In Response

The Case Against Physicalism in the Analysis of Behavior

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Stemmer (1992) addresses a number of difficult issues arising from Skinner's treatments of private events (although it is worth noting that Stemmer's term, *inner events*, describes a location rather than the special set of contingencies that have come to be implied by the term, *private events*; e.g., Skinner, 1953). Among the points made by Stemmer are the following: First, radical behaviorism may be properly characterized as compatible with physicalistic reductionism, or "the view that all scientifically significant statements are reducible to statements of physics" (Stemmer, 1992, p. 115; see Carnap, 1936). Second, inner events are physiological events, and mentalistic terms found in natural language carry dualistic baggage that should be avoided (e.g., by substituting an expression such as "physiological pain state" for "pain state"). Third, private events are a matter of inference from publicly observable interactions between behavior and environment, and types of private events are discriminated by observers on the basis of differences in observed functional environment-behavior interactions (or "indirect individuation"; p. 116).

Stemmer (1992) discusses what may be the single most complex topic arising from Skinner's published work. Thus, it is not surprising that a great deal of the paper may occasion comment and critical discussion. For example, the third

point listed above highlights Stemmer's emphasis of the role of inference in the occurrence of third-person statements regarding private events, but Skinner has also provided a rich interpretation of first-person statements as well (i.e., first-person statements under the control of private events; e.g., Day, 1976b, 1977, 1983; Skinner, 1945, 1953, 1957, 1964, 1974). Of particular interest here is Stemmer's implication of a compatibility between Skinner's views and the sort of reductionism advocated by Carnap (e.g., 1936). Although this is clearly not the focal issue of Stemmer's paper, it is this issue that will be the focus of this commentary; namely, the implications of physicalistic reductionism for the analysis of behavior.

The title of this commentary requires some clarification. The case to be made here is not against *materialism*, in this context used to describe the view that natural science deals always and only with the "material" world; the world that (as behavioral scientists we would assume) encompasses all human functioning and the environmental context within which it is observed. Rather than investing in burdensome ontological commitments, it might be simpler for the radical behaviorist to say that the world that we observe (which is variously described as the "material" or "physical" world) is sufficient to account for "psychological" phenomena. Skinner emphasized such a view in his important contribution to the Harvard Symposium on Operationism (1945), when he made reference to "the bold and exciting behavioristic hypothesis that what one observes and talks about is always the 'real' or 'physical' world (or at least the 'one' world)" (p. 382).

The term *physicalism* has a variety of

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usages in psychology and philosophy. In contrast to *materialism*, *physicalism* is used here to refer to the various positions that imply some sort of *reduction to physical measures* (the term *reductionism* will be limited in this commentary to the latter usage; other usages of the term may not be engaged by Stemmer's interpretation; Stemmer, 1992, p. 117). For example, *physicalism* frequently appears in the literatures of philosophy of mind and cognitive science in treatments of the "mind-body problem." Discussions of "type-type" and "token-token" physicalism are concerned with questions regarding the relation between "mental" states and brain states (e.g., Flanagan, 1991). For the radical behaviorist, the traditional formulation of the mind-body problem, if it is a problem at all, is primarily a problem of verbal behavior. This does not mean, of course, that many difficult problems concerning verbal behavior and private events do not remain to be addressed by the radical behaviorist, and it also does not exclude the problems of physicalistic reduction with respect to *behavior*.

The principal question to be examined is whether the subject matter of behavioral science may be regarded as reducible to the language of physics. The answer to this question may define the future of behavior analysis as a scientific field. The fact that the question is even raised is evidence that radical behaviorism is not yet free of the historical influences of logical positivism and methodological behaviorism (e.g., Day, 1976a, 1976b, 1977, 1980, 1983; cf. Smith, 1986). An emphasis upon physicalism (as the term is being used here) may be found in the writings of a number of contemporary behavior analysts (e.g., Harzem & Miles, 1978; Johnston & Pennypacker, 1980; Killeen, 1992; Miller, 1980; Stemmer, 1992, is to be included only insofar as his materialistic position also emphasizes physicalistic reductionism, as appears to be the case on p. 115). That Skinner's work has been interpreted by some to be advocating a brand of physicalistic reductionism has been the focal point of some of its most harsh and bitter critical

reviews (e.g., Chomsky, 1959; Koch, 1964, 1976; cf. Day, 1976a, 1977). To be sure, Skinner had employed such "physicalistic" terminology and/or descriptors in several of his published writings (as Stemmer and others have documented very well), even though the implications of such a position seem to run contrary to other properties of Skinner's scientific system (e.g., Hayes & Hayes, 1992). Indeed, I hope to indicate that it is precisely these *other* properties of Skinner's radical behaviorism that, unlike physicalism, will allow us to build the sort of comprehensive science of human behavior envisioned by Skinner.

