

Skepticism of Caricatures

B.F. Skinner Turns 100

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Juxtaposition of recent claims about B.F. Skinner in popular science books with actual quotations from Skinner's work reveals several enduring misinterpretations. Their promulgation is unnecessary and serves no beneficial purpose for the broader scientific community.

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March 20 marks the 100th anniversary of B.F. Skinner's birth (March 20, 1904; he died August 18, 1990). Skinner championed psychology as a science of behavior, and in so doing, emphasized the study of behavior and the environmental events preceding and following instances of behavior. He was one of the most influential and controversial psychologists of the twentieth century. But despite his prominence, misinformation about Skinner's radical behaviorism remains widespread and is apparent in a variety of recent books. I will address three common and partially overlapping myths about Skinner, which I will refer to as the Blank Slate Myth, the Empty Organism Myth, and the Only Overt Behavior Myth.

The Blank Slate Myth

Skinner's emphasis on environment-behavior relations has led to inferences that he believed the organism was a virtual blank slate upon which the environment writes unfettered by genetics or biology. Unbelievably, this view still exists and for many, references to Locke, Watson, and Skinner appear to be interchangeable. For example, Pinker (2002, 169) describes Skinner as "a staunch blank-slater," while a recent book on child development suggests "Skinner's view was that children were the ultimate blank tablets, passively waiting to be inscribed by reinforcement schedules" (Gopnik et al.; 1999, 19). LeDoux (2002, 83) further suggests that according to Watson and Skinner "learning was a universal capacity that worked more or less the same regardless of which animal was doing the learning and what was being learned." These authors are overgeneralizing, failing to distinguish Skinner's approach from that of Locke and Watson, the latter being infamous for making what even he admitted was the exaggerated claim that he could train any infant to any specialty. Skinner took no such position, noting that Watson

is probably responsible for the persistent myth of what has been called "behaviorism's counterfactual dogma." And it is a myth. No reputable student of animal behavior has ever taken the position "that the animal comes into the laboratory as a virtual *tabula rasa*, that species differences are insignificant, and that all responses are about equally conditionable to all stimuli." (Skinner, 1966/1969, 173)

If Skinner was unwilling to postulate that a laboratory animal arrives as a blank slate it strains credulity to assume he thought otherwise of humans. Skinner (1959/1972, 558) went further, lamenting that Watson is remembered "for an extreme environmentalism, and for a coldly detached theory of child care, no one of which was a necessary part of his original program." Thus, it is even more regrettable and contrary to fact when Skinner is characterized similarly.

For Skinner, behavior was clearly seen as the product of the combination of genetics and environment: "The environment made its first great contribution during the evolution of the species, but it exerts a different kind of effect during the lifetime of the individual, and the combination of the two effects is the behavior we observe at any given time" (Skinner 1974, 17).

Thus, behavior is seen as the result of both genes and environment. Genes alone do not engage in behavior. Unified, whole organisms interacting in and with an environment behave. The

influence is interactive and nonreducible. This point, while apparently obvious, is especially important when dealing with a fluid subject matter like behavior (or patterns of behavior), where environmental consequences for a particular class of behavior commingle with innate repertoires, quickly making them inseparable: "It would be hard to say how much of the strength of the behavior is due to each. . . . We may have an innate repertoire of aggressive behavior, but similar behavior is generated by many contingencies of reinforcement" (Skinner 1984, 220).



B.F. Skinner

The Empty Organism Myth

A corollary of the Blank Slate Myth about Skinner is the Empty Organism Myth, which suggests that Skinner dismissed or ignored the role of the brain in learning. For example, according to Ridley (1996, 258) Skinner's "behaviorism held that animals' brains were black boxes which relied upon pure association to learn any task with equal ease." Similarly, Pinker (2002, 20) suggested that for Skinner "studying the brain was just another misguided quest to find the causes of behavior inside the organism rather than out in the world."

In Skinner's view, the contingencies of survival (i.e., evolution) give us not only a genetic heritage, but also a central nervous system that is

modifiable by consequences (the first great contribution of the environment): "What evolves is an organism as a physical system, and it is such an organism that is modified by operant conditioning" (Skinner 1975, 120).

In other words, organisms have as an evolved feature a central nervous system that is capable of being altered by experience. We are born with a brain that is flexible, plastic, and incomplete. The flexible, adaptable brain can take full advantage of selection by consequences occurring during the lifetime of the organism (the second great contribution of the environment): "Just as genetic characteristics which arise as mutations are selected or discarded by their consequences, so novel forms of behavior are selected or discarded through reinforcement" (Skinner 1953, 430).

