On "Setting Events" and Related Concepts

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The term "setting event" is examined in light of recent interest in the possible utility of the concept. The term was found to characteristically include properties of environmental variables, functional relations already defined, and other functional relations either unspecified or not identified with any generally-accepted term. "Setting event" as a technical term may be too general and functionally unclear and should thus be viewed with caution. An alternative approach is examined in the recently-proposed term, "establishing operation," which is viewed as a more limited, functionally specific, and therefore preferable approach to the adoption of new technical terms.

The "operant" is defined as a functional environment-behavior unit that is characterized in terms of a jointly-defined three-term contingency. The "operant," "reinforcement," and "discriminative stimulus" are three technical terms which make up the operant contingency. These terms, along with the technical terms subsumed under another functional environment-behavior unit, the "respondent," constitute the fundamental technical vocabulary of the science of behavior.

However, the momentary effectiveness of the familiar three-term contingency is often said to depend upon another class of environmental variables. The clearest example of such a fourth term is provided by deprivation/satiation variables or aversive stimulation (Skinner, 1953). Several terms have been proposed in the literature in the attempt to capture the effects of such motivational variables as well as various effects of environment-behavior interactions in an individual's recent history, the effects of context, and so on. These include "setting events" (Bijou & Baer, 1961; an adaptation of the term "setting factors" of Kantor, 1959), "potentiating variables" (Goldiamond, 1983), and "establishing operations" (Michael, 1982).

While these terms are related in several basic respects, they also differ along sev-

eral dimensions, such as which of the three terms of the operant contingency are affected by the defined variables and the range of environmental variables (including, for example, deprivation, specific histories, context, etc.) that are subsumed by the term. This paper will focus upon the latter dimension, that is, the range of environmental variables subsumed by the term. The term to be examined will be "setting events," as it has figured prominently in certain theoretical and conceptual analyses of behavior (e.g., Bijou, 1976; Bijou & Baer, 1961, 1965) and because of a recent interest in the implications of the term for behavior analysis (Larsen & Morris, 1983; Wahler & Fox, 1981).

"Setting Events" and Functional Relations

A recent paper by Wahler and Fox (1981) reviewed the various meanings of "setting events" and noted the productive methodological and conceptual implications of the term for applied behavior analysis. The types of variables encompassed by the term were identified as (1) deprivation/satiation variables, (2) presence/absence-of-object or "context" variables, and (3) environment-behavior interactions in the individual's recent past. That is, such variables may affect the strength of other, perhaps more specific stimulus functions in a given situation. Food deprivation will affect the momentary effectiveness of food as a

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reinforcer; the effects of discriminative stimuli may be shown to depend upon the presence or absence of other stimuli in a given situation and upon certain events in the organism's recent history, and so on (Mackintosh, 1974; Wahler & Fox, 1981). Thus the characteristics that distinguish "setting events" from "stimulus events" could be identified as (1) the complexity of the former compared with the latter, and (2) temporal delays frequently involving the former that are not regarded as characteristic of the latter.

The question of interest here is not whether it is wise to expand the types of environmental variables that may be included for analysis in applied settings. Wahler and Fox (1981) make an excellent case for such an expansion and provide many interesting examples. The question of interest here concerns the wisdom of classifying the effects of such variables under a term such as "setting events." That is, is it advantageous to classify a complex environmental object, event, or interaction with delayed behavioral effects as a setting event if it is in fact *functioning* as a complex or conditional discriminative stimulus? "Discriminative stimulus" is a technical term that specifies a particular type of controlling relation. If the *complexity* of the controlling *stimuli* increases but the *nature* of the controlling *relation* remains the same, may we at some point justify a change in terminology from "the effects of discriminative stimuli" to "the effects of setting events?"

To take a hypothetical example, a specific history of differential reinforcement may produce discriminative control over an organism's responding with respect to one element of a large stimulus array, or many elements as in a pattern, or relations between elements (either spatial or temporal), or to any of these (in principle) conditional upon presence or absence of a houselight. If we are to adopt "setting events" as a technical term, we may be faced with the problem of defining the point at which the complexity of the situation warrents its usage.

A large body of research has shown that the kinds of environmental events

that may gain discriminative control over behavior may be quite complex (Mackintosh, 1974, 1977; Sidman & Tailby, 1982), and their effects are properly viewed with respect to the "context" in which they occur (Mackintosh, 1974, 1977) and may involve delayed effects (White & McKenzie, 1982). In addition, studies have shown that environment-behavior interactions may serve a discriminative function over an organism's behavior, whether such interactions occur with another individual (Epstein, Lanza, & Skinner, 1980; Hake, Donaldson, & Hyten, 1983) or with respect to the organism's own previous behavior (Shimp, 1983). While the level of complexity or delay of effects in such studies are not of the magnitude of the examples cited by Wahler and Fox (1981), it is clear that these are continua along which discriminative stimuli may exert their influence over behavior.

To summarize, it is proposed that we should approach the term "setting events" with great care primarily because the functional nature of the term is unclear. In the review provided by Wahler and Fox (1981), no *particular* controlling relation is identified with the term. Instead, the term appears to be characterized in terms of topographical features of environmental variables, such as complexity, temporal delay of effects, presence/absence-of-object, and so on. The functional relations that *are* subsumed by the term include what may be complex or conditional discriminative stimuli, deprivation/satiation variables, and perhaps others left unspecified.

