the sense of Interpretation 3 above. As dispositions, they actually existed and could apply to other situations. Any particular definition did allow surplus meaning. This move was at least conceptually related to Carnap's of a little over a decade earlier, and indeed MacCorquodale and Meehl cited Carnap (1936, 1937) in their list of references. The effect of this move was to lift the limitations on theory construction and general system building that had become points of contention during the 1940s. Given the S-O-R mediational model with partial operational definitions of the mediating organismic variables, psychologists could now indirectly but nonetheless legitimately appeal to unobservable mental variables in their theories and explanations, but still stay within the bounds of methodological behaviorism. Interpretation 3 has predominated since the end of the second quarter of the 20th century, with an accompanying proliferation of mediating entities in what pass as psychological theories and explanations.

A natural question now is: How do the three interpretations count as instances of the same point of view? After all, they seem to be saying at

least three different things. Recognizing that the three interpretations can be said to differ among themselves in certain respects, we can say that all are nonetheless instances of the same point of view because all prohibit direct talk about mental events. The operative word here is *direct*. Interpretation 1 explicitly prohibits any kind of talk about mental events. Interpretations 2 and 3 do allow some talk, but that talk is *indirect*, by virtue of operationism, rather than direct.

In sum, according to Interpretation 3, mental terms were admitted as theoretical terms in the S-O-R mediational model. Unlike Interpretation 2, however, an operational definition could be considered to be partial, and the terms or concepts were interpreted as hypothetical constructs, which admitted surplus meaning. As before, explanatory appeals to mental causes were indirect and by virtue of operationism judged not be in violation of the fundamental thesis of methodological behaviorism, namely, that psychological theories and explanations should be based on observable stimuli and behavior.

### RESEARCH PRACTICES, VERBAL BEHAVIOR, AND OPERATIONISM

As mentioned earlier, the second feature of methodological behaviorism entails particular research methods and explanatory practices. The words of Kendler and Spence (1971) are illustrative:

The neobehavioristic decision concerning the nature of explanation is, in principle, both clear and simple. Explanation is equated with theoretical deduction: an event is explained by deducing it from one or more general propositions. The deductive process is analogous to mathematical proof although its precision can vary from mathematical verification to the logical use of ordinary language. The constructs used in the theoretical propositions must in some manner be representative of the concepts involved in the events to be ex-

plained. In other words the theoretical constructs must be coordinated with the empirical events. (p. 21)

According to these methods and practices, psychologists should observe hypothetico-deductive practices by testing theories that contain mediating theoretical terms and concepts. These terms should be construed according to various versions of the S-O-R mediational model. More specifically, psychologists should impose their independent variables under carefully controlled conditions, record observable dependent measures from experimental and control groups, and then conduct tests of statistical inference to compare the data from the groups. If the results are consistent with the predictions of the theories, psychologists should take the results to validate the mediating theoretical terms and the conceptual scheme that underlies the theory. Psychologists should also take the results to validate the general model by which psychologists are presumed to acquire scientific knowledge: Scientific knowledge is the unique product of theory testing according to the rules of logic, and differs from ordinary knowledge because of its adherence to the rules of logic.

These methods, practices, and assumptions currently underlie mainstream research programs of faculty and scientific institutes, as well as professional socialization in the discipline of psychology. They underlie courses in research methods, experimental design, and statistics in most psychology departments at colleges and universities. They underlie standardized tests in the discipline such as the Graduate Record Examination. Research and psychological explanations that are not consistent with these practices are given less weight, if any weight at all, in the scientific community, for example, as reflected in the editorial decisions of scholarly journals and research support from granting agencies.

As I mentioned in the introduction of the present paper, we get different answers to the two rhetorical questions, based on the underlying conceptions of verbal behavior and operationism to which we adhere. Methodological behaviorism adheres to a symbolic referential conception of complex verbal behavior and a particular conception of operationism. According to these conceptions, (a) words are things that symbolically refer to other things; (b) psychological terms are hypothetical constructs that, when given partial operational definitions, may be inferred to symbolically refer to or represent causal mental variables; and (c) the job of psychology is to use observables as proxies to stand for causal mental variables so that those variables may be investigated.

