CHAPTER 6

Behavior Theory for the Study of Psychopathology

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THE REINFORCEMENT CONTINGENCY: A CRITICAL BEHAVIOR THEORY CONCEPT FOR UNDERSTANDING ABNORMAL BEHAVIOR

Like normal behavior, abnormal behavior is maintained by its reinforcement contingencies (see Salzinger, 1972, for behavior theory models for different types of psychopathology). The concept of the reinforcement contingency is basic to behavior theory (Skinner, 1953). It delineates the three-part relationship existing between the emission of behavior and its controlling stimuli as follows: Operant behavior (behavior that operates on the environment) is emitted under particular stimulus conditions called discriminative stimuli and is followed by reinforcements, which are consequences affecting the probability of emission of additional responses belonging to the same class of behavior. The concept of drive will assume less importance in the context of this chapter for two reasons. First, it is more important in the acquisition than in the maintenance of behavior. Furthermore, it has more of an effect when the reinforcements are primary than when they are conditioned (although there is some evidence for the existence of conditioned drives for conditioned reinforcements, Eisenberger, 1970). Since the maintenance of most human behavior is largely a function of conditioned reinforcements, the importance of drive is lessened.
THE DISCRIMINATIVE STIMULUS AS A CONTROLLING VARIABLE FOR ABNORMAL BEHAVIOR OUTSIDE THE LABORATORY

Man is reinforced for different behaviors in different situations. This is critical for the definition of what constitutes abnormal behavior and for judging the degree of that abnormality. Patients, like normal individuals, do not behave in the same way with all people in all situations. The most disturbed patients do not always manifest abnormal behavior.

Identifying Discriminative Stimuli

More often than not, the therapist evaluating a patient has insufficient information about the situation in which the behavior is emitted. The therapist dealing with an outpatient must infer the discriminative stimulus for a particular instance of behavior from the patient's verbal and nonverbal behavior during the interview situation. The characterization of the discriminative stimulus in this case depends not only on the patient's memory of his past behavior in a specific situation, but also on the therapist's behavior during the interview.

One form of psychotherapy that attempts to deal explicitly with the discriminative stimulus is desensitization (Wolpe, 1958). In using this technique the patient learns to imagine the situation in which his abnormal behavior (anxiety) typically occurs. The technique assumes that stimulus generalization takes place from the imagined to the real situation. Although Wolpe argues that desensitization acts on classically conditioned responses mediated through the autonomic nervous system, others (e.g., Salzinger, 1969) have suggested that this type of therapy also conditions operant responses (primarily approach responses to feared objects and situations) mediated by the skeletal nervous system.

The inadequacies of record keeping in most state hospitals, where we care for the vast bulk of the patient population, make it impossible to describe accurately the various situations, or discriminative stimuli, that exist at the time the patient emits specific types of behavior. At best, these stimuli are recalled haphazardly by diverse staff members during the course of a case conference or are gleaned from incomplete and biased case records. On the basis of this type of information, clinicians must make decisions regarding the patient's diagnosis, his course of treatment, and his length of stay at the hospital.

Some Studies of the Effect of Discriminative Stimuli

Despite the usual difficulties in identifying the discriminative stimulus, Zarlock (1966) showed that it can have a profound effect on the behavior
of even the most disturbed psychotics. He studied the effect of the discriminative stimulus on the behavior of acutely disturbed schizophrenics. They had been hospitalized at least once before, were restricted to the ward, and required tranquilizing drugs. None had pronounced difficulty with either speech or locomotion. A large room in the ward served as an experimental chamber. It was modified four times during the course of each day, for a period of 10 days. For one one-hour period the room provided “recreational” discriminative stimuli; for another, “occupational” discriminative stimuli; for a third, “social” discriminative stimuli; and for a fourth, “medical” discriminative stimuli. The room door was locked under the medical condition only. Patients received neither verbal instructions nor verbal reinforcements in the various conditions. They were assigned randomly for one hour each day for 10 days to each of the four conditions.

Zarlock observed both verbal and nonverbal behavior. Pathological verbal content included hallucinations, delusions, somatic complaints, incoherent speech, and bizarre expressions. The total number of pathology statements varied from 3 during the recreational situation, to 12 in both the occupational and social situations, to 324 in the medical situation. The four situations also produced differences in the patients’ activities. They devoted 95% of their time to games in the recreational situation; 90% to work in the occupational situation; 90% to making small talk in the social situation; and, finally, 90% to a discussion of personal problems in the medical situation. The amount of time the patients spent communicating among themselves varied from 10% in the medical situation to 70% in the occupational situation and 90% in the recreational and social situations. Bizarre behaviors such as praying aloud and gesturing occurred 33 times in the medical situation, as opposed to 2 times in the recreational and occupational situations and 4 times in the social situation.

