On the Relation Between Radical Behaviorism and the Science of Verbal Behavior

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A fully-developed "science of verbal behavior" may depend upon a recognition of the implications of Skinner's scientific system, radical behaviorism, particularly as it relates to the nature of scientific research. An examination of the system and Skinner's own research practices imply, for example, that samples of vocal or written verbal behavior collected under controlling conditions may be observed as directly for the effects of controlling contingencies as in the traditional practice involving cumulative response records. Such practices may be defended on the basis of the pragmatic epistemology which characterizes radical behaviorism. An example of one type of exploratory method is described.

In a number of places in the writings of B. F. Skinner, reference is made to a "science of verbal behavior" (e.g., Skinner, 1957). The reference appears to have been made first in Skinner's (1945) landmark paper on operationism. This paper also marks what appears to be Skinner's first published reference to "radical behaviorism," the scientific system which has been identified with Skinner's work. While the scientific field with which Skinner is identified is called the experimental analysis of behavior (or, more generally, behavior analysis), the purpose of this paper is to examine the role of radical behaviorism, as a scientific system, to the development and methodology of a science of verbal behavior as a specialized field.

RADICAL BEHAVIORISM AND THE ANALYSIS OF BEHAVIOR

It could be argued that of all of Skinner's contributions, the most important is the system of science which allows for a consistent, systematic, comprehensive, natural science of behavior. This is the system which characterizes Skinner's work over the past 50 years, and which may be described as the "philosophy of science" known as radical behaviorism. But why should behavior analysts be concerned with issues of "mere

philosophy," and what have such issues to do with the analysis of verbal behavior?

To take a radical behaviorist view, "philosophy" is not regarded as some rationalistic exercise which somehow stands apart from ongoing human behavior and its products, but rather is a term which describes certain verbal practices within a cultural context. Issues of "philosophy" are thus important to the development of behavior analysis insofar as such issues identify or define the assumptions, rules, or contingencies with which a scientist may productively approach and interact with the relevant subject matter of the field. It may be said that "radical behaviorism" describes a set of contingencies which may lead to effective contact with behavioral ("psychological") phenomena, rather than a set of specific conceptual or methodological prescriptions (e.g., Day, 1983). A full appreciation of the implications of radical behaviorism (as Skinner has described it; e.g., 1945) depends in turn upon an understanding of the implications of Skinner's functional analysis of verbal behavior. As it is hoped to be shown later, the two are interdependent in Skinner's work and may be a key to the full development of a science of verbal behavior.

A great deal of space could be devoted to a discussion of the varieties of positions which go by the name of "behaviorism" (cf. Moore, 1987), so the major points will be developed here by way of summary. This summary is based on those writings in which

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Skinner has discussed radical behaviorism (e.g., Skinner, 1945, 1964, 1974, 1989), and treatments of those writings (e.g., Day, 1980, 1983; Moore, 1987). First, radical behaviorism is frequently contrasted with a position called "methodological behaviorism," which might be viewed as a kind of scientific orthodoxy in contemporary psychology (e.g., Day, 1983; Moore, 1987). The latter position might be summarized by the following: (1) the definition of the (empirically-based) subject matter as publicly-observable behavior (related to historical ties with logical positivism); (2) the focus upon the study of behavior as a means of investigating internal, causal mechanisms of a conceptual nature which form the basis of scientific explanation; (3) a commitment to the practice of operational definitions in the traditional sense (to be found described in virtually every introductory psychology text in current use); and (4) a position which has been described in terms of reductionism and mechanism (e.g., Hayes, Hayes, & Reese, 1988).

The position which has come to be called radical behaviorism is different enough by contrast that some have argued strongly that the label "behaviorism" in the description is both inappropriate and damaging (e.g., Lee, 1988). Skinner (1989) has recently described radical behaviorism as a position in which behavior is treated as a subject matter in its own right, apart from internal explanations, mental or physiological. To elaborate somewhat, the position has been called anti-mentalistic, anti-dualistic, and anti-reductionistic (Holland, 1988), and one in which a pragmatic epistemology joins with the Machian principle of "staying at the level of your observations" (e.g., Skinner, 1931, 1974). An appreciation of radical behaviorism gives us a perspective with which to view the breadth of Skinner's work; to take two representative examples published in 1957, his book (with C. B. Ferster) *Schedules of Reinforcement*, and his book *Verbal Behavior*.

While these two books may be regarded as different in kind when viewed from the traditional (methodological behaviorist) perspectives of experimental/theoretical psychology, they are perhaps best understood together as two examples of radical behaviorist epistemology and scientific method (e.g., Day, 1976). In the case of one of the books,

the emphasis was upon the control of behavior, where the controlling relations were made visible through the use of cumulative records. In the case of the other book, samples of behavior and controlling conditions were presented as examples of controlling contingencies, and in this sense the emphasis was upon the interpretation of behavior. In both cases, observers made discriminative statements about controlling contingencies, where the statements were under the control of records made *directly* from the on-going behavior of individual organisms.

While it is clear that Skinner's research may be described in terms of both radical behaviorism and the research practices of the experimental analysis of behavior, it is also clear that we may make a further distinction between these as well (e.g., Day, 1983). That is, the hallmark of the experimental analysis of behavior is a particularly effective set of methodological traditions; namely, the experimental analysis of a representative operant response class with an individual (typically but not exclusively non-human) organism in a controlled setting. Such methodological strategies, however, do not specify nor require any *particular* scientific system or orientation. One can employ such methods, for example, in the investigation of operant behavior as a means of testing the "validity" of any sort of cognitive theory or model. Further, the lack of commitment of the methodological orientation to any particular scientific system has been supported by at least one of the past editors of the *Journal of the Experimental Analysis of Behavior* (Zeiler, 1977).

VERBAL BEHAVIOR: METHODOLOGICAL ISSUES

Certainly there is more than one way to do scientific psychology, and even more than one way to formulate the field of "operant conditioning." The point to be made here, though, is that the sort of "science of verbal behavior" which has been proposed by Skinner depends upon the system identified as radical behaviorism. For example, perhaps the most pervasive and persistent of the misguided criticisms of Skinner's analysis of verbal behavior (e.g., Chomsky, 1959; Koch, 1964) have taken the formulation to be rooted in methodological behaviorism or classical

"S-R" psychology. Such critics have rightfully documented the limitations of such an approach, but have wrongfully attributed the approach to Skinner, whose radical behaviorism promises a truly different and effective approach to the verbal field when compared to the traditional orthodoxy of "experimental psychology."