An additional point may be in need of clarification regarding the role of physiological variables in the analysis of behavior. Certainly the study of physiology will continue to yield important information about the functioning of the organism as a whole, and the relationship between physiology and the science of behavior was clearly a topic of longstanding interest to Skinner (e.g., 1938, 1974). For present purposes, however, we may make a distinction between the issue of the *usefulness* of physiological *data* to behavioral science (through its contributions to the prediction, control, and interpretation of the behavior of the individual organism as a whole) on the one hand, and the issue of the *reduction* of behavior to *physical measures* on the other. The first of these issues is uncontested here; the second is the issue to which the present usage of the term *physicalism* applies (a discussion of the relations between these issues is beyond the scope of this brief commentary).

Critical discussions of physicalism and its implications for the analysis of behavior have appeared in the writings of a number of prominent behavior analysts (e.g., Hayes & Brownstein, 1986; Hayes & Hayes, 1992; Hayes, Hayes, & Reese, 1988). The most extensive treatments may be found in the writings of Willard F. Day (the papers cited here are included in a volume of his collected works; Leigland, 1992). Day emphasized those properties of Skinner's writings that pointed to the functional analysis of *ob-*

served phenomena, and emphasized the hazards and limitations of searching for some sort of epistemological or methodological bedrock in "objective" physical measures. Issues of physicalism appear as well in Catania's authoritative text, *Learning* (1992), in his discussions of the term *response* (pp. 12–14), the concepts of the operant (chap. 6) and discriminated operant (chap. 7; see especially the section on concepts, pp. 146–147), and in the chapter on verbal behavior (chap. 11; see especially the section on abstraction, pp. 237–240; see also Day, 1969; Skinner, 1953).

Are statements about operants reducible to statements in the language of physics? Catania (1992) properly describes an operant in terms of an observed correspondence between two kinds of response classes: (a) one class defined in terms of the differential effects upon the environment of response variations (i.e., given an environmental context, certain response variations will produce reinforcement while others will not), and (b) another class defined by the variations of responding that are produced by the reinforcement contingencies. The nature of the functional definitions of behavior-analytic technical terms requires both a distinction (or a discrimination on the part of the observer) and an interaction (or an observed correlation or correspondence; cf. Skinner, 1931) between (a) the environmental contingencies and (b) the behavioral effects produced by those contingencies.

To take examples from standard laboratory preparations, the former class may indeed be specifiable in physical terms, in the sense that only lever presses with a certain force will produce a food pellet, only key pecks of a given location and force will produce mixed grain for a certain number of seconds, and so on. The latter class may also be specifiable in physical terms, in the sense that a changing distribution of responses in contact with a mechanical operandum may be measured in terms of frequency or rate, and so on. However, with respect to a functional analysis, it is neither class alone but the *relation* or *correspondence*

between them that is of interest (e.g., Catania, 1992; Day, 1980; Skinner, 1931, 1935, 1938). The assessment of such correspondences depends upon the discriminative repertoires of observers given environmental conditions, and is thus a behavioral (rather than a "physical") matter. In other words, the discriminations made by scientists of operants, as with all *functionally defined* units of environment-behavior interaction (such as the respondent or reflex relation, e.g., Skinner, 1931; or discriminated operants, e.g., Catania, 1992), may themselves be characterized as discriminated operants on the part of observing scientists (e.g., Skinner, 1957), and thus one is unable to "reduce" such interactions to some sort of purely "physical" foundation (e.g., Day, 1980). Skinner's early recommendation was to remain at the level one's observations (Skinner, 1931), and for the scientific analysis to proceed on the basis of functional or pragmatic criteria (e.g., Hayes & Brownstein, 1986; Leigland, 1992; Morris, 1992; Moxley, 1992).

