

## The Functional Analysis of Psychological Terms: The Symmetry Problem

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Skinner (1945) proposed an empirical research program in which subjective, mentalistic, or psychological terms from ordinary language could be analyzed in terms of the contingencies that control their occurrence. The practical successes of such a program, however, may face an unusual challenge. The symmetrical relation between the terms and the controlling contingencies may be construed by critics as support for the “intentional criticism,” a frequent criticism of radical behaviorism by philosophers in which intentional concepts are said to “underlie” or are “presupposed” or are otherwise foundational to the technical vocabulary of behavior analysis. These critics thus promote intentional explanations as more fundamental and of more general importance than behavior-analytic explanations of human behavior. A pragmatic counterargument is described in which the vocabulary of controlling contingencies enables uniquely effective behavior with respect to the phenomena that control the occurrence of the psychological term, unlike additional ordinary-language terms that might also be evoked by the term.

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In 1945, B. F. Skinner’s landmark paper, “The Operational Analysis of Psychological Terms,” appeared in print. In this paper Skinner laid out his functional view of verbal behavior, began outlining the implications of his larger systematic perspective, and identified it with the term *radical behaviorism*. It was here that he also first described the role of private events in a science of behavior. In addition, the 1945 paper described a research program from which the title of Skinner’s paper was derived.

The functional (as we would now say) analysis of psychological terms was a program of research that involved an analysis of any ordinary-language “subjective” or “mentalistic” term through an examination of the conditions or contingencies of reinforcement that controlled its occurrence. Skinner’s (1999) 1931 doctoral dissertation provided an early example of his approach by analyzing the term *reflex*, concluding that the conditions that give rise to the term (as a tact;

Skinner, 1957) involve an observed correlation between a stimulus and a response (vs. the various sorts of gratuitous physiologizing that often occurred in the context of the term; see Catania, 1998).

Thus, the functional analysis of psychological expressions could be used as a strategic approach for the analysis of mentalistic terms and practices. Terms such as *purpose*, *intention*, or, from the field of cognition, *schema*, or even such abstract terms as *exists* might be analyzed in this way. To take the latter example, under what conditions is a person likely to say that something “exists” or “does not exist” (e.g., in philosophical discussions, “mental events” are often said to exist, but “unicorns” do not)? A functional analysis turns the traditional ontological question into one of human behavior and verbal practices.

In 1945, Skinner expressed great confidence in the ultimate success of such a program. Nevertheless, he did not advance the program, because he eventually came to view it to be of historical interest only. That is, rather than making sense, so to speak, of traditional terms in the context of a contemporary scientific analysis, Skinner ad-

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vocated instead the development of a new and effective scientific technical vocabulary; the product of the experimental analysis of behavior (Skinner, 1945). It is worth noting, however, that many of Skinner's writings included interpretations of ordinary-language mentalistic expressions analyzed in terms of contingencies of reinforcement (e.g., Skinner, 1953, 1974, 1989).

Skinner's (1945) program for the functional analysis of psychological terms, however, has been defended and advocated by Leigland (1996) on the basis of three lines of argument. First, a functional analysis of mentalistic or psychological terms would help to clarify the mentalistic verbal practices of ordinary language (or for that matter, the mentalistic verbal practices of cognitive psychology) by relating the relevant terms to controlling conditions. Such a strategy might, for example, reveal the functions of some theoretical terms as simple re-descriptions of phenomena. Second, the program might show the relevance of behavior analysis to traditional psychological and philosophical problems. That is, a rejection of mentalistic explanations should not be confused with an interest in all of the phenomena associated with terms such as *mental*, *cognitive*, and so on. An effective functional analysis of the latter verbal practices could show how a radical behaviorist account addresses such issues in a consistent, comprehensive, and effective way. Most uninformed critics believe that behavior analysts either ignore or are simply incapable of dealing with such complex issues. Further, the analysis of the interactions between terms and phenomena would clarify the phenomena of interest as well, and could indicate directions for new behavior-analytic lines of research. Third, the development of a successful program would extend the methodological practices of the functional analysis of verbal behavior.

Skinner's proposal is certainly not without its challenges, however. The purpose of this paper is to provide a

brief overview of these challenges, with an emphasis on a particularly unusual challenge. Possible ways of meeting these challenges will also be discussed.

### *Challenges: Methodology*

One straightforward challenge to the functional analysis of psychological terms concerns methodology. It is one thing to propose a new and complex program of research, and quite another to develop an appropriate and effective scientific methodology for its achievement. A number of methodological issues and challenges have been discussed by Leigland (1996), and will not be reviewed here.