In addition, the system identified with Skinner's approach to science may point the direction to the development of empirical and analytic methods appropriate to the verbal field. To be sure, many appropriate, effective, and important methodological advances are currently in use and continue to appear. For example, recent efforts in the experimental analysis of human behavior have made frequent use of a sort of metaphor of Skinner's original rat/lever/box "preparation" in that human subjects will press a button or key which may produce a type of contrived reinforcement, where the interest is in rate of response, and so on. Many additional methodological variations have appeared, potentially effective in the analysis of a wide range of complex human behavioral phenomena (the reader is referred to the 1989 Convention Program of the Association for Behavior Analysis for recent examples).

The focus of Skinner's (1957) interpretations, however, was the verbal behavior of the speaker. Early analyses of the verbal behavior of the speaker include the pioneering efforts of Greenspoon (e.g., 1955) and others as attempts were made to develop experimental procedures and measures relevant to the analysis of verbal behavior. A number of difficulties appeared in this development, however, and studies attempting direct analyses of the ongoing verbal behavior of the speaker became less frequent (see Holz & Azrin, 1966, and Michael, 1984, for reviews). It is not the purpose of this paper to provide a review of the research on verbal behavior, and space does not permit an exhaustive review of all the issues involved, but it may be useful to briefly examine some of the key issues raised by this research.

First, there is a question of measurement. The traditional practice in the experimental analysis of behavior has been to identify an operant response class and to count instances of this class in time (as in rate of

response) and over conditions, preferably in some mechanical/automatic fashion. But what are the "units" to be recorded in verbal behavior as they occur in time? Early studies began with the very reasonable strategy of examining the occurrence of sentence constituents, such as plural nouns. A more contemporary strategy might involve the counting of instances of the mand and tact relation (Skinner, 1957) in a given verbal context. The question remains a difficult one, however; that is, are we to count instances of some sort of unit of verbal behavior in time, and if so, what sort of "unit" should it be (e.g., sentence parts, sentences, functionally-defined types of verbal operants, etc.)? We will return to this issue in the sections below.

A second question concerns the issue of the objectivity of the measurement, once the type of measurement has been specified. The general issue of "objectivity" in science is a difficult one, but some critiques of the early methodological excursions into the analysis of on-going verbal behavior have closely associated the issue of "objectivity" with the need for experimental control (e.g., Azrin, Holz, Ulrich, & Goldiamond, 1961). The issues are not the same, however, since the traditional emphasis upon experimental control appears to be derived from the pragmatic character of Skinner's radical behaviorism (cf. Day, 1980; Hayes, Hayes, & Reese, 1988; Skinner, 1974). Further, traditional conceptions of "objectivity" generally exclude private events from the subject matter of a natural science, while Skinner has written extensively about the role of private events in a science of behavior, particularly on those occasions when he was describing his views on radical behaviorism (e.g., Skinner, 1945, 1953, 1964, 1974).

In the case of verbal behavior, one may speak of the need for "objectivity" in terms of the precision or reliability of measurement, but again the issues are not so simple. To take an extreme example, one might maximize the precision and reliability of the measurement of verbal responding by the use of a mechanical device such as a voice-operated relay (e.g., Holz & Azrin, 1966). But the convenience, precision, and reliability of such mechanical devices are purchased at the cost of circumvention of the behaving listener, and therefore at the cost of the contingencies which make verbal behavior

interesting and important to begin with, if not the "verbal" character of the behavior itself. Further, while the use of mechanical devices generally in the analysis of non-verbal behavior has given rise to an extraordinarily effective laboratory science, the traditional use of such devices may have also given rise to confusion on the point of physicalistic reductionism in the analysis of behavior (cf. Day, 1977, 1980; Skinner, 1974). That is, the use of mechanical devices in the study of operant behavior may appear to carry the implication that responses classes may be reducible to the language of physics. But a close examination of the issues leads to the conclusion that it is impossible to specify any response class, whether verbal or non-verbal, in purely physical terms (for discussions see Catania, 1984; Day, 1980; Schnaitter, 1984).

To this point we might summarize the issue of objectivity from the standpoint of radical behaviorism as follows. First, the emphasis upon experimental control in the analysis of behavior is not based on a concern for "objectively investigating the real world of psychological laws" (to coin a phrase) as much as an interest in effective means of indentifying controlling variables and contingencies. Second, the traditional linkage between "objectivity" and the exclusive study of public behavior does not apply to radical behaviorism, since the latter considers occurrent private events as directly observable and to be included in a complete scientific formulation (although certainly not as causes of behavior). Third, while the effectiveness and precision of measurement is an important concern to any system of science, it is possible that a concern for traditional conceptions of "objectivity" may in fact lead one away from the questions of interest, or may needlessly delay the development of effective methods appropriate to the subject matter (as indicated in the extreme case in which physical measures of verbal behavior may be advocated on the basis of their unimpeachably objective nature).

What then does the issue of "objectivity" mean in the scientific context of radical behaviorism? Again, to understand the full implications of Skinner's scientific system is to view it in the context of Skinner's analysis of verbal behavior. Skinner (1957) describes what we speak of as "objective" in

terms of the stimulus control of verbal behavior. For example, (and to make use of contemporary terminology; cf. Michael, 1988), verbal behavior is generally described as "objective" if the current discriminative stimulus control of the verbal behavior is strong relative to the effects of any specific establishing operation. Such verbal relations are characterized as an important property of scientific research practices, and Skinner's extensive interpretation is a first step in the identification of some of the contingencies which bring scientific verbal behavior under the most direct control of observed environmental events (Skinner, 1957; for a recent, informative, and concise summary of the position as it relates to the issue of private events, see Skinner, 1989, p. 132).

This is also a useful perspective with which to view the term as it appears in Skinner's own work (e.g., 1953). One strategy which is helpful in this context is to trace through the examples in which Skinner employs mentalistic terms to illustrate traditional mentalistic "explanations" of behavioral phenomena (many such examples are found in *About Behaviorism*, 1974). When Skinner goes on to contrast such practices with an analysis in terms of contingencies of reinforcement, Skinner frequently introduces the analysis with a phrase such as "the simple fact is. . ." (1974, p. 52), "the basic fact is. . ." (1974, p. 57), "the significant fact is. . ." (1974, p. 49), or "...although the observed fact was simply that. . ." (1974, p. 35). In these cases Skinner is clearly arguing for a more effective scientific analysis, but when he reformulates a mentalistic explanation into the "observed facts" of a behavioral analysis, he is also clearly arguing for a more "objective" formulation, in the radical behavioristic sense. That is, he is arguing for "staying at the level of your observations," or, for a scientific formulation which emphasizes means of increasing the stimulus control of observed events and interactions over the verbal and non verbal behavior of the scientist (and it is this connection, of course, which has led some to point to relations between radical behaviorism and phenomenology; cf. Day, 1969; Kvale & Grenness, 1967).