As I discuss below, these conceptions of verbal behavior and operationism can be contrasted with the conceptions entailed by radical behaviorism.

### **RADICAL BEHAVIORISM: RESEARCH PRACTICES, VERBAL BEHAVIOR, AND OPERATIONISM**

The research and explanatory practices of radical behaviorism are expertly described in such sources as Chiesa (1994), Sidman (1960), Barlow, Nock, and Hersen (2009), and Johnston and Pennypacker (2008). Suffice it to note that these practices do not depend on the logical status of psychological terms, as in traditional psychology based on mediational neo-behaviorism, but rather on pragmatic considerations. In addition, they do not explain the behavior of the scientist in mental terms. Consequently, they avoid the epistemological dualism inherent in traditional explanations of the behavior of the scientist.

Research may be undertaken for any of several reasons: (a) to evaluate hypotheses, (b) to indulge the investigator's curiosity about nature, (c) to

try out a new method or technique, (d) to establish the existence of a phenomenon, and (e) to explore the conditions under which a phenomenon occurs (Sidman, 1960). To be sure, one reason may be to evaluate a theory, but there are other reasons. The goals are ultimately to identify the variables of which changes in behavior are a function, to identify how the relations among behavior and its controlling variables are to be brought together in a system, and to identify what methods are appropriate to the study of such a system. Group statistical designs in which data are aggregated may only obscure, rather than reveal, order. Of principal concern are the reliability and generality of data. Reliability is ordinarily a matter of replication. Generality is ordinarily a matter of identifying similarities and differences among subjects, responses, controlling variables, and settings. Thus, radical behaviorism approaches research from a different point of view than does methodological behaviorism.

Radical behaviorism regards the methodological behaviorist conception of verbal behavior as decidedly mentalistic, in light of the commitment to words as symbolic things and a reference theory of meaning. The controversies reviewed earlier about exhaustive versus partial operational definitions and so on are all very interesting, but they are actually beside the point, because they are all predicated on a symbolic, referential conception of verbal behavior, which is an ineffective conception by virtue of its mentalism.

In contrast, radical behaviorism views verbal behavior as operant behavior, occasioned by antecedent circumstances and maintained by reinforcing consequences. The radical behaviorist commitment here is to a fundamentally nonmentalistic account of verbal as well as nonverbal behavior. Radical behaviorism further argues for operationism as the functional analysis of verbal behavior in

terms of contingences. Meaning is not a matter of symbolic reference, of having observables stand for unobservables. Meaning is to be found in an analysis of conditions of use.

For radical behaviorism, the analysis of scientific verbal behavior turns on the analysis of the sources of control over the verbal behavior in question. With specific regard to mental terms, radical behaviorism asks, Why do psychologists assume in the first place that theories and explanations in psychology require mediating mental terms, where *mental* is assumed to refer to something unobservable from another dimension? Instead, radical behaviorism approaches the subject of meaning by asking, What, if anything, is being spoken about when mental terms are used? Science begins to a great extent with the verbal process of tacting. Tacts are verbal responses occasioned by objects, events, or situations, or properties of objects, events, or situations. If science does begin with tacting, how much control over mental terms comes from (a) extraneous and incidental sources that are cherished for irrelevant reasons, as in the explanatory fictions of folk psychology; or (b) objects, events, or situations; or properties of objects, events, or situations; tacts, extended tacts, constructed tacts, abstractions, conditional discriminations, including interpretations of control by private stimuli and responses?

Even though many explanatory fictions of folk psychology take the form of tacts, the explanatory fictions are not literally tacts of objects, events, or situations, or even the properties thereof, where those objects, and so on, are assumed to be from another dimension. Rather, operational analysis reveals that they are instances of verbal behavior under extraneous and incidental sources of control: culturally based intraverbals, linguistic transformations, and mischievous metaphors.

To be sure, some ostensibly mental terms may well tact something.



Operational analysis of those terms reveals the extent to which they are tacts. Some examples of tacting in psychological theories and explanations are as follows:

*Dispositions.* Dispositions tact the probability of behavior in antecedent circumstances. However, I note that dispositional talk does not itself constitute a causal explanation of behavior because the cause of the behavior is not specified. We still need a causal account in terms of contingencies responsible for the behavior being tacted. On this view, some mental terms in ordinary language (e.g., belief, desire, intention) but not all (e.g., thinking) may be understood as dispositional. Interpretation I may be seen as consistent with a dispositional approach, but suffers from the same liabilities if it is applied to all mental terms: It is an incomplete psychology because it ignores or denies behavioral events accessible to only one person.

