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The Ecological Perspective Setting Events and Behavior

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All behavior (learning) occurs within environmental contexts; indeed behavior may be situation-specific. Within an ecological perspective behavior and environment are viewed as interactive (Rogers-Warren & Warren, 1977). Willem (1974) defines an ecological perspective as one which encompasses the "complex relationships and interdependencies within organism-behavior-environment systems . . ." (p. 152). In any ecological context behavior may be viewed as deviant when discordance arises or organism-behavior-environment homeostasis is disrupted. Consequently, the organism, behavior, and/or the environment requires modification to reestablish "balance." For the ecologist as well as the contemporary applied behavior analyst, environmental determinism is the underlying construct on which assessment and intervention approaches are based.

For the most part, activities of the ecologically oriented scientist center on relatively global issues and the descriptive study of phenomena in natural settings. In contrast, the behaviorally oriented investigator focuses on experimental manipulation of specific behaviors and empirical validation of functional effects. The goal of the ecologist is to account for human behavior by identifying environmental factors that provide the context for given behavior and the interaction effects of behavior and environmental influences; the goal of the behavior analyst is to control and manipulate the environment to elicit or evoke desired responses.

Educationally, an ecological perspective calls for assessment of the student's environment to identify sources of discordance. (Several resources are available that discuss these assessment methods; e.g., Cantrell & Cantrell, 1975, 1985; Hobbs, 1966, 1982; Rhodes & Tracey, 1972.) As Cantrell and Cantrell (1985) state, "Deciding what ecological variables to include, how to measure them, and then how to use the information is seldom simple" (p. 280). Traditionally, an ecological approach includes assessment of three primary ecosystems—the home, school, and community (Hobbs, 1966)—which may be further divided to include such subsystems as church, community cen-

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ter, Boy Scouts, and peers evaluated within the context of neighborhood, community, and state resources (Cantrell & Cantrell, 1985). The implication is that each of the ecological subsystems should be analyzed in considerable detail to enable the design and coordination of services/resources and effective interventions.

In our opinion a thorough assessment of a child's major ecosystems currently is impractical for educators and may be impossible to obtain. Such assessment may be impractical in that many areas of discordance are not within the control of educators to change. For example, single-family, insular mothers have been shown to negatively affect the outcome of treatment of deviant children (Wahler, Afton, & Fox, 1979). Even though this ecological variable may distract from the child's educational progress, the teacher's control over whether the mother is married or participates in extra family activities is minimal. Additionally, today's technology for remediation simply is not sophisticated enough to measure variables to reliably identify each discordant area within the student's total ecology. We propose that a more profitable "ecological" approach for educators may be to analyze classroom and school environments in terms of the interaction between controllable environmental variables and specific student behaviors.

Theoretically, our assessment/intervention approach incorporates "setting events" as discussed by Kantor (1959) into applied behavior analysis (ABA). Thus, the basic ABA paradigm is retained but expanded. Within this framework, setting events are considered those ecological variables that increase or decrease the power of antecedent stimuli and/or consequences within the immediate environment. Tactics of applied behavior analysis (ABA) have empirical documentation as to their direct and positive impact in development of teaching/learning environments. However, as Brown, Bryson-Brockmann and Fox (1986) indicate, the typical three-phase analysis used by behavior analysts (i.e., stimulus-response-consequence) is insufficient to fully account for treatment success (or

failure). We propose that analysis of setting events may provide sources of environmental control as yet unutilized by behavior analysts that will aid in the development of more effective educational programs. In particular, behavior instability, collateral behavior change, and the reciprocal effect of behavior on the environment may be understood more fully and controlled more effectively through the examination and manipulation of setting events. Since the teacher's major task is to create a classroom environment that facilitates student learning of appropriate behavior, it follows that educators may benefit from systematically incorporating manipulation of setting events into their instructional programming.

The remainder of this paper focuses on two general categories of classroom setting events—intrapersonal (internal) and physical/social (external). Next, issues related to measurement of the effect of setting events or other ecological manipulations are presented briefly. Finally, our recommendation for setting event research to improve our understanding of classroom and school ecologies is recapitulated.