This very brief and oversimplified example is chosen merely to illustrate a way in which radical behaviorism addresses traditional issues of relevance to scientific method.

Other issues raised by the critics of the early analyses of the speaker, such as the issue of the subject's "awareness" of the prevailing contingencies in a verbal behavior experiment (cf. Michael, 1984), may also be productively addressed within the context of radical behaviorism (e.g., Skinner, 1957, 1974). In summary, any traditional issue of importance to the verbal and non verbal practice of science may be reformulated in terms of a functional analysis of a special kind of human behavior. The argument has been made, however, that behavior analysis as a field has been slow in addressing the implications of such interpretations to the development of effective scientific methods, and in providing direct analyses of scientific behavior as such (e.g., Day, 1979).

In the following sections, a simple analogy will be drawn between Skinner's own research practices (e.g., Ferster & Skinner, 1957; Skinner, 1938), as examples of radical behaviorist scientific methodology, and a possible methodological strategy for the direct analysis of the verbal behavior of the speaker. One issue remains to be addressed, however, as an issue of methodological relevance to a science of verbal behavior.

SKINNER'S VERBAL BEHAVIOR AND A SCIENTIFIC PROGRAM

The issue of an appropriate scientific agenda or program is relevant to both methodology and the science of verbal behavior more generally, and may be related to the often-reported lack of research following the 1957 publication of Skinner's *Verbal Behavior* (cf. McPherson, Bonem, Green, & Osborne, 1984). To state the matter plainly: what are we to do, as researchers, with Skinner's (1957) book? What are the important empirical questions to be addressed? The difficult questions of appropriate research methods then follow.

To be sure, many important questions have been and continue to be productively addressed in interesting research reported in the *Journal of the Experimental Analysis of Behavior*, and especially *The Analysis of Verbal Behavior*, and many important questions remain to be addressed, such as those listed in Jack Michael's (1984) review of the field. Without implying any criticism of current efforts, it might be useful to examine once

again the nature of Skinner's (1957) book as a means of seeing possible ways to proceed in the development of a science of verbal behavior, since the direction to take and the methods to use are not obvious from the book itself (cf. McPherson et al., 1984), except for some statements of a general nature (e.g., "The ultimate aim is the prediction and control of verbal behavior," Skinner, 1957, p. 12).

One strategy is to view the book as a kind of theory, consisting of a series of rationally-derived hypotheses, which are in need of experimental confirmation in the laboratory. From this sort of perspective, the book is incorporated into the traditional arena of experimental psychology, and assessed and evaluated within the context of methodological behaviorism or other mentalistic systems of science. While variations on this perspective might produce a body of interesting research (a kind of theory-testing approach), an extreme version of such a perspective may be seen the notorious, inadequate, and rather perverse review of the book by Chomsky (1959). In an important paper by Eshleman and Vargas (1988), it was noted that prior to Chomsky's attack, "reactions seemed favorable though perhaps puzzled" (p. 23). Much of Skinner's work is indeed puzzling, if not impossible to understand, when viewed from traditional psychological perspectives.

An alternative perspective is one which is compatible with the book itself. Rather than attempt to fit the book into traditional systems, so to speak, the book may be taken as an example of a truly different kind of system. Viewing the book from the perspective of the system it describes helps in understanding what Skinner was doing when he was writing it, and the kind of method it demonstrates (as noted in the comparison above with Ferster & Skinner, 1957).

From a radical behaviorist perspective, Skinner brings a highly sophisticated discriminative repertoire to bear on a complex subject matter. This repertoire is largely the product of an extensive history in the experimental analysis of behavior. The extraordinary number of examples and illustrations that are presented in the book constitute a kind of data, in that they are records made directly from the verbal behavior of individual people, or arise from direct contact with other verbal sources in the verbal

community. Terms such as "mand," "tact," and "intraverbal," among others, are not terms which refer to theoretical entities (Skinner rejects traditional theories of meaning and reference, and his interpretation "makes no appeal to hypothetical explanatory entities," 1957, p. 12), but are themselves examples of extended and abstract tacts, controlled in Skinner's verbal repertoire by broad classes of observed controlling relations and contingencies.

Such a characterization may seem either obvious or irrelevant, or perhaps both. But the perspective with which the book is viewed may carry with it a formulation for the development of the scientific field. Or to state it another way, alternative scientific systems involve rules for scientific behavior. An interpretation of Skinner's verbal behavior in terms of the system he describes in the book *Verbal Behavior* may be useful in formulating the next steps in the scientific analysis.

From the point of view of radical behaviorism, the sorts of discriminations reported in the book *Verbal Behavior* are not in need of "experimental confirmation" in the traditional sense (the book does not offer a "model" or "theory" of "language"); they stand on their own as interpretative examples from the verbal field. What would be needed is a refinement and extension of discriminations of this sort, based on a functional analysis of verbal behavior. A radical behaviorist assessment of the scientific value of the work would not be based on the degree of correspondence between derivations from the material and experimental confirmation from the laboratory (such an epistemology is at the very heart of methodological behaviorism; see also Hayes, Hayes, & Reese, 1988). An appropriate assessment would be based instead upon the degree to which the analysis allows us to deal more effectively with the subject matter (i.e., the prediction, control, and interpretation of verbal behavior; e.g., Skinner, 1974).

GENERAL RECOMMENDATIONS

Based on these considerations, we may address the general issue of the programmatic and methodological development of a functional analysis of verbal behavior. In searching for methodological directions it may be helpful to recall the practices which

have been effective in the analysis of non-verbal behavior. For example, Skinner found it useful to display behavior changes in a cumulative record because (a) it was a record made *directly* from the on-going behavior of an individual organism, and because (b), joined with an experimental analysis, the use of the cumulative record made controlling contingencies visible and open to direct inspection (cf. Ferster, 1978; Skinner, 1956, 1976, 1989).

Following this theme, it is suggested that the appropriate role of basic research in the laboratory, or in applied areas in which the control of verbal behavior is conspicuous (e.g., psychotherapy research), would be to make controlling relations *visible* in the verbal context under observation. In this way, the discriminative repertoires of the observing scientist (or, for example, psychotherapist) may be refined such that effective interaction with the subject matter may be increased, and so on. Progress is currently being made through a variety of methodological approaches, including the use of contrived laboratory topographies with human participants (e.g., key presses or button pushes), but I believe that Skinner's scientific system points to a direct sort of analysis of the verbal behavior of the speaker, and that such direct analyses might form the basis of a science of verbal behavior.