As complex as the topic might appear, however, some relatively simple methodological strategies have been explored. Perhaps the simplest idea has been to set up conditions of environment-behavior interaction, such as a pigeon's key-peck response under the control of specific types of reinforcement contingencies, and have observers simply talk under the influence of the interactions observed, with an interest in the properties of "psychological" or "mentalistic" terms thus evoked (e.g., Leigland, 1989).

Specific psychological terms might be targeted in a similar way. Certainly many such expressions have been subjected to interpretations in behavior-analytic terms. For example, when one describes a behavior as "purposive," the description is under the control of behavior interacting with certain contingencies of reinforcement. As noted above, Skinner's writings have many examples of such interpretations.

The exercise of interpretation in this fashion should not be regarded as reductive, or asserting that the contingencies are what the term "really means" or what it "really is," or that the contingencies have a foundation in true reality while the psychological concept is a fiction. Such positions engage ontological issues in a way that leads only to unproductive and point-

less philosophical arguments. Rather, we may simply say that there are two vocabularies under the control of the same phenomenon and that one of these, the behavior-analytic technical vocabulary, is particularly useful when there is an interest in prediction and control (e.g., Leigland, 1999).

The principal methodological question, however, is what to do with such interpretations. Following clues from Skinner's (1957) discussion of scientific verbal behavior, there might be methods devised for confirmation that could be applied to an interpretation of the contingencies that control the occurrence of a psychological term (Leigland, 1996). For example, we might begin with a psychological term (e.g., *purpose*) and propose an interpretation involving controlling contingencies (framed in the scientific technical vocabulary of behavior analysis). One way to confirm the interpretation might be to set up a behavioral interaction (e.g., with humans or nonhumans on videotape) that conspicuously displays the contingencies involved in the interpretation, and test whether the episode will evoke the psychological term in question when observers are asked to describe or explain the interaction (with suitable thematic probes, etc.). A variety of such contexts would need to be examined and additional methodological issues considered, but generally speaking, if one starts with a term and formulates controlling contingencies as an interpretation, a kind of confirmation is achieved if one can then show that the identified contingencies indeed evoke the term in the verbal behavior of observers.

The preceding strategy is similar to Skinner's (1957) notion of the confirmation of a tact. A confirmation of an intraverbal (see Skinner, 1957) might be achieved if the behavioral episode described above were written out as a kind of narrative in ordinary language, with the relevant contingencies translated (via the environment-behavior interaction) into ordinary-language terms. If the written descriptions

evoked the relevant psychological terms in a similar fashion, a kind of confirmation of the interpretation would be achieved in this case as well (Leigland, 1996).

#### *Challenges: The Intentional Criticism*

For proposals such as the functional analysis of psychological terms, the most formidable challenges characteristically involve the production of a successful research program; thus, issues concerning methodology are likely to be of the greatest interest and demand the greatest attention. This particular program, however, faces a rather unusual challenge involving a criticism of radical behaviorism and behavior analysis from philosophers. In fact, the criticism in question is certainly the most frequently cited criticism of radical behaviorism. This criticism has sometimes been labeled the *intentional* criticism (e.g., Lacey, 1995–1996; Lacey & Schwartz, 1987; Leigland, 1998).

The intentional criticism begins with Skinner's position of the elimination of ordinary-language mentalistic or intentional terms from behavior-analytic scientific explanations of behavior. Skinner would eliminate such terms as *beliefs* and *desires* from scientific use in favor of the technical vocabulary of contingencies of reinforcement. Generally speaking, the criticism asserts that Skinner fails in his attempts to have nonintentional explanations of behavior, because the technical behavioral vocabulary presupposes the intentional concepts, or because the intentional terms are foundational to, or underlie, the technical behavioral terms. The latter explanations seem to be successful only because the contrived experimental contexts restrict behavior to such an extent and in such an artificial way that the intentional concepts appear to be unnecessary. Thus not only do these critics say that Skinner fails in his attempts to formulate nonintentional explanations of behavior, but they go on to say that the inescapable

and unavoidable intentional explanations (construed in such term as *beliefs* and *desires*) are also more useful, because they are used in many more contexts, allow useful predictions of human behavior, and so on.