"Setting Events" and "Stimulus Events"

It seems that some of the conditions giving rise to this issue of terminology may be found in the history of the term "stimulus," which has long been occasioned in the scientific verbal community by relatively simple environment-behavior interactions in laboratory settings. One of the excellent points made by Wahler and Fox (1981) is that the narrow and specific connotations of the term "stimulus" seem lacking when one is faced with

the formidable complexity of environmental influences over human behavior in applied settings. Certainly the scientific sophistication and effectiveness of applied behavior analysis will depend upon our ability to discriminate and analyze functional relations that make increasing contact with such complexity. However, the main point here concerns terminology rather than methodology.

Great care should be taken that new technical terms are defined by their clearly different and separate behavioral functions from those terms already defined, rather than pointing to broadly-defined environmental characteristics of such potential variables. If our scientific verbal behavior lacks effectiveness because of limitations associated with the traditional usage of the term "stimulus," then our efforts should involve a careful re-examination of this complex term. However, if our examination of technical terms retains its functional orientation, we may be able to avoid some of the problems involved in defining, for example, "discriminative setting events" as opposed to "discriminative stimulus events."

"Motivational" Variables and "Establishing Operations"

It is thus argued that the term "setting events" should be viewed with caution because it includes (1) *properties* of environmental variables (such as "complexity") and (2) certain *functional relations* that are already defined technically (such as the discriminative function). However an additional set of variables remains to be addressed for which a functionally-defined technical term has yet to be generally accepted. These are the variables commonly termed "motivational" and include deprivation/satiation variables, certain effects of aversive stimulation, and perhaps others that do not easily fit into these two categories (e.g., salt ingestion). A profitable approach to the introduction of a technical term that makes contact with such variables might be illustrated by the recent work of Michael (1982, 1983). In these papers Mi-

chael proposes a new term, "establishing operation," and carefully examines the distinctions between the functional characteristics of variables corresponding to this term and those of existing terms (such as the discriminative stimulus).

"Establishing operation" is defined in terms of two features: that it is some environmental variable (event, operation, condition, etc.) that (1) alters the momentary effectiveness of a given class of reinforcing events, and (2) evokes behavior that in the past has been strengthened by that class of reinforcing events (Michael, 1982; cf. Michael, 1983, for analogous arguments for punishing events). Thus, to take some simple examples, food deprivation may function as an establishing operation in that it both alters the effectiveness of food presentation as a reinforcing event and also makes more likely the occurrence of those response classes which in the past have been reinforced by food. The onset of electric shock may function as an establishing operation in that it both makes effective the offset of shock as a negatively reinforcing event and makes likely any escape behaviors which have been so reinforced in the past.

"Establishing Operations" and Discriminative Stimuli

The establishing operation, then, functions simultaneously in two ways: (1) by affecting functional consequences (that is, affecting a specific type of functional relation), and (2) by serving an antecedent evocative function. It should be noted that the term "evoke" is used here as a general term referring to antecedent controlling functions, of which "occasion" (as in the case of the discriminative stimulus) and "elicit" (as in the respondent case of the unconditioned stimulus) may be seen as specific types of evocative functions (Michael, 1983). Conditions of deprivation or aversive stimulation may evoke behavior, for example, as in the case of the mand as a type of verbal operant (Skinner, 1957).

As argued above, an issue of focal interest to the introduction of a term is how

its functional properties differ from technical terms already functionally defined, particularly in a case such as the establishing operation, which is characterized as serving an antecedent controlling function in a way that under some conditions may appear similar to the discriminative stimulus. To oversimplify Michael's arguments for the sake of illustration, the power of a discriminative stimulus to control behavior results from a history of differential (effective) reinforcement. The power of the establishing operation to control behavior comes not from a history of differential (effective) reinforcement *availability*, but rather from a history of correlation between an operant response class and the variables that make a characteristic consequence momentarily effective as reinforcement. Thus, the onset of electric shock would not be viewed properly as a discriminative stimulus for negatively-reinforced "escape" behavior because this would require a condition in which, for example, if the onset of the shock occurred, the occurrence of the response would be followed by shock offset, but if the onset of the shock did *not* occur, then the response would *not* be effective in terminating the shock. The point is that the *presentation* of an aversive condition can serve a "motivational" function in that it makes effective the *removal* of the condition as negative reinforcement. It thus qualifies as an establishing operation under our definition, and should not be considered a discriminative stimulus simply by virtue of its evocative function.

Hence, in the case of "establishing operation," a functional definition is given, along with relevant examples providing comparisons with other functional relations. In addition, Michael's papers provide a critical examination of the choice of terms itself, noting, for example, that a more complete term would be "establishing/abolishing operations," since such operations may also decrease the momentary effectiveness of reinforcers and thus the strength of relevant response classes.

Conclusions

This paper has not tried to provide a comprehensive review of the terms relevant to the above issues. For example, it has not addressed Michael's (1982) proposed "establishing stimulus," more recently termed the "conditioned establishing operation" (Michael, 1983), which is identified in terms of altering the momentary effectiveness of conditioned reinforcement. The more important omission for general purposes is an examination of Goldiamond's (e.g., 1983) proposed term, "potentiating variables." However, the purpose of this paper has been to examine the need to expand a scientific technical vocabulary to include the increasingly-discriminated range of functional relations identified in the analysis of behavior and to discuss two examples. While the excellent methodological points made by Wahler and Fox (1981) are well taken, it is argued here that the term "setting events" may be asked to do too much in its apparent inclusion of complex or conditional discriminative stimuli, certain characteristics of environmental conditions, "motivational" variables, and perhaps others. It is possible that such broadly-defined terms may eventually make it too easy for us to "explain" complex or unclear environment-behavior interactions. Our scientific verbal behavior should make careful discriminative contact with the subject matter, and Michael's "establishing operations," limited to a particular type of functional relation, is illustrative of the kind of careful, technically specific, and functionally-oriented approach we should consider when promoting the adoption of new terms.

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