In the case of a laboratory preparation, for example, it is not difficult to arrange for an experimental session in the following way. A human participant is brought to a room which is free of visual or auditory distractions. Social consequences are arranged for behaving verbally (perhaps differentially in the context of specific objects or events in the manner of establishing discriminative control), given a large variety of additional sorts of controlled conditions. Such a situation would be designed for the conspicuous control and observation of the verbal behavior of an individual speaker, and would also closely approximate a "natural language" context. There is little doubt that experimental conditions could be so arranged that the control of verbal behavior could be observed under specifiable conditions. It would be a relatively simple matter to arrange for permanent records of the vocal or written verbal behavior thus obtained.

But the question arises as to what to do

next. What are the "units" to be counted? Where or what is the "operandum" in such an operant preparation? How can we be "objective" about what we are observing? More generally, what are we looking for and how do we analyze such data? Each of these questions will be addressed briefly.

The question of "objectivity" may be solved largely in the same way that it was solved in early operant preparations through the use of the cumulative recorder. That is, through the use of records made directly from the behavior of the individual organism. In this case, tape recordings provide such a direct record, and the collection of written samples of verbal behavior has the advantage for some studies of making transcription unnecessary (e.g., Leigland, 1989). Of course, the "directness" of any record will depend upon the details of recording and the behavioral features or dimensions to be emphasized; the cumulative recorder may vary in speed and in other ways as a means of revealing a finer grain or overall trends, and a number of variations of recording and transcription techniques are available to those interested in the analysis of verbal behavior (and, in a point to be developed below, a special task awaiting a science of verbal behavior is the development of new variations which emphasize controlling contingencies).

Complete transcriptions of vocal recordings obtained in an experimental session are probably a necessity in most cases, but for the purposes of analysis may not be necessary depending upon the focus of the experiment. The general issue was raised by Skinner (1938) in Chapter 1 of *The Behavior of Organisms* when the point was made that the most complete record of the behavior of a rat in an operant chamber might be made with "a battery of cameras and a sound-recorder," (p. 57), but that "much of the detail of a complete representation is unnecessary and even inconvenient. . . (in) . . . an analytic and selective system" (p. 58). Skinner might have made movies of his rats, but for the sake of analysis and convenience, he chose "the quick and comprehensive look at the fine grain of behavior in the cumulative curve" (Skinner, 1976, p. 218). Analogous analytic and selective methods might be developed in the case of verbal behavior as well, short of complete transcription.

Nonverbal behavior makes contact with the contingencies of reinforcement through mechanical interaction; an "operandum" (e.g., the familiar lever or key, in the case of the classical laboratory preparations). The closest approximation to an operandum in the case of verbal behavior, however, is the listener, whose history in a given verbal community has produced a repertoire which allows for effective interaction with the speaker. From the standpoint of radical behaviorism, the observing scientist may be viewed as a listener in this sense, whose behavioral repertoire includes both a history in a common verbal community with the speaker as well as a specialized discriminative repertoire arising from training in the analysis of behavior. Verbal behavior *operates* on the behaving listener, and there is no reason why the scientist (or a group of independently-observing scientists) may not serve the function of listener-as-operandum in the direct, functional analysis of on-going verbal behavior.

But what are dimensions of behavior to be so analyzed? What are the "units" to be counted? An interest in rate of response has been important in the analysis of behavior for a variety of reasons, and these will not be reviewed here. But if science is to be regarded as a "search for order, for uniformities, for lawful relations between events in nature" (Skinner, 1953, p. 13), then I suggest that the question of appropriate "units" or dimensions of verbal behavior to be analyzed is an empirically-based, functional or practical question, rather than a rationally-based, formal or theoretical question.

Skinner, of course, has always approached the question of units functionally, and one example can be seen in the following famous passage from *The Behavior of Organisms*: "Before we can see precisely what a given act consists of, we must examine the changes it undergoes in strength. . . . A specification is successful if the entity which it describes gives smooth curves for the dynamic laws" (1938, p. 37). At the time this was written, rate of response was the means by which orderly changes in behavior could be shown as a function of contingencies of reinforcement. The same sort of functional approach to units of analysis is frequently seen in Skinner's (1957) *Verbal Behavior*, but the complexity and multiply-determined nature of verbal

behavior leaves open the question of effective measurement.

Regarding the simple experimental setting described above, the question of the dimensions, properties, or units of analysis may be addressed empirically. After samples of verbal material are collected under specifiable controlling conditions, a beginning approach might be made by engaging in a functional analysis of *whatever* changes in verbal behavior which may be systematically discriminated by observing scientists (e.g., Dougherty, 1980). Some of the implications of radical behaviorism in such an analytic strategy are these: (1) we need not be delayed by fruitless attempts to specify the verbal behavior or observed changes in "physical terms" (as noted above, such an effort would probably be useless even in the case of the variations which constitute the response class called, "pressing a lever"); and (2) there is no methodological requirement that demands the counting of the occurrence of specified units of behavior over time.

In terms of a systematic approach, the pragmatic epistemology which characterizes radical behaviorism appears to be satisfied if (1) the descriptions of the dimensions of verbal behavior and observed changes, in whatever terms these are presented, are controlled by direct records of actual verbal behavior; (2) the changes may be seen clearly in the records; and (3) the observed changes may be shown to be a function of environmental variables. Note that these characteristics also apply to the work reported in Ferster and Skinner's (1957) *Schedules of Reinforcement*, in that the detailed and extensive descriptions of the effects (including such effects as the "knee," e.g., p. 51) were controlled by the presented cumulative records, and the changes were orderly, replicable, and controlled by experimental manipulations.

Additional methodological analogies might be drawn. If a possible effect is not clearly seen in a cumulative response record, or if replications are ambiguous, the traditional strategy in the analysis of behavior is increased control in the experimental context and systematic replication, until some clarification of the controlling relations may be observed (Sidman, 1960). Similarly, with records of verbal behavior, ambiguous changes in the verbal material would lead to

procedural variations aimed at the sharpening of control in the verbal context; the modification of events or variables as properties of the speaker's verbal or nonverbal environment.