The medical situation corresponds most closely to the condition in the state hospital. We do not imply here that the hospital initiates the peculiar and bizarre behavior. It is clear, however, that the discriminative stimuli which it provides promote “sick” behavior; other situations could promote behaviors incompatible with “sick” behavior, even for such seriously disturbed patients as schizophrenics. The extent to which research findings reflect the environment of the patient must be determined and taken into account before making general inferences about the behavior of the schizophrenic.

Higgs (1970) compared a group of schizophrenics remaining in an old ward with another group shifted to a newly constructed one. He used a psychiatric rating scale and a measure of behavior based on time sampling. Three weeks after the move, 68% of the shifted group improved according to the psychiatric rating scale and 80% improved according to the be-
havioral observations. The group that remained in the same quarters maintained their scores on both measures. Application of the time sampling procedure eight weeks after the move showed that the change lasted, since 78% of the moved patients still manifested improvement.

The environment that acts upon patients is of course not restricted to architecture. Studies of the effect of group constitution on the behavior of normal individuals and patients (Sommer, 1967) are beginning to yield significant findings. Griffit and Veitch (1971) found that high values of temperature and population density increased the expression of negative feelings and aggressive mood on paper and pencil questionnaires.

In addition to these rather gross environmental variables, more subtle discriminative stimuli influence the behavior of schizophrenics. Braginsky, Grosse, and Ring (1966) and Braginsky, Braginsky, and Ring (1969) showed that verbal discriminative stimuli modify the amount of "mentally ill" behavior that patients emit as a function of their perception of the relationship between such behavior and discharge from the hospital. Two male patient groups (88% psychotic and 12% neurotic) were given the same 30 items from the Minnesota Multiphasic Personality Inventory. One patient group ("old-timers") had been in the hospital for more than three years, whereas the other patient group ("short-timers") had been there for less than three months. The patients received the same test in two different forms. The investigators administered the first form, the "Mental Illness Test," telling the patients that its purpose was to discover how mentally ill they were, with the larger number of "true" responses indicating greater illness and therefore a longer period of hospitalization. They administered the second form, the "Self-Insight Test," telling the patients that it revealed the extent of the patient's knowledge of himself, with the larger number of "true" responses indicating less mental illness and shorter hospitalization.

The results were quite clear. The old-timers made significantly more "true" responses for the Mental Illness Test than for the Self-Insight Test, whereas the short-timers made more "true" responses for the Self-Insight Test than for the Mental Illness Test. In addition, while the old-timers made more "true" responses than the short-timers for the Mental Illness Test, they made fewer than the short-timers for the Self-Insight Test. Furthermore, a control group of old-timers given the tests without information about the relationship of the responses to their state of health and discharge from the hospital performed the same way for the two differently labeled tests, the number of "true" responses on each of the tests being approximately half way between the number of such responses made by the patients given the special instructions.

Unquestionably, patients are differentially responsive to instructions,
again showing that such discriminative stimuli affect even seriously disturbed patients hospitalized for long periods of time. It should also be noted that the two groups of patients were influenced differentially by the same instructions, indicating that ostensibly identical reinforcement contingencies are in fact different for various groups of patients. Patients who had not been in the hospital for a long time responded to the idea of release from the institution as a positive reinforcement, whereas old-timers viewed it as a negative reinforcement. Since the different groups of patients found different types of events positively reinforcing, they acted in accordance with the discriminative stimuli for those reinforcements.

In the same context, Grayson and Olinger (1957) asked psychiatric inpatients to answer the MMPI “the way a typical, well adjusted person on the outside would do.” Seventy-three per cent showed a change in the direction of more normal responses, although in fact only 11% reached a so-called normal level (cf. Chapter 24 of this volume).

THE DISCRIMINATIVE STIMULUS AS A CONTROLLING VARIABLE FOR ABNORMAL BEHAVIOR STUDIED UNDER EXPERIMENTAL CONDITIONS

Fuhrer and Baer (1970) found less differential conditioning of the galvanic skin response (GSR) in schizophrenics than in normal individuals when the conditions of the experiment were kept the same for the two groups. However, when provided with additional discriminative stimuli, in the form of instructions and some training about the differences in CS+ (the conditioned stimulus paired with the unconditioned stimulus) and CS− (the conditioned stimulus not paired with the unconditioned stimulus), the schizophrenics no longer manifested less differential conditioning than the normals.

Neale, McIntyre, Fox, and Cromwell (1969) demