Representation: A concept that fills no gaps

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Four categories of complex behavioral phenomena have traditionally given behaviorists trouble, at least in part because they began studying them only recently: Novel behavior (which leads some to speak of "creativity"); complex, distinctively human behavior not easily traceable to genes or the environment (which leads some to speak of such things as "the self-concept" or a "language organ"); covert behavior ("ideas," "thoughts," "percepts," "feelings," and so on); and behavior under the control of events that occurred in the remote past. Roitblat is troubled by the latter category and appeals to such notions as "memory" and "representation" in his attempt to deal with it.

A pigeon pecks a plastic key that is transilluminated with yellow light. The light is extinguished, and 5 seconds later two other keys are illuminated – one yellow and the other green. The pigeon pecks the yellow one. How is it that the pigeon is able to do this? The answer, unfortunately – except in cases in which there is obvious mediating behavior (e.g., Blough 1959; Epstein & Skinner 1981) – is that we don't yet know.

The term "representation" sheds no light on the problem. It is one of a large number of cognitive terms in wide use that seem to fill a gap where the facts are not yet available. As Roitblat himself notes: We in no way explain the pigeon's behavior by saying that it "has a representation" of yellow, and alternatives such as "the pigeon was able to do this because it has a memory" or "because it remembers" are also uninformative. Having seen the sample stimulus, the pigeon was changed in some way, presumably physical. Neurophysiology is as yet too crude a science to identify the change, but it is surely there to be found.

Roitblat believes that we can make inferences about such changes from behavioral data, and that is surely true. Biologists and psychologists who study the biological basis of behavior do so routinely. But Roitblat's models are not physiological or anatomical, and in fact he presents no biological data whatsoever. Rather, Roitblat, like many cognitivists, uses behavioral data to construct models of information-processing systems that might generate similar data. He is not telling us what's inside, but rather how a computer might simulate behavior. The validity of this enterprise rests on the debatable assertion that organisms really are information-processing systems. Even Newell and Simon (1972) note that this is an assertion, but somehow an analysis of it gets lost among their myriads of models. I have examined this issue in some detail elsewhere (Epstein 1981) and here will note only that if the assertion is wrong, then so, most likely, are Roitblat's models of representation.

Roitblat gives undue weight to this cognitive construct with some parentheses and a slash. Speaking about the rate at which foraging animals obtain food, he writes, "In some animals this information is undoubtedly represented neurally (cognitively)." Does the punctuation signify that "neurally" and "cognitively" are one and the same thing? Later, he writes that the medium of a representation "appears to be neural/cognitive." Does this mean both "neural" and "cognitive," which are different things? In spite of these juxtapositions, it is clear from the paper as a whole that the two terms are not meant to be synonyms. Representation has no neural status for Roitblat, though he seems to wish that it did.

Many facts are cited about how behavior changes as a function of species, experience, and current circumstances. The facts speak for themselves and are the basis of a powerful heuristic. Roitblat's construct tends to divert attention from them and hence impedes a fuller understanding of their contributions. The sentence "experienced birds use some kind of map . . . to control their flight paths," in the context in which it is used, means only that, adult birds, after being displaced from their migratory routes, find their way back more successfully than young birds (What aspects of experience are important? Is age critical? Is maturation a factor? What properties of a bird's current environment control its return to the migratory route?). The statement "animals use experience-derived models of their environment to control behavior" tells us nothing more than that experienced animals negotiate their environments more successfully than unexperienced ones (What are the relevant experiences?).

Roitblat's concept is no substitute for facts about how genes and the environment determine the behavior he attributes to it, or for facts about how changes in behavior are mediated by the body. The concept may impede the search for such facts. He has not shown, furthermore, that a model of representation will lead to discoveries about the nervous system. Though he admits that representation is not an explanation of behavior, he asserts more than once that models of representation will provide the "kernel of an explanation." I fail to see the difference.

Roitblat's whipping boy, associationist behaviorism, is not the only kind of behaviorism. Skinner's many detailed analyses (e.g., 1945, 1957, 1977) of the covert processes that Roitblat subsumes under the term "representation" are conveniently omitted. Why Roitblat even bothers to discuss behaviorism is not clear; and, indeed, the fact that his concept is presented in so doctinaire a fashion makes it all the more suspect.