An advantage of the cumulative record, however, was that it permitted not only an inspection of responding over time, but also included some form of record of the events controlling that responding (reinforcement pips, event pens, reset functions, records of concurrent responding, and so on). In this connection, one of the most important methodological tasks facing a science of verbal behavior is that of devising ways of making contingencies of reinforcement *visible* in explicitly verbal contexts (that is, "visible" in the sense of conspicuous and more clearly discriminable by observing scientists). A variety of methods which serve this function already exist among the diverse basic and applied fields of behavior analysis, the archetype of which was the cumulative record (cf. Skinner, 1976). A recent and illustrative development in an applied field is seen in an important technique developed by Touchette, MacDonald, and Langer (1985) for the analysis of problem behaviors in applied settings. In this case, a relatively simple data-keeping system is used to generate a scatterplot from which assessments of stimulus control may be made.

To summarize, Skinner's "science of verbal behavior" is best conceptualized within the context of Skinner's scientific system, and there is no doubt that this system is radically different from other approaches within traditional scientific psychology. Skinner's own research practices (as examples of empirical work done in the context of this system) imply that records made from the on-going behavior of individual organisms may be studied directly for the effects of controlling contingencies, when the records of the behavior are collected under environmental conditions allowing for prediction and control. One important methodological problem is in devising ways of making the controlling contingencies conspicuous for purposes of analysis. One way of approaching this problem is to set up laboratory situations in which verbal behavior is clearly controlled by environmental variables, and work with records of the verbal behavior and the controlling verbal or nonverbal events/variables

towards increasingly effective ways of *showing* the effects that can be *seen* (or heard). In our functional analysis of verbal behavior, if we want to get to the complex and subtle contingencies involved, then we must somehow go there.

Certainly the control of verbal behavior is observed on a daily basis by all of us—what methods might be developed to make the contingencies visible? The complexity of the field is daunting, but this may be balanced against what Skinner has noted as the “many favorable characteristics (of verbal behavior) as an object of study” (1957, p. 5). Among these, (1) the fact that it is (almost by definition) easily observed, (2) “the facts are substantial (careful observers will generally agree as to what is said in any given instance)” (Skinner, 1957, p. 5), and also (3) that it is perhaps more easily and accurately recorded than any other type of (nonverbal) behavior.

Skinner's (1957) *Verbal Behavior* provided a remarkably rich interpretation of verbal contingencies with many examples drawn from many sources. Despite the many productive efforts currently underway in the basic and applied analysis of verbal behavior (including the very important work on related topics such as stimulus equivalency; e.g., Gatch & Osborne, 1989; Hayes, 1989), there is little doubt that a great deal of methodological work needs to be done in order to make contact with the realities of on-going verbal interaction. Appropriate functional-analytic methods may be developed through direct contact with such verbal behavior in laboratory and applied contexts. Radical behaviorism, as a scientific system, defines a scientific direction and beyond this perhaps we need only “stay at the level of our observations” and take our cue (as did Skinner in the 1930s) from Pavlov: “control your conditions and you will see order” (Skinner, 1956).

EXPLORATORY STUDIES

The development of innovative methodological strategies for the analysis of verbal behavior was a primary concern of Willard Day and his students at the University of Nevada, Reno. A number of methods were devised, although no results of these studies have been published in sources accessible to the larger behavior analytic community.

Presentations based on this work have been made at professional conferences such as the Association for Behavior Analysis, however, and the general approach adopted by these researchers has taken on a variety of names; among these, “Reno methodology,” “radical methodology,” “behavioral phenomenology,” and “behavioral hermeneutics.” Examples of the approach include McCorkle (1978), Spooner (1981), and Dougher (1984), and discussions of the general methodological strategy may be found in Bennett (1988), Kohlenberg (1988), and Leigland (1986).

This research will not be reviewed here, but the general focus of the methodological strategy is best described as the interpretation of verbal behavior. Generally, the methods are aimed at the interpretation of written material, either transcribed verbal interactions, such as a psychotherapy session (e.g., McCorkle, 1978), or other textual material (e.g., Day, 1987). The interpretations normally involve the identification of functional classes of verbal behavior to be found in the transcribed or textual material, where the classes are defined in terms of their functional effects upon the reader/researcher. Attempts at the assessment of controlling variables are then made with respect to the verbal material, as part of the process of interpretation. The general process thus has much in common with the practices of contemporary hermeneutic perspectives, in this case derived from a radical behavioristic epistemology (Day, 1988; Kohlenberg, 1988).

The focus of this paper, however, is the prediction and control of verbal behavior; in particular, the on-going behavior of the speaker. The purpose of this section is to briefly examine some examples of exploratory research which would illustrate some possible approaches to the recommendations made above.

In the early 1960s, Willard Day began a research project which was to be a first step in the development of an experimental preparation for the analysis of the behavior of the speaker. The guidance for the so-called “Redbook” studies was found in Skinner (1938, 1957) and Sidman (1960). The procedure involved a volunteer subject in a standard experimental room where a contingency was arranged for simply talking. The initial instructions noted only that the session would be over when a certain number

of "points" were collected (but did not specify the relevant behavior or contingencies), and that the delivery of each point would be heard as an audible "click" in the experimental room. The clicks were presented at a relatively constant rate when the subject was talking. Tape recordings made during the sessions were transcribed.

In an early description of these studies, Day (1971) reported that over multiple sessions of this type with a given subject, a kind of baseline became evident in the "recognizably consistent patterns" of verbal behavior seen across sessions. A brief examination of some of these records (Dougherty, 1980) shows that these "patterns" involved certain themes which were likely to appear in such baseline sessions. In the case of one of the subjects, for example, a "typical baseline session" would include some talk regarding sports, progress in school, family, and so on (Dougherty, 1980).

Once a given baseline was thus established over sessions, manipulations were made in the experimental space and their effects examined in the verbal material obtained. The manipulations involved a variety of objects or audience variables introduced into the room, such as a person who doesn't speak, or speaks only minimally, and so on. The return to baseline conditions and recovery of baseline patterns of verbal behavior then followed in traditional operant fashion.

The Redbook studies of Willard Day were an early attempt to follow the implications of radical behaviorism to a laboratory analysis of the behavior of the speaker. Despite the fact that these exploratory studies produced some interesting and unusual results (cf. Day, 1971), they have never been published, and subsequent developments and circumstances eventually led Willard Day away from further development of the preparation (e.g., post-doctoral study in philosophy at Oxford, the founding and editing of the journal *Behaviorism*, and the developing interest in interpretative practices; Day, personal communication). An overview and analysis of the Redbook studies may be found in a master's thesis by Michael Dougherty (1980).

In our laboratory (with the assistance of Kelly G. Wilson), some preliminary steps have been taken along similar lines. The study to be reported here is offered only as a modest, incomplete illustration of the sort

of methodological proposals made above. In this context, the exploratory research is "playful" in the sense described by Ferster (1978) in his characterization of the early operant studies, and is obviously only one of many possible ways of approaching the complexity of the subject matter.

When initial attempts to deal with some contingencies involved in verbal conversation proved to be too complex, an effort was made to simplify conditions as much as possible. In keeping with the above recommendations, the general strategy was to simplify the controlling conditions for a speaker by setting up an experimental context where orderly changes in (vocal) verbal behavior may occur as a function of a given type of variable; for example, a simplified form of functional consequences. Given records of the verbal behavior and consequences, the next step was to develop ways of showing the changes in verbal behavior as a function of controlling contingencies in some convenient, visual format.

While these goals have not yet been achieved, some steps have been taken in this direction. Five female undergraduate students participated in the most recent study as part of an introductory psychology course extra-credit option. The small experimental room contained a table, chair, tape recorder, and a small microphone and speaker.

The procedural sections of the printed instructions are reproduced as follows (informed consent was obtained from each subject):

The procedures for the session are as follows. Your task in the study is simply to talk to the person in the next room. They will not be able to talk to you directly, but they will be able to communicate with you by way of a small "beeping" device. There is a particular "topic" that we would like you to talk about, but instead of telling you what it is, we would like you to find the topic (or figure out what it is) and then talk about it. You will hear a short "beep" when you are talking about the topic that we have in mind, or are close to the topic. The "beeps" represent points, and we would like you to collect as many as possible during the session (we will count them for you). Again, the study concerns language as a form of communication. It is important that you try to find the topic and talk about it, and to collect as many points as possible. . . .

The short "beeps" (approx. 1-sec duration) were delivered via handswitch by an experimenter in the adjoining room, and

were presented in such way as to shape successive approximations of the verbal behavior "toward" a pre-specified topic (such as the subject's "hometown"). The tape-recorded sessions lasted from 10 to 20 minutes, and before debriefing the subjects were given a short post-session questionnaire which, for example, asked the subject to identify the topic being sought (or to make their best guess as to what the topic was).

If and when a subject "reached" the designated topic, the beeps were presented in such a manner as to maintain verbal responding on the topic. After a given presentation of a beep, the next delivery occurred as soon as the listener was sure that the topic was maintained by the speaker. In some cases the topic was not fully "shaped" but only approximated, and as with more standard shaping situations, the (putative) reinforcer was initially delivered (in most cases) with respect to rather "remote" approximations or verbal "topographies," and was occasionally used to "prime" the behavior, in the sense of increasing (or maintaining) the variations in verbal behavior emitted by the subject.

By way of general comments, the procedure produced several different patterns or strategies across the five subjects. For example, one subject (S3) spoke quite rapidly but in a kind of normal discourse, with topics flowing from one to the next in a rather "natural" sequence. Another subject (S5) spoke rather reluctantly and carefully, with more frequent pauses, and with nearly all of her verbal behavior emitted as a series of questions (as if playing "20 Questions," which the procedure resembled somewhat). As a third example, another subject (S4) followed the sort of natural narrative pattern which also characterized the behavior of S3, but in this case began by rapidly listing a series of words which served the function of "general topic headings," and was thus shaped almost immediately to the designated topic, which was maintained (with slight procedural variations) for the remainder of the session. Most of the other subjects showed a more gradual "shift" in verbal behavior as the session progressed.

More specific questions may be addressed. What is the course of shaping over such a complex dimension of behavior, and what does it look like? How might such effects be

presented to show changes in the fine grain of behavior as a function of controlling contingencies? While a number of procedural issues need to be addressed in such a study, it was clear that orderly changes in verbal behavior were obtained, and the tape recordings included the temporal location and verbal context of the presented beeps. The next step involved the exploration of ways to present the effects observed.

On the one hand, the sessions could simply be transcribed in their entirety, along with markers indicating the placement of beeps as events. Certainly this approach has much to recommend it, since it would provide the most direct and complete record of the events as they occurred (and transcription techniques are available which make possible a very detailed and sophisticated reproduction of naturally-occurring verbal interaction; namely, those developed for "conversation analysis" by ethnomethodological sociologists; cf. Anderson & Fehr, 1989).

But despite the abundance of detail available from complete transcription, the approach is not without its disadvantages, not the least of which is the fact that the transcription process itself is a notoriously tedious and time-consuming one. More to the point, the products of complete transcription present difficulties as a form of "data presentation," if for no other reason than sheer volume of material (even a 10-min session can produce a very large amount of verbal material). As anyone who has read Ferster and Skinner's (1957) *Schedules of Reinforcement* can testify, direct records of *any* kind of behavior as it occurs in time will take up a great deal of printed space, even if the records allow for such techniques as reduction and "telescoping."

To extend the analogy a bit further, Ferster and Skinner (1957) found it useful to present their cumulative records in a variety of ways to emphasize different features of the behavior and contingencies under analysis; they would sometimes present reduced records from an entire session of many hours in length, or would present "collected segments" to illustrate a particular effect, and so on. Similarly, those involved with the analysis of the behavior of the speaker may find occasion for reproducing records of complete sessions through some sort of transcription

technique, while for other purposes a series of "representative" sections or excerpts may suffice. We have explored a few of these strategies in the present study, but given the quantity of written material resulting from complete transcriptions, quickly began to look for an analogy to Skinner's (1938) "analytic and selective system" in enabling a more convenient format for presenting the data.

At what is perhaps the other end of a continuum (from complete transcription), there may be ways of coding items or topics as they are discriminated as such over time by independent listener/researchers, and then organizing the resulting "codes" in some fashion. Several variations of this type were formulated for the present study, but while the coding itself was not thought to be an insurmountable problem (since similar issues frequently arise in applied behavioral studies; and, as Skinner has noted, "...careful observers will generally agree as to what is said in any given instance," 1957, p. 5), the resulting products proved unsatisfactory for a number of reasons. A more productive approach appeared to be in looking for ways of preserving direct transcription (and thus deal with direct records of the behavioral events), but in some selective and systematic way.

One basis upon which to select functional "units" in such a situation is to simply identify those sections of the verbal material which controlled the switch-pressing (or "beep-presenting") on the part of the listener/experimenter in the adjoining room (that is, those sections or passages identified by the latter as having done so). Such an approach has the advantage of reducing the amount of verbal material presented to those verbal events which could be identified as having participated in the direct control of the shaping listener. Showing the changes in the sequence of such functionally-defined "units" over time as a function of consequences might reveal a kind of order in the verbal interaction. Other properties of the verbal material might be dealt with in other ways.

