I will argue that there is no such thing as a minimal, antiseptic, or unprejudiced description of the data, the behavior, that it is the job of the behavioral scientist to explain. Descriptions under which it is the psychologist/ethologist's job to explain behaviors are in principle descriptions of functional behavioral structures. But to describe the functional structure of an organism's behavior requires heavy reference to normal organism-environment relations. Moreover, to explain the behavior of an organism is not to subsume this behavior under predictive laws but under normative laws, laws that define the historical organism-envoronment system. Narrow psychology/ethology, "methodological solipsism" (Fodor 1980, 1987), is not merely too narrow an approach; it is impossible in principle.

Four Senses of "Function"

It is important, first, to distinguish among various senses of the word "function". In which of these senses are descriptions of function straightforward descriptions of observable data? In which, if any, is it the behavioral scientist's job to explain behaviors described by reference to function?

Ia. Function as activity

Anatomy might be said to differ from physiology, roughly, in that anatomy studies the structure of body organs and systems while physiology studies the "functions" of these items, studies what they do. This distinction is between statics and dynamics, between studying a three dimensional temporal slice and studying a four dimensional structure, an activity or process. In this sense of "function", many functions, processes, are straightforwardly observable. And in this sense of "function" to study behavior is definitionally to study function. For behavior is four dimensional; a behavior is an event. Indeed, it is clarifying to think of physiology itself as a study of behavior, the behavior of inner organs and systems--behavior, say, that doesn't show on the outside. This leaves such activities as blushing, sweating, galvanomic skin responses and the chameleon's color changes for the psychologist/ethologist to study, but mostly it leaves bodily movement or, in the higher species, the effects of striated muscle contractions---which feels about right. (For a completely different tradition in the use of the term "behavior", see, as a paradigm, Engel 1986.)

Ib. Function as effect

At the start of his compendious book, Animal Behavior, Robert Hinde tells us that "there are two methods for describing behavior. One involves reference ultimately to the strength, degree and patterning of muscular contractions....the other involves reference not to these changes but to their consequences" (1970, p.10). It is natural to think of the consequences or effects of muscle contractions or, more liberally, of bodily motions, as "functions" of these, as functions that they perform. In this second sense of "function", many functions of behaviors are, again, straightforwardly observable. To describe a behavior as a motion having, as a matter of fact, a certain effect is not to leave the realm of the intersubjectively observable. (I am assuming that nothing so subtle as Hume's point about the nonobservationality of causes is at issue here.) And if we turn to the actual practice of

behavioral scientists, including during the hey day of behaviorism, very few have ever restricted themselves to collecting data on body motions or muscle contractions, and these only in rather special contexts. For example, to describe a behavior as eating, jumping, bar pressing--or scratching--is already to have moved beyond muscle contractions to the effects of these.

But if we ask if it is, in general, the job of the behavioral scientist to explain behaviors described in accordance with their effects, it is not clear that the answer is univocal. One effect of Rattus-the-rat's current muscle contractions is that the bar in front of him is depressed, another is that the watching experimenter frowns or smiles, a third that an elongated shadow passes over the floor in front of the cage, a fourth that a food pellet enters his cage, a fifth that this pellet makes a rattle that alerts young Templeton in the cage next door, making his mouth water. Surely it is not the job of the rat psychologist to explain all of these happenings. Which then is it his job to explain?

One possible answer is that the psychologist is interested only in laws of behavior; the effects of behavior that engage his attention are just those that fall under laws. For example, if there is some law of behavior under which Rattus' present lowering of the bar falls but none under which his causing an elongated shadow falls, then ipso facto that Rattus pushes the bar down is a behavior that it is the psychologist's job to explain, that Rattus causes an elongated shadow is not. The actual history of psychology suggests that the psychologist may be able to predict the effect that is bar pressing in accordance with laws of rat psychology without being able to predict the bodily motions that cause the bar pressing, without, say, predicting whether Rattus will use both paws, right paw, left paw or nose to depress the bar. So some of the laws of rat psychology may be about behavior described just in accordance with "function", in the sense of effect, and not about bodily motions at all.

However, this answer to the "which-effects-need-we-explain" question might be countered. Clearly, it may be said, the rat psychologist will not have completed his job until he can explain why, can predict when, Rattus will move the right paw, when the left paw, when both etc.. This may well require rat physiological psychology, but surely it is part of the behavioral scientist's program to explain not only the effects of bodily movements but these movements themselves. But if Rattus' bodily movements can be explained, then by adding only non-behavioral laws, for example, laws of physics, surely the effects of these movements can be explained as well. But these latter laws are not within the province of behavioral science. Strictly speaking, then, behavioral science will end by explaining only bodily motions. In the end it need not mention effects of bodily motions at all or, indeed, anything that lies outside the organism. Mature behavioral science will be "narrow".