The following series of quotations illustrates the general flavor of the intentional criticism, as expressed by some well-known philosophers and cognitivists:

Skinner's experimental design is supposed to eliminate the intentional, but it merely masks it. Skinner's nonintentional predictions work to the extent they do, not because Skinner has truly found nonintentional behavioral laws, but because the highly reliable intentional predictions underlying his experimental situations (the rat desires food and believes it will get food by pressing the bar—something for which it has been given good evidence—so it will press the bar) are disguised by leaving virtually no room in the environment for more than one bodily motion to be the appropriate action and by leaving virtually no room in the environment for discrepancy to arise between the subject's beliefs and the reality. (Dennett, 1978, p. 15)

Take a pigeon or rat . . . in a "Skinner Box," . . . on some stipulated schedule of reinforcement. After a time one will be in a position to say something like this: The animal pecks or paws at rate  $x$  in the presence of stimulus  $s$  because is it on schedule  $r$ . One ends up, or so it seems, with an explanation characterized in utterly nonintentional terms. However, there is a trick. The true behavioral laws Skinner comes up with in situations such as these make sense precisely because there are true mentalistic laws that underlie them. That the animal pecks or paws at rate  $x$  in the presence of stimulus  $s$  on schedule  $r$  makes sense precisely because we know that any organism at 80 percent of normal weight is hungry and desires food. (Flanagan, 1991, pp. 96–97)

While I recognize that one's holding a theory (whether of physics or of RB) has a causal history, the rational evaluation of a theory is not reducible to the causal history of its being held. . . . The phenomenon of scientists making rational evaluation of theories . . . can be described in intentional idiom: Judgments are made, after engaging in critical dialogue and controversy, about how well a theory fits with the available empirical data and other accepted theories in view of the criteria of evaluation. There

is no evidence that renders remotely plausible that functional analyses of the scientist's verbal and experimental behavior in relation to environmental contingencies can describe this phenomenon; and any apparent plausibility it may have is parasitic upon making loose and inadequate paraphrases ("translations") of intentional terms into RB idiom (not "interpretations," functional analyses of their uses). (Lacey, 1998, p. 65)

The chasm between what can be measured by a physicist and what can cause behavior is the reason we must credit people with beliefs and desires. In our daily lives we all predict and explain other people's behavior from what we think they know and what we think they want. Beliefs and desires are the explanatory tools of our own intuitive psychology, and intuitive psychology is still the most useful and complete science of behavior there is. To predict the vast majority of human acts—going to the refrigerator, getting on the bus, reaching into one's wallet—you don't need to crank through a mathematical model, run a computer simulation of a neural network, or hire a professional psychologist; you can just ask your grandmother. (Pinker, 1997, p. 63)

Now the question is, what has the intentional criticism to do with an empirically successful functional analysis of psychological terms? An interesting problem arises because the very data produced by such a program can easily be construed as support for the intentional criticism. This is because the relevant relations are symmetrical. We began with a statement that a certain term is controlled by certain contingencies, and then arranged the contingencies and demonstrated control over the term. However, the relationship could also be construed as one in which the psychological term (let's say an "intentional" term) has controlled the behavior analyst's formulation of "controlling contingencies." The symmetrical relation between the ordinary-language psychological term and the corresponding contingencies described in behavior-analytic technical vocabulary mean that either direction of the controlling relation may be emphasized or taken as priority.

In other words, although behavior analysts would construe the empirical

relation as a kind of confirmation of the original interpretation, philosophical critics of radical behaviorism and behavior analysis would surely construe the same data as providing evidence for the intentional criticism; that is, that the technical vocabulary of behavior analysis is indeed parasitic upon, or is inescapably based upon or derived from, an underlying foundation of intentional terms and concepts. Such critics would be able to point to such "foundational" intentional terms in all such instances, as they have done even in cases of behavior analyses in which no intentional terms have been offered (as in the above quote by Flanagan, 1991).

It is likely that no amount of argument about the symmetrical relations themselves will be convincing with respect to either side of such a dispute. However, the intentional terms on the one hand and the technical vocabulary of contingencies of reinforcement on the other hand can both be related to additional verbal and nonverbal behavior, and this may provide a way of comparing the implications of the two symmetrical verbal relations.

### *The Pragmatic Asymmetry*

By way of summary, we begin with what we may generically term a psychological phenomenon; some sort of observed environment-behavior interaction. The observed phenomenon could involve a person engaged in a verbal interaction of some sort, or it could be an identified behavior problem that is observed in a clinic, school, or home, or it could involve a pigeon's behavior in an operant chamber. From the pragmatic perspective of radical behaviorism, the phenomenon may give rise to two different kinds of vocabularies in the conditional context of verbal descriptions or explanations (for present purposes, the latter two terms will be treated together). One vocabulary involves the ordinary-language mentalistic or intentional terms, such as *beliefs*, *feelings*, *desires*, and *dispo-*

*sitions*, with which we are all familiar. The other vocabulary involves the technical scientific vocabulary of behavior analysis. Under a given phenomenon, certain types of symmetrical relations may be established between the two vocabularies (although these would not qualify as translations in any literal sense).