*Behavioral relations.* These terms tact a controlling relation between behavior and some antecedent circumstance. For example, the term *discrimination* may be understood as tacting different responding to different circumstances, typically attributable to a history of different experiences in those circumstances. Similarly, the term *generalization* may be understood as tacting similar responding to similar circumstances. Such terms need not be understood as referring to mediating mental processes.

*Physiology.* Physiological terms tact physiological events during two gaps in a behavioral account (within a particular event; between one event and the next), although as a material rather than an efficient cause.

*Private behavioral events.* These terms tact behavioral events accessible to only one person.

What then are “private behavioral events”? Skinner (1953) talks of private behavioral events in the following way:

When we say that behavior is a function of the environment, the term “environment” presumably means any event in the universe affecting the organism. But part of the universe is enclosed within the organism’s own skin. Some independent variables may, therefore, be related to behavior in a unique way. The individual’s response to an inflamed tooth, for example, is unlike the response which anyone else can make to that particular tooth, since no one else can make the same kind of contact with it. Events which take place during emotional excitement or in states of deprivation are often uniquely accessible for the same reason; in this sense our joys, sorrows, loves, and hates are peculiarly our own. With respect to each individual, in other words, a small part of the universe is *private*. We need not suppose that events which take place within an organism’s skin have special properties for that reason. A private event may be distinguished by its limited accessibility but not, so far as we know, by any special structure or nature. We have no reason to suppose that the stimulating effect of an inflamed tooth is essentially different from that of, say, a hot stove. The stove, however, is capable of affecting more than one person in approximately the same way. (pp. 257–258)

In general, two sorts of private events are at issue. The first concerns verbal reports about feelings or sensed conditions of the body. The second is covert operant activity. The functional role of stimulation from these two sorts of private events, such as how the stimulation exerts an effect on subsequent verbal and nonverbal behavior, may now be examined in greater detail. Verbal reports about our internal sensations and feelings come about as the verbal community circumvents the problem of privacy and bases the differential reinforcement necessary to bring verbal behavior under the control of private stimulation on either collateral responses or public accompaniments. Control then transfers from public to private discriminative stimulation. An established response may also come under the control of private stimulation related to the original via stimulus generalization. This account answers the longstanding “private language” problem in philosophy, and may be contrasted with implicitly mentalistic commitments to a private language in traditional accounts.

Covert operants are executed by the same response systems as overt behavior, just reduced in magnitude. The organism is doing the same thing as it does in the presence of an actual object or situation. For example, when we think, we engage in behavior with respect to some set of circumstances. The behavior is of such a reduced magnitude that it is not accessible to anyone else. We make contact with the behavior through our interoceptive or proprioceptive nervous systems, rather than exteroceptive. The behavior then influences subsequent behavior, such as by being discriminative, reinforcing, or aversive, just as overt behavior would be with respect to those circumstances. The most common examples are verbal because verbal behavior does not require environmental support. In addition, speakers can talk to themselves effectively because they are both speakers and listeners. However, nonverbal behavior may also be covert. In the case of covert verbal behavior, what bridge players are said to "have in mind" when they consider playing a particular card is presumably covert verbalizations based on past overt instances of playing a card and the consequences of doing so. In the current instance they are doing what they have done in the past, and they are saying something about the consequences of having done so, only in a reduced magnitude. Much covert behavior, whether verbal or nonverbal, is acquired in overt form and then transfers to covert because of environmental circumstances. In any event, the covert form doesn't accomplish anything that is beyond the overt. With advances in technology, covert operants may no longer be covert. Neural prosthetics are but one example.