Of course, the kind of "order" which might be revealed by such methods would not be of a quantitative sort. What is more important than a pretense of mathematical sophistication is that the records of the environment-behavior interactions show

systematic changes that can be seen, described, replicated, and which open additional avenues for the analysis of verbal behavior. The examples to be presented are only primitive examples of what might be done in verbal contexts. A rationale for this kind of data presentation might be clarified by comparing it to an analogous context for the shaping of nonverbal behavior. Suppose one were interested in a close examination of the variation and selection dynamics of the shaping process as it occurs with a rat in the standard lever/box preparation. One could easily set up a video camera and videotape the entire handshaping process from the beginning to the first few complete lever presses. It could be made clear from the videotapes exactly when a food pellet was delivered, the variations in response topography which occurred, and the changes in topography over the shaping session through the selective action of reinforcement.

There are a variety of ways in which the results of such an exercise might be presented. The videotape itself is the most complete record, of course, but would present problems as a form of scientific communication (as noted above). A much more convenient form would be the presentation of copies of a sequence of videotape frames, in a manner used previously by Robert Epstein (e.g., 1985) in studies of the effects of combined behavioral repertoires in pigeons. Suppose further that the contingencies of presenting the data were such that one were limited to the *minimum* number of such videotape frames that one could choose in showing the progress of shaping; how would one select the appropriate frames to show the progress of shaping in the most selective manner?

A case could be made that the videotape frames showing most clearly the response approximations which led the experimenter to deliver a pellet would provide the most concise record of the systematic changes in behavior. Such a record would be selective; it would not, for example show any "missed opportunities" for reinforcement, but would include any occasions where, say, a previously-established topographical approximation were accidentally reinforced, and would include entire segments in which the variations "regressed" for some reason, and

necessitated re-establishment through differential reinforcement, and so on.

In other words, selecting such frames would mean the selection of those moments in which the organism's behavior made contact with the contingencies of reinforcement, as mediated by the behavior of the person shaping. Of course, such a record would also show something of the changing behavior of the latter as well, and would thus document the "mutual adjustments" over time as a function of mutual control.

In any case, such a rationale was applied to the verbal material of the present study, and two examples of the resulting records are shown in Figure 1. The top two lines of Figure 1 show a record from Subject 3, and the bottom two lines a similar record for Subject 5. In both cases the session was approximately 10 minutes in length, and the top and bottom portion of both records indicate roughly five minutes of continuous session time. The delivery of each beep is shown as an increment on the record. Both the meter of time (taken from the tape recorder) and the size of the increments are relatively arbitrary; the scales of those records shown

in Figure 1 were selected primarily on the basis of visual clarity, convenience, and size constraints (since, like a standard cumulative record, the present interest concerns patterns, changes, and the relative placement of events rather than quantitative formulation).

In constructing the records, the experimenter involved in the shaping session listened to the tape recordings and identified those passages which led to the delivery of the beep with which the passage is associated on the record. The passages were transcribed and placed directly on the "step" preceding the increment marking the temporal location of the subsequent beep. This placement allows for passages of varying lengths to be included on the record, and thus shows both the verbal "topography" which functioned to control the delivery of a beep, as well as the temporal location of the delivered beep in the session.

In some cases, the transcribed passages were abbreviated by "condensing" the extended passage to its functional portions (for example, the passage, "There are six people in my family" is shown as "(6 in my) family"), with the supporting material indicated in

10 MINUTES

Fig. 1. Records of shaping sessions for two subjects.

parentheses. Another type of modification of the transcribed passages involved the editing of some specific names and locations as a way of preserving confidentiality (indicated by brackets). It should also be noted that the transcribed passages are not, of course, "drawn to scale," since even a long "sentence" of vocal responding could take up very little space on the session's time line.

The two subjects were chosen in part because of differences observed between the two sessions. As noted above, the verbal behavior of S3 could be described as generally relaxed, fluid, narrative, and as having been "shaped" to the designated topic; in this case, the subject's "hometown." The verbal behavior of S5, on the other hand, could be described in general terms as somewhat careful (if not reluctant), and framed almost exclusively in terms of questions. The "shaping" was incomplete in the case of S5, for whom the designated topic was the subject's "leisure activities."

In looking more closely at the records for S3 (top records), the session began with a pause, followed by a discussion of some of the social adjustments experienced by the subject in the transition from high school to college (marked at "a"). After a brief pause, this was followed by a brief description of her current off-campus job (at "b"). Following a somewhat longer pause, some comments were made about the recently-televised presidential debate (at "c"). The first delivery of a beep occurred following a statement about shopping, which was followed in turn by a long pause.

The second delivery occurred following the statement, "There are six people in my family," and (after a brief pause) this marked the beginning of a near-continuous monologue which might be described in terms of the following themes. Following the (1) *general topics* of the beginning of the session (to "(6 in my) family"), there were the themes of (2) *family descriptions* (to "(family chosen) to be together"), (3) *family background* (to "(Dad's Company) on (local street name)"), (4) *family business* (to "(Business. . . is fun. . .) we all get to be together"), (5) *family hometown* (to "(this City) a real growing place for my family"), and (6) *family home* (to the end of the record). The only deviations from these themes were in one section in which the family's interests in sports were described

(marked at "d"), and a brief section following this in which the religious activities of the family were described (marked at "e").

An inspection of the record for S3 shows a transition of the topics to that of the subject's hometown (the topic chosen for shaping), and some statements were quite specific regarding this topic; for example, "I've lived here all my life," (note the "inadvertent" delivery of two beeps), and "(this City) a real growing place for my family." The final section of the record concerned the involvement of the family in the preservation and expansion of the family house itself, and thus appears to show a further "narrowing" of the topic as the session progressed. On the post-session questionnaire, the subject identified the designated topic as, "Family — how many, business, hobbies, religious."

In looking more closely at the records for S5 (bottom records), the session began with a long pause eventually leading to the question, "Can I start?" Between the first and second deliveries of a beep (the latter occurring after, "Is it outside?"), the subject began a series of rather general questions, as indicated by the following excerpt: "Can I find out if it's a person, or a place, or thing? . . . if it's the weather? . . . if it's like trees, up in the sky, on the ground? . . ." The designated topic in this case was the subject's "leisure activities," and following the second delivery (provided primarily for the purpose of maintenance), a wide variety of questions occurred intermittently (concerning such possible properties of the hidden topic as colors) until a third beep was eventually delivered ("Is it a thing?"). Following the third delivery, a "narrowing" of the topic occurred rapidly leading to the fifth delivery, which followed "Is it a person?" (toward further variations in the general direction of person-subject-activities-leisure, etc.).