Soon I will argue that both of these answers to the which-effects-need-we-explain question are mistaken. But first there are other senses of "function" to be explored.

Ic. Function as the organism's purpose

The behavioral scientist with whom we began this paper took it

that "grooming behavior" was a description of behavioral "function" in a sense in which descriptions of function go beyond straight descriptions of the experimental data to incorporate illicit speculations of some kind. He would, I am sure, have objected to "Jane said she was ill" (as opposed to "Jane uttered the words 'I am ill'") as a straight description of the data for the same reason. What kind of illicit speculation did he have in mind?

If we look to the history of behaviorism we find a strong concern that the data for psychology should be intersubjectively observable data in contrast, specifically, to data collected by introspection. One of the things that was traditionally thought to be known by introspection and, when the chips were down, by introspection alone, was what ones intentions or purposes are in action. It apparently followed that no reference to the significance to the organism, no reference to the organism's purpose in behaving, should be made when describing the data for psychology/ethology. To describe behavior by reference to its purpose would be to describe it by reference to hidden, probably occult, causes in the organism, causes that, at least, could not be directly observed. It would be to build "mentalistic" notions into the very description of ones data.

Description by reference to the organism's purpose is a third thing that can be meant by description of "function", and it may be in this third sense that my colleague in biobehavioral science objects to the use of "functional" descriptions as descriptions of the ethologist's data. It is because the label "grooming behavior" seems to describe the organism's purpose, not merely the effect of the behavior observed, whereas "scratching" seems more neutral, that the label "grooming behavior" is shunned, "scratching" preferred. Similarly, Lehner (1979) cautions us that in describing a dove's behavior "as 'escape flying behavior' we are assuming that the dove was responding to a stimulus from which it wanted to escape" (p. 46). Again, "Jane said that she felt ill" would normally imply that the sounds Jane uttered were purposefully uttered as an expression of certain thoughts that she had, whereas a description just of the sounds Jane uttered carries no such implication.

The behavioral scientist who is wary of describing behaviors in a way that imparts purposiveness to the organism that performs them is likely also to be wary of descriptions that emphasize the effects, especially the more remote effects, of bodily motions. For the more distant the effect described the more likely it is that this effect of the bodily motion was mentioned, rather than other effects, due to the assumption that this was an intended or purposeful effect, the others not. On the other hand, every body movement has, in fact, numerous, perhaps innumerable, immediate or short range effects as well as innumerable long range effects, so that any mention at all of effects (bar pressing, eating) is necessarily a selective mention. The result is that the prohibition against describing behaviors in a way that suggests purposiveness on the part of the organism has a tendency to spill over, tainting all descriptions that tell of effects, and that the notion "function" meaning merely effect tends to blur in our minds with the notion "function" meaning purpose. For example, Lehner

(1979) tells us that the distinction between "empirical description--description of the behavior in terms of body parts, movements and postures (e.g., baring the teeth)" and "functional description--incorporation of reference to the behavior's function--(e.g., bared-teeth threat)" is "nearly synonymous" with Hinde's distinction between describing muscle contractions and describing consequences of these (pp. 44-45).

Now an organism's purpose in behaving clearly is not a straightforwardly observable datum. Moreover, if purposes are equated with mental states, states of the insides of the organism, the behaviorists were surely right to insist that an unbiased description of the behavior of the organism, of its output, should not make any assumptions about the organism's purpose--about the nature of the mechanisms inside the organism. That much follows, not from the peculiarities of behaviorism, but merely from the principle that explanans and explanandum should be kept distinct. Interpreting "purpose" as it was historically interpreted by behaviorism, surely it is not the job of the behavioral scientist to explain behaviors described by reference to "function" in this sense of "purpose".

Id. Proper functions

But there is a second sense of "purpose" that makes no reference to an organism's purpose, no reference to any inner states at all. This kind of purpose is biological purpose or, as I shall say, "proper function" (Millikan 1984, Chapters 1 and 2).

Consider, for example, the eyeblink reflex--the blink that one cannot help making whenever an object approaches the eye too closely or too swiftly. This reflex has as a proper function to prevent foreign objects from entering the eye. By that I mean that the mechanisms responsible for producing the eyeblink reflex or, more accurately, the genetic materials responsible for producing these mechanisms, have continued to be reproduced, have proliferated, have resisted replacement by alternative genetic materials, because of the efficacy of the eyeblink reflex in keeping foreign matter out of the eye. Or so we speculate, and do not consider ourselves to be at much risk in doing so. Similarly, a proper function of the heart is to pump blood, and a proper function of the teeth is to tear and to grind food. These are indeed speculations, but not speculations about mental states. They are speculations about the evolutionary history of the structures in question. It is not that the eyeblink reflex expresses a want to keep foreign objects out of the eye. The proper functions of behaviors are not, as such, things the organism "wants" to do, any more than either the kidneys or the organism harboring them wants to rid the body of wastes.