A special case of a private behavioral event is a covert perceptual response. Ordinarily, when objects are actually present, such perceptual responses as seeing or hearing those

objects may be understood as simply part of the total behavioral episode involving the objects, rather than covert behavior. However, when such objects are absent, we might engage in covert perceptual behavior involving the objects when we (i.e., via our perceptual systems) do the same things as we do in the actual presence of those objects. Examples are suggested by the words *imagining* or *visualizing*. We might also have covert perceptual responses based on Pavlovian processes. If we customarily see red hearts and diamonds and black clubs and spades in a deck of cards, we might see a specially prepared red club as a heart because red and curved shapes have occurred together in the past. Readers may consult Skinner (1953, pp. 257–282) for a comprehensive account of how private behavioral events may be included in a natural science of behavior.

In traditional psychology, inner causes from a mental dimension carry the major explanatory burden. Radical behaviorism acknowledges that some important forms of stimulation are in fact private, meaning that they are accessible only to the behaving person. However, if these forms of stimulation are private, is Skinner being mentalistic himself? The present argument is that he is not. First, the private forms of stimulation are within the behavioral dimension, not mental. Second, the origin and effectiveness of private forms of stimulation depend on prior public events. That is, the private stimulation is not an autonomous, independent contribution of the organism. When a given instance of behavior occurs, private forms of stimulation may not even be functionally relevant to the behavior. If prior public events have made private stimulation functionally relevant, radical behaviorists argue the private stimulation contributes to discriminative control.

There are many events that take place within the body that can be

known about. At issue is the functional role of these events in a science of behavior. Some events are physiological and studied by neuroscience. For example, neuroscience studies the physiological events that take place in structures and pathways when a stimulus impinges on an organism and the organism subsequently responds, or when experiences with the environment on one occasion lead an organism to behave differently on a subsequent occasion. The activity in these structures and pathways is not ordinarily a private behavioral event, at least in the sense in which radical behaviorism conceives of private events. Brain activity is simply part of the physiological processes according to which any behavior can take place. As discussed above, radical behaviorists are interested in those private behavioral events that contribute to subsequent behavior via a specific history of environmental relations.

### SUMMARY AND CONCLUSIONS

Overall, traditional psychology has come to entail the orthodoxy of formalized mediational S-O-R neobehaviorism represented by Interpretation 3. This orthodoxy has led to a proliferation of hypothetical constructs that supposedly refer to mediating acts, states, and so on, in a mental dimension, themselves unobservable but held to underlie behavior. Traditional psychology then uses observables as evidence to justify appeals to causal mental variables, which are in turn interpreted as hypothetical constructs to make theories and explanations appear logically valid and to meet the requirements of science. Thus, I argue that the methodological behaviorist way of answering the two rhetorical questions identified in the introduction results in an "institutionalized mentalism" of traditional psychology. Indeed, Interpretation 3 has been adopted almost universally in traditional psychology.

I further note that cognitive psychology is often said to dispute behaviorism. Ironically, what it disputes is a behaviorism based on Interpretations 1 and 2. Very few radical behaviorists actually adhere to either of these interpretations. In fact, contemporary cognitive psychology is entirely consistent with the mediational neobehaviorism based on Interpretation 3 and methodological behaviorism (Moore, 1996).

Radical behaviorism is based on different views of verbal behavior and science than is methodological behaviorism. These views follow from pragmatic questions: What can be manipulated in space and time at the consistent level of a behavioral dimension that results in effective action, even for only one person? How can we effectively talk about the variables and relations that yield prediction and control? Theories in radical behaviorism are abstract and economical formulations of the relations between independent and dependent variables, expressed in a minimum number of terms, rather than appeals to supposed mediating states and processes in another dimension. Explanations consist in a causal account of the behavior in question, in terms of contingencies at the level of phylogeny, ontogeny, or the culture. Methodological behaviorism gives rise to an epistemological dualism of the scientist, in which explanatory behavior of the scientist is given a mentalistic account. In radical behaviorism, logical and scientific verbal behavior can be given a naturalistic analysis that is ultimately more effective because it does not appeal to inferred mental causes, if only indirectly, of the behavior of either the observed subject or the observing scientist. Overall, we can conclude that radical behaviorism offers a more effective science than a methodological behaviorism, a view liberally laced with mentalism. Let us be sure that we keep the radical, interpreted as thoroughgoing, in

radical behaviorism, and that we do not devolve to methodological behaviorism with an incomplete psychology and an institutionalized mentalism.

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