Given this symmetry, how are the two vocabularies to be assessed with respect to one another? In the philosophical literature, it is characteristic of the intentional criticism to maintain not only that the vocabulary of intentional terms is foundational to technical vocabularies that contend to eliminate the intentional, but also that the vocabulary of intentional terms is more useful than the technical. This is because the former is the one we use in ordinary discourse when making descriptions and predictions regarding the behavior of ourselves and others, and it is implausible to expect that the technical vocabulary would be of much use in such situations, except to provide crude and ineffective translations of the useful intentional into the supposedly scientific technical term (e.g., Dennett, 1978; Lacey, 1998).

Of course, no effective scientific technical vocabulary (e.g., the vocabularies of physics, chemistry, or biology) is normally useful in discourse outside the concerns of the scientific community (e.g., Leigland, 1998; Skinner, 1957). Such vocabularies were developed under special conditions in which prediction and control required the development of new terms and concepts not found in ordinary language, and in which such terms and concepts followed increasing discriminative contact with the functional properties and events of natural phenomena. The same is true for behavior analysis, which stands alone among the psychological sciences in its inductive development of an effective, coherent, generally applicable, descriptive, and empirically based scientific technical vocabulary.

For a scientific account, the place to

compare the verbal practices of the technical with the commonplace is not in the arena of the commonplace, but rather in those contexts in which something extraordinary must happen. Science is important because of what it can *do*, not just because of what it can say.

The terms, concepts, and methods of behavior-analytic science, of course, offer a powerful alternative to traditional ordinary-language accounts of behavior. It is the alternative that a natural science approach has always brought to applied problems; direct observation, measurement, and analysis, the application of known empirical processes, the arrangement of contingencies, assessment and evaluation, and so on. The fact that intentional explanations are commonly put to use and are useful in everyday discourse does not mean that the means, methods, and language of science is somehow superfluous. The traditional "folk language" of physics, chemistry, and biology is useful enough in everyday life as well, but is not enough when faced with the deep and important questions with which science has concerned itself.

Such issues might be addressed empirically. Present a severe behavior disorder to the intentional critic for explanation and the construction of a solution, and compare the resulting strategies with those of a trained behavior analyst. A simpler illustration might be offered by the standard operant chamber with a pigeon pecking a response key. Here as well, the phenomena under observation will yield intentional terms and explanations (e.g., Leigland, 1989) as well as explanations framed in terms of contingencies of reinforcement. The question would be this: If the task were now to construct some *new* behavioral phenomena in this context, which of the two explanations or vocabularies would effectively enable such constructions? One could imagine the intentional explanations taking such forms as these: "We need to turn

the light into a signal," or "make the light meaningful," or "the pigeon needs to understand . . .," or "the pigeon must first have the desire . . .," or "the pigeon must come to believe that what it is doing will have an effect," and so on. But how does one make such things happen; how does one *do* that? A scientific approach has effective answers to such questions, framed in such terms as the discriminative stimulus function, the discriminated operant and stimulus control, a history of differential reinforcement, establishing operations, and so on (e.g., Catania, 1998; Martin & Pear, 1999).

### *Summary and Conclusions*

The functional analysis of mentalistic, intentional, or, more generally, psychological terms faces a number of challenges. One of these concerns appropriate scientific methodology. Another challenge may engage a successful empirical program. The behavior analyst would offer the results of the program to show that ordinary-language psychological terms may be effectively interpreted in terms of contingencies of reinforcement. However, the symmetrical relation between the psychological term on the one hand and the technical behavior-analytic vocabulary on the other may enable intentional critics of radical behaviorism to assert that the program in fact demonstrates the foundational status of the psychological terms to the derivative and less effective scientific vocabulary of behavior analysis.

Given such a verbal deadlock, each vocabulary may be cashed out by showing what further effective behaviors may be enabled by each type of vocabulary. Scientific technical vocabularies may be characterized by the enabling of effective action, such as prediction and control in challenging contexts. Construed in this way, the technical vocabulary of behavior analysis may be shown to go beyond the abilities of ordinary language, as have the vocabularies of other natural sciences.

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