One unique aspect of humans is our protracted period of immaturity (i.e., childhood), which must have been evolutionarily selected for. Why this lengthy period of immaturity? One reasonable hypothesis is that it provides us time to learn

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about our specific environment (see also Gopnik et al., 1999): "A long infancy gives the ontogenic process greater scope, and its role in adapting to very unstable environments is a great advantage" (Skinner 1984, 220).

Thus, the development of the trillions of neural connections in the brain is shaped collaboratively by biological and environmental factors. Moreover, given a central nervous system that is modifiable by consequences, one can conclude that all variables that affect behavior inevitably also affect the neurobiological state of the organism. Moreover, changes in behavior derive from—and are correlated with—neurobiological changes. In Skinner's words:

The physiologist of the future will tell us all that can be known about what is happening inside the behaving organism. His account will be an important advance over a behavior analysis, because the latter is necessarily "historical"—that is to say, it is confined to functional relations showing temporal gaps. Something is done today which affects the behavior of the organism tomorrow. No matter how clearly that fact can be established, a step is missing, and we must wait for the physiologist to supply it. He will be able to show how an organism is changed when exposed to contingencies of reinforcement and why the changed organism then behaves in a different way, possibly at a much later date. What he discovers cannot invalidate the laws of a science of behavior, but it will make the picture of human action more nearly complete. (Skinner 1974, 236–237)

The last sentence of the above quote may be a source of much of the confusion. While biological science is clearly seen as important and useful, a science of behavior is not dependent upon and need not wait around for biological advances. That is to say, psychology and neurology/physiology are different sciences, working at different levels of analysis. Neurological/physiological explanations are not necessary to legitimize psychological science. Neurology/physiology may provide explanations at that level of analysis, but that explanation cannot undo established environment-behavior relations at the psychological level of analysis. Moreover, when important neurological events are identified, "These events in turn will be found to be preceded by other neurological events, and these in turn by others. This series will lead us back to events outside the nervous system and, eventually, outside the organism" (Skinner 1953, 28).

This is not a rejection of biology, but rather a call for, and emphasis on, rigorous understanding of environment-behavior relationships in their own right. Indeed, "A comprehensive set of causal relations stated with the greatest possible precision is the best contribution which we, as students of behavior, can make in the co-operative venture of giving a full account of the organism as a biological system" (Skinner 1956/1972, 270).

An example might help to clarify here. It is well established that a tone that has preceded a shock comes to reliably produce a response (e.g., a lever press) that has terminated the tone and preempted the shock (escape/avoidance conditioning). Finding that damage to, or removal of, the amygdala influences this type of learning (LeDoux 2002) provides important additional information and was more readily achieved because it could build upon an already known environment-

behavior relationship. Likewise, that effective psychosocial intervention for social phobia produces changes in amygdalar functioning (similar to effective pharmacotherapy, see Furmark et al., 2002) is fascinating, consistent with the view that changes in behavior are correlated with changes in neurology, and leads to a fuller account of the process of effective psychotherapy. However, it is also the case that identification of the biological changes was not required to establish the validity of the behavior changes observed: "By appealing only to environmental variables (while assuming a given set of genetic and organic variables), psychology may make this contribution entirely within its own field. That there are etiological factors lying beyond this field is doubtless true" (Skinner 1957/1972, 253).

The preceding should make clear that Skinner was not antagonistic to biology, recognized that brain changes are necessarily correlated with changes in behavior, and would concur that the most complete account involves understanding environment-gene-brain-behavior relationships. However, his level of analysis was environment-behavior relationships and these cannot be removed from the sequence. He writes, "The organism is, of course, not empty, and it cannot be adequately treated simply as a black box, but we must carefully distinguish between what is known about what is inside and what is merely inferred" (Skinner 1974, 233).

While Skinner clearly recognized the importance of genetics and biology, he was adamantly opposed to mentalism—that is, to invented, hypothetical, or metaphorical nervous systems that are in principle unobservable (i.e., nonphysical) and confuse psychology with physiology/neurology. I turn to Skinner's rejection of mentalism, but not covert events, next.