At this point it is useful to divide the verbal material of the session into three sections. Section 1 covers the material from the beginning to the fifth delivery, at "Is it a person?" (approximately $\frac{3}{4}$ of the upper portion of the record), Section 2 covers the material from this point to the entry, "Is the person me?" (slightly past the midpoint of the lower portion of the record), and Section 3 covers the section from this point to the end of the record.

Section 2 contains some interesting effects, and some examples of what may be a "reluc-

tance" on the part of the speaker. First, some rather curious questions appear shortly after the identification of "person;" for example, "Is it a person who would be walking outside on the street?" and "Does the person walk outside a lot?" (note that "walking" may be an approximation to a leisure activity, and that the appearance of "outside" may be an effect of earlier reinforcement). Second, after the delivery following "person" there was another following the further specification of "just one person," (as opposed to more than one person), but the question requires further specification for the speaker when the question appears again. In this second case (which actually involves asking the question twice), "just one person" must be discriminated from "any type of person."

Perhaps a more systematic trend may be seen in the changes in questions from roughly the beginning of the lower portion of the record up to the question, "Is the person me?" The series of questions leading up to the identification of herself as the focus of the topic takes approximately one-third of the session time, and from early in the series it would appear to be evident that the individual in question could be no one else (since it is very unlikely, for example, that after the question identifying "a student here" that it would be some other student with a common history to both speaker and listener). Further, the confirmed identification of "female" is followed by a pause and then a question clearly involving self-description ("Does the person have long hair?"). The person is next identified as being "in this building," which would appear to narrow the options still further. Nevertheless, the next statement is a reappearance (in slightly different form) of a question asked moments before: "Is the person a girl? I forgot." This is followed by the further specification to "in this room" and finally, "Is the person me?"

This brings us to Section 3, in which the session takes a different course. The first statement following "Is the person me?" was "So now you want me to talk about myself." No beep was presented in this instance, because of the possible aversiveness of certain kinds of self-description for this individual in a research context. This in turn had the effect of making ambiguous the subsequent direction of the shaping procedure (the joint effect

may be seen in the decrease in rate of beep deliveries, as well as in the later statement, "... I don't know what I'm supposed to say"). Most of the remaining statements were self-descriptive in the somewhat limited sense of tacts controlled by publicly-observable properties of the individual and immediate context. Eventually the subject again asked, "Now you want me just to talk about this person?" and this time a beep was delivered, but a rather long pause followed and the session was ended. In the post-session questionnaire, the designated topic was identified with the single word, "me."

A number of questions may be raised about an exploratory procedure of this type. First, it should be noted that the study was not a complete analysis of the reinforcement function of the presented "beeps," although appropriate conditions for such an analysis could be arranged. If the presented beeps are to be taken as a type of reinforcement, then the role of reinforcement in a situation such as this needs to be clarified.

For example, in the case of S3 it is an interesting question, and not at all clear from the present data, whether the beeps (if serving as reinforcement) are serving a selection or a maintenance function. This question may be re-formulated in the following way: how sensitive was the on-going verbal behavior of S3 to any specific, selective function of the presented beeps? Another way to formulate the question is in terms of the units of analysis: was all of the verbal behavior concerning "family" a relatively "coherent unit" of verbal behavior in this context, for which the presentation of the beeps served primarily to maintain or extend the unit in time, or were there particular variations which were sensitive to the momentary effects of the delivered beeps as reinforcement? In the latter case, what would be the functional relations between such properties of the on-going verbal behavior of the speaker and those properties which serve to control the behavior of the listener-as-shaper? How different would the record of S3 be if, at some point, the beeps had been presented randomly?

A number of other questions present themselves in the case of S5. The point to be made is that many questions may be addressed experimentally in simplified verbal contexts such as these, particularly (and

perhaps necessarily) if the procedures allow for multiple sessions with a given individual. A great number of other procedural variations are also possible. For example, some of the above questions may be analyzed in the context of additional variables, such as variations in establishing operations (e.g., if the beeps/points were exchangeable for money), or the effects of more specific instructions concerning contingencies. A variety of issues concerning stimulus control or social interactions might be addressed as well.

CONCLUSION

There is no doubt that a great deal of progress has been made, and continues to be made in the functional analysis of verbal behavior. Recent examples may be seen in the continued refinement of the verbal practices with which we make contact with the verbal field (e.g., Michael, 1988), as well as a growing number of studies which combine the interests of both basic and applied science (e.g., Howard & Rice, 1988; Stafford, Sundberg, & Braam, 1988). The analysis of the processes of stimulus equivalency, as noted above, are of obvious relevance to the verbal field, as are the various formulations and controversies surrounding the analysis of "rule-governed behavior" (cf. Vargas, 1988).

Yet the kind of "science of verbal behavior" envisioned by Skinner is as yet undeveloped. Further development might be accelerated through a close examination of the implications of radical behaviorism for the practice of scientific research. The issue is seldom raised by behavior analysts, and the methodological and theoretical traditions of methodological behaviorism appear to be gaining ground in some quarters (e.g., Perone, 1988); but is methodological behaviorism necessary? The basic questions to be addressed in methodological development, from the standpoint of radical behaviorism, are these: Can the behavior be observed and recorded? Can the observed changes be described? Can the relevant contingencies be analyzed? Is the analysis effective—does it lead to the prediction and control of the behavior of the individual? Does the analysis suggest application to human problems?

If the field of behavior analysis is ever to make productive contributions to the verbal

practices of psychotherapy, to take but one example, then we must begin a direct, empirical, functional analysis of verbal behavior as it is there to be observed in controlled settings. Radical behaviorism, as a natural science "system," is inextricably linked to the functional analysis of verbal behavior, and it is only through an appreciation of the implications of the former will a "science of verbal behavior" be fully underway.

Given the complexity of on-going verbal behavior, is such a laboratory science relevant to the prediction and control of the individual speaker possible, or are we left with interpretive analyses only? It might be assumed that a significant degree of order is unlikely to be seen at the level of the individual organism in this case. But I submit that in the late 1920s and early 1930s, many psychologists of the period would have made the same assumption regarding the behavior of the individual, intact, freely-moving rat, until "a new world (was) opened to inspection" through Skinner's cumulative records (Skinner, 1956). The world which awaits us now is the world of human verbal behavior.

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