Setting Events as Ecological Variables

As indicated, applied behavior analysis (ABA) tactics have been demonstrated empirically to be extremely powerful in aiding teachers to instruct and manage the behavior of students. ABA tactics emphasize the systematic use of contingency management and stimulus control procedures. However, the power of the discriminative stimuli and/or consequating stimuli may be increased or decreased as a result of other factors. These factors may be called setting events and they constitute the contextual conditions in which organism-environment interactions occur (Morris, 1982). Setting events are those environmental events that determine which of the potential stimulus-response relationships appear at a given point in time. By way of review, a discriminative stimulus is the presentation of a specific event that is followed reliably by a specific response;

reinforcing stimuli are those stimulus events that follow a specific response and increase the rate of that response. Setting events, in short, differ from the discriminative and reinforcing stimuli commonly discussed in relation to the three-term Skinnerian paradigm of stimulus-response-consequence. Additionally, in contrast to stimuli, setting events are likely to have greater stability across time (Brown, Bryson-Brockmann, & Fox, 1986). We view the concept of setting events as being of greater relevance to the classroom teacher than the more global factors typically considered in ecological intervention models.

Setting events may be intrapersonal (internal) or physical/social (external). Fatigue, drugs, emotional status, injury, and hunger represent intrapersonal setting events. Physical/social setting events within the classroom ecology, for example, include classroom noise level, lighting, teaching arrangements, and number of classmates and adults present. Setting events such as these may increase or decrease the value of stimuli that directly affect a given behavior; they represent ecological variables over which the teacher may exert some control and thereby affect the potential power of the educational program. By expanding our assessment/intervention approach modestly and examining the effects of setting events, we can develop a data base on the influences of organismic and contextual conditions on environment-organism interactions that have not as yet been examined functionally or extensively.

The following presentation of intrapersonal and physical/social setting events is meant to be illustrative. Classroom setting events that a teacher might control are discussed. As seen in the following examples, there will be times when the teacher may need to directly and systematically intervene to establish desired setting conditions; other times merely arranging for the setting event to occur as part of the daily routine will suffice. Readers are reminded that the examples provided are by no means exhaustive. However, variables (and intervention tactics) discussed are those for which an empirical

data base presently is established or is being established.

Intrapersonal Events

Intrapersonal events that may serve as setting events have not been thoroughly analyzed. Probably the major reason is that internal states such as emotions and psychological states are difficult to directly measure and most often are inferred. For example, when intensified emotional states are present, the teacher/clinician actually observes behaviors that indicate a given emotional state exists. An "angry" child may display physical evidence of anger such as a reddened face, a quickened respiration rate, and other behaviors we infer as anger. Incidentally, it is interesting to note that other heightened emotional states (e.g., "excitement") may be accompanied by many of the same covert and overt behavioral manifestations as anger. Generally, the presence or absence of other collateral behaviors enables us to discriminate between a child's happiness and anger. Both emotional states, nonetheless, may be instructionally detrimental in that they may decrease the power of the teacher's instructional presentation.

Questions of how to respond to perceived emotional states and/or to establish internal states conducive to learning remain. Often, however, simple interruption or cessation of the ongoing activity is sufficient to regain more acceptable behavior. Another common intervention, timeout from reinforcement, may serve two purposes when a student is angry (or in an emotional state that precludes efficient learning). One effect is to punish the behavior (e.g., tantrums) that indicated the presence of anger, and the other is to provide an opportunity for the anger to subside. Both are outcomes that increase the power of the teacher's instructional control (i.e., the child's emotional and behavioral state become suitable for academic productivity). Similarly, the overly excited "happy" student's emotional state may be decreased by simply providing a few moments of "quiet time" to allow the student to regain his composure, again

increasing the power of the teacher's environmental control over student learning.

Physiological states such as hunger and fatigue may also be important setting events for classroom behavior. If a child is hungry s/he is less likely to respond to the typical reinforcers available in the school. Of course, hunger may be remedied by providing breakfast, lunch, and snacks. Student fatigue

cal needs, it is clear that they may impinge on the effectiveness of educational interventions.