The Only Overt Behavior Myth

Even if we accept that Skinner recognized that humans are not biologically empty, clearly it is accurate that he saw the organism as cognitively empty, right? According to Seligman (2002, 31), Skinner "argued for half a century that all of mental life was mere epiphenomena. . . ." Pinker (1997, 62) concurred that Skinner "held that beliefs and desires have nothing to do with behavior—indeed, that they are as unscientific as banishes and black magic." Not exactly. Skinner opposed mentalism but did not reject the role of private events.

The distinction between public and private is by no means the same as that between physical and mental. That is why methodological behaviorism (which adopts the first) is very different from radical behaviorism (which lops off the latter term in the second). The result is that while the radical behaviorist may in some cases consider private events (inferentially, perhaps, but nonetheless meaningfully), the methodological operationist has maneuvered himself into a position where he cannot. (Skinner 1945/1972, 383)

Furthermore, Skinner writes that

Mentalism kept attention away from the external antecedent events which might have explained behavior, by seeming to supply an alternative explanation. Methodological behaviorism did just the reverse: by dealing exclusively with external antecedent events it turned attention away from self-observation and self-

knowledge. Radical behaviorism restores some kind of balance. It does not insist upon truth by agreement and can therefore consider events taking place in the private world within the skin. It does not call these events unobservable, and it does not dismiss them as subjective. (Skinner 1974, 18)

Behavior lies on a continuum: some is only privately observed (e.g., thinking, imagining), while some is publicly observed (e.g., movements), but all of it is in principle observable and hence amenable to scientific analysis. Private responses are not dismissed by Skinner (as in Watsonian, methodological, behaviorism) but are also accorded no special status and are not seen as different in kind from other behavior.

Covert behavior is almost always acquired in overt form and no one has ever shown that the covert form achieves anything which is out of reach of the overt. . . . It [covert behavior] does not explain overt behavior: it is simply more behavior to be explained. (Skinner 1974, 115)

Consider, for example, the question "What is the tenth word of the National Anthem of the United States?" To solve this problem you might a) write out the words and then count them, b) rehearse the words silently while counting on your fingers, or c) rehearse and count silently. What happened here? In response to the external antecedent event—the problem—a sequence of overt and/or covert responses were then emitted, each of which changed the situation/environment and controlled subsequent responses that ultimately made emission of the correct response (i.e., *light*) more probable. Skinner's analysis recognizes the importance of the various overt and/or covert responses in the causal sequence but requires that the causal sequence be completed by extending it backwards to the external antecedent and forward to the consequences for correct or incorrect responses. Furthermore, note that there was no necessity that your sequence of overt and/or covert behavior led to a correct answer. Most obviously, if you lack exposure to the National Anthem of the United States (or your repertoire is deficient in basic counting skills), effective overt or covert adjustments are unlikely. The last point emphasizes again the importance of prior selection by consequences (i.e., the individual's learning history) in explaining current behavior (both overt and covert).

Human beings attend to or disregard the world in which they live. They search for things in that world. They generalize from one thing to another. They discriminate. They respond to single features or special sets of features as "abstractions" or "concepts." They solve problems by assembling, classifying, arranging, and rearranging things. They describe things and respond to their descriptions, as well as to descriptions made by others. They analyze the contingencies of reinforcement in their world and extract plans and rules which enable them to respond appropriately without direct exposure to the contingencies. They discover and use rules for deriving new rules from old. In all this, and much more, they are simply behaving, and that is true even when they are behaving covertly. (Skinner 1974, 245–246)

This description is a far cry from considering human beings passive, empty, nonthinking black boxes.

The purpose of this article is not to recruit adherents or to convince anyone of the relative merits of Skinner's position,

nor to denigrate or dismiss the theories of the contemporary authors cited. My goal was simply to use the occasion of the approaching 100th anniversary of Skinner's birth to clear away some mythical debris that remains about his approach to psychology as a science of behavior. The material presented does not constitute historical revisionism, but Skinner in his own words with some supporting text and examples. You may disagree with Skinner's actual positions, but it serves no purpose to disagree with myths or caricatures. Indeed contemporary behavior analysis does not sit still looking backwards, but continues forward from the tradition established by Skinner making important advances in a natural science approach to emotions and motivation (see Dougher and Hackbert 2000; Michael 2000), problem solving, cognition, and language (see Donahoe and Palmer 1994; Hayes, Barnes-Holmes, and Roche 2001). Skinner would have it no other way: "The study of human behavior is, of course, still in its infancy, and it would be rash to suppose that anyone can foresee the structure of a well-developed and successful science. Certainly no current formulation will seem right fifty years hence" (Skinner 1956/1972, 260).

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