In these examples, like many *nonverbal* human examples we might examine, behavior is operating in a direct or "mechanical" fashion upon the nonsocial, nonverbal, or "physical" environment. The implications of physicalism versus (Skinnerian) functionalism, however, are most important when examined in the context of verbal behavior. In the case of verbal behavior, the behavior of the speaker operates not upon the mechanical (which is to say, at least in one sense, the "physical") world, but rather upon the behavior of other people who share a common history as part of a verbal community (Skinner, 1957). In the case of verbal behavior, in other words, the operandum is not a mechanical contact but the behaving listener. It must be emphasized that our analysis of verbal behavior is fully encompassed within our *materialistic* view; the "one world" remains sufficient in all cases (it is worth noting that Skinner frequently used the term *physical* in describing this view, although physicalism and materialism are distinguished for present purposes in the manner noted above).

Some research in progress on the shaping of verbal behavior illustrates the problem with respect to reduction to physical measures (Leigland, 1989, 1991a, 1991b). In a series of experiments, human participants were asked to talk about a particular topic (to a listener in the adjoining room via microphone), but were instructed that they must discover on their own or "find" the topic in question. They were told that they would hear a short beep (from the listener, the only form of reply) when they were talking about the topic in question, or were close to the topic. The experimenter/listener in the adjoining room delivered beeps in the manner of differential reinforcement of successive approximations toward the predesignated topic. The resulting verbal material was tape recorded and transcribed in several ways in order to reveal orderly relations between the contingencies and changes in the verbal behavior of the subject. Cases in which shaping has occurred may be clearly discriminated on the basis of the transcribed material, and the experimental preparation has been extended to the analysis of the reinforcement function of the beeps and a variety of other variables.

The point to be made here, however, is that the shaping that takes place in such a context is along a verbal rather than a mechanical response dimension. The terms used above in describing the procedure, such as "close" to the topic and shaping "toward" the topic, are obvious instances of a spatial metaphor (Skinner, 1957). No amount of analysis of vocal cord movements or audio spectrographs or other "physical" measures will be sufficient in characterizing the relevant properties of change in the verbal behavior of the subject. Characterizing such changes requires a *behaving listener* with a complex discriminative history in a given verbal community, and thus we may forego a physicalistic analysis in favor of a truly *functional* analysis of verbal behavior. From a radical behaviorist perspective, the usefulness of such analyses does not depend upon the details of the procedures *as such* (i.e., procedures involving interobserver agreement or physical measures of behavior do not

necessarily constitute prerequisites for methodological "validity") but rather upon whether the methodological strategy allows for systematic progress in the prediction, control, and interpretation of behavior (e.g., Hayes & Brownstein, 1986; Hayes & Hayes, 1992; Leigland, 1992; Skinner, 1945, 1957, 1974).

There may be a variety of ways available to address the important pragmatic concerns of scientific methodology; precision of measurement, experimental control, replicability, and so on. We will make very limited progress, however, if behavior analysis makes a fetish of physical measures and outmoded prescriptions of "objectivity" (e.g., Skinner, 1974, 1989). Stemmer's (1992) scholarship provides clear evidence that Skinner may indeed be read as advocating a kind of physicalism (e.g., see also Johnston & Pennypacker, 1980; Killeen, 1992), but Skinner has also been interpreted as developing a radically new conception of science, a comprehensive natural science of behavior in which a pragmatic epistemology joins with what could be described as a kind of psychological phenomenology (e.g., Fallon, 1992; Kvale & Grenness, 1967; Leigland, 1992; the arguments made here regarding physicalism and functionalism correspond in a number of important ways to discussions of Skinner's work in terms of mechanism and contextualism; e.g., Hayes et al., 1988; Morris, 1992; Moxley, 1992).

Discussions of the implications of Skinner's writings will continue, and Stemmer's (1992) article is a welcome addition to the growing discussion of a very difficult and important part of these writings. In the meanwhile, however, the field of behavior analysis continues to develop, but in what direction? Materialistic assumptions do not necessarily imply physicalistic reductionism, and attempts to force the analysis of behavior into the latter tradition will be costly indeed. The functional properties of human verbal interaction, for example, simply will not yield to "physical" or "mechanical" measures. Skinner's extensive writings seemed to imply two paths for a science of behavior. Will behavior analysis be the sort of science that

will be able to move directly and boldly into complex areas of human verbal functioning? What sort of science shall it be?

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