As stated earlier, intrapersonal or internal setting events have not been empirically identified nor have intervention strategies to modify these events been developed and validated. Research is needed to clarify the relationship between these factors and educational programs.

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may be a major problem in many classrooms. If students are so tired that they cannot concentrate or stay awake, even consequating stimuli that had been powerful reinforcers in the past are likely to be ineffective. For some students, physical activity prior to academic work may affect the power of the discriminative stimuli and the power of reinforcers during a given assignment. Fatigue may be offset somewhat with the selection of tasks that require active (versus passive) participation at the appropriate instructional level. Provision for rest may be another option for altering a fatigue state.

Procedures for correcting the intrapersonal setting conditions such as hunger and fatigue may themselves interfere with the effects of educational programming. For example, if food is the main form of reinforcement, snacks may diminish the power of contingent edibles; time for rest alleviates fatigue but reduces the total instructional time available. Ultimately, to modify these examples of intrapersonal setting events (i.e., hunger and fatigue), cooperation between the home and the teacher is likely to be necessary. Although the main mission of education has not been to assess or address student physiologi-

Physical/Social Events

A number of physical/social setting events have been the subject of research investigations for years; these setting events include classroom organization, schedules, classroom rules, teaching arrangements, types of instructional materials and equipment, size of the classroom student-teacher ratio, number of handicapped and nonhandicapped peers, and possibly many other factors. By way of example, several of these physical/social setting events are discussed below.

Classroom organization. Many authors have discussed the importance of classroom setting events that structure the classroom to clarify the relationship between student responses and their consequences (e.g., Haring & Phillips, 1962; Hewett, 1968). A major impression gained from review of the literature is that the physical environment of the classroom should be organized to leave little doubt as to what behavior is expected within different areas. For example, independent study areas should be arranged for students to engage solely in independent study (e.g., workbook assignments, silent reading, and so on). Areas of the

classroom should be clearly discernible by students. For example, the teacher may assign individual study areas. Study cubicles, used in special education classrooms for some time, have demonstrated effect on student on-task behavior (e.g., Shores & Haubrich, 1969). While in cubicles or other physically contained areas, the students are less likely to become involved in interpersonal interactions than when they are at their own desks (Haubrich & Shores, 1973). Therefore, unpredictable distractions are minimized and the power of the stimulus effect of the academic materials is increased.

The learning center approach in which parts of the room are arranged in areas with clearly defined behavioral expectations is another example of managing physical/social setting events. Areas of a learning center may be defined by partitions and signs that cue the students as to what the consequences and behavioral expectations are for a specific center.

Classroom rules. In classrooms with an explicit code of conduct—either teacher-generated or student-generated rules—this code may function as a setting event for more orderly, nondestructive, and nondisruptive student behavior than classrooms lacking clear behavior guidelines. Even teacher behavior may be more predictable in a school with articulated expectations for student performance and conduct than a school with implicit rules or a general guiding philosophy. Paine, Radicchi, Rosellini, Deutchman, and Darch (1982) offer guidelines for setting up classroom rules and include such admonishments as limiting the number of rules, wording rules positively, and posting rules in a visible area of the classroom.

Classroom schedule. The sequence of classroom activities, the consistency with which schedules are followed (Paine et al., 1982), the amount of time allocated for various teaching/learning activities (Lentz & Shapiro, 1986), and the actual amount of time students engage in appropriate instructional tasks (Gable, Hendrickson, & Lyon, in press) are related to student classroom behavior and achievement. By providing stu-

dents with advance organizers (e.g., a preparatory statement explaining what will happen next) or environmental cues (e.g., posted schedules) pertaining to daily events, teachers may “set the stage” or create environmental contexts in which the power of direct instruction variables may be enhanced. For example, we know that application of the Premack Principle (e.g., “If . . . , then you may. . . .”) can change

Strain, Tremblay, & Shores, 1981), teacher presence during free play (Shores, Hester, & Strain, 1976), presence of normally developing children in free play (Hecimovic, Fox, Shores, & Strain, 1985), proximity of children (Spiegel-McGill, Bambara, Shores, & Fox, 1984), and the general category of play activity (Tremblay, Strain, Hendrickson, & Shores, 1980). These studies and others (e.g., Hendrickson,

The effectiveness of classroom interventions is likely to be increased by more careful definition and control of setting events.

the probability of the occurrence of the conditional behavior. By clarifying this relationship with an advance organizer (e.g., “If you finish your English assignment correctly by 11:00, you may spend 10 minutes at the computer center”), the teacher may facilitate establishing the contingency arrangement between English work completed and computer time.

As another scheduling example, consider the fact that the time a student is engaged academically in appropriate work is related to productivity and achievement, whereas on-task behavior per se is not necessarily related to productivity. To arrange the setting to improve the chance of increased engaged time, the teacher will need to schedule in advance sufficient time for practice as well as select those materials or instructional arrangements that increase the student’s opportunity to respond (Lentz & Shapiro, 1986).

Social behavior. In our research on social interaction several classroom settings events have emerged as important to designing programs for developing appropriate social interaction among young, severely handicapped children as well as among handicapped children and their normally developing peers including: type of toys (Hendrickson,

Strain, Tremblay, & Shores, 1982) have demonstrated that the power of children’s initiations to engage in play (i.e., provide discriminative stimuli) and receive positive, reciprocal responses by peers (i.e., consequences) is enhanced by several setting events.

Measurement and Setting Events

This proposed ecological assessment/intervention model expands the basic ABA investigative framework to include empirical documentation of the effects of setting events within classroom and school ecologies. Within the current paradigm the breadth of traditional ecological assessment/treatment attempted within the educational arena is curtailed and in concert with recommendations for educators to limit their investigations to school environments (Wiederholt, Hammill, & Brown, 1983). Although our specificity and delimitation of parameters improves the potential for identifying and establishing more powerful ecological interventions, the concerns of Cantrell and Cantrell (1985) for selecting appropriate variables to measure as well as for choosing appropriate observation and measurement metrics (Gable & Trout, 1985) remain.

Numerous researchers (e.g., Kazdin, 1985; Voeltz & Evans, 1982; Willems, 1974) have discussed the need to consider selection and definition of target behaviors (dependent variables) in light of: (a) their relevancy to daily functioning, (b) the possibility of collateral behavior change (e.g., Hendrickson, Gable, Hester, & Strain, 1985), (c) the reciprocal nature of behavior (e.g., Tremblay, Strain, Hendrickson, & Shores, 1981), (d) the potential for unanticipated effects (Willems, 1974), (e) the possibility that a behavior may be part of a constellation or syndrome (Kazdin, 1985), (f) the need to evaluate treatment generalization and setting events that may promote the transfer of learning (Hecimovic et al., 1985), and (g) the fact that responses may be independent variables as well as dependent variables (Staats, 1971). In spite of these issues, as Willems (1974) notes with simplistic beauty, data are needed to reduce the mystery.

Summary and Conclusion

Previous researchers have discussed the potential significance of the ecological variables of setting events (e.g., Kantor, 1959; Wahler & Fox, 1981), and we have hypothesized that beyond controlling the stimulus-response-consequence dimensions of classroom instruction, those ecological variables over which the teacher may exert greatest control are setting events. The importance of investigating setting event effects is primarily to account for sources of variability. Laboratory research has the advantage of controlling many of these events through the nature of the laboratory. Those of us teaching and conducting applied research do not have the laboratory advantage. Sidman (1960) points out that variability is error and that the major focus of research is to lessen error of experiments, thereby increasing the prediction and control of targeted behavior. Similarly, in the student's natural ecosystem, the goal is to identify the factors that impinge on successful organism-environment interface. Measurement and discussion of setting events typically have consisted of describing contexts narratively, not numerically. Generally, the setting events defined

along the dimensions of where, what, when, and who, factors that are tangential, but not directly accounted for, in the typical ABA analysis of stimulus-response-consequence. The expanded paradigm becomes setting events-stimulus-response-consequence. Whereas ABA procedures have been proven effective when the variables within the paradigm are defined carefully, the effectiveness and efficacy of classroom interventions are likely to be increased by more careful definition and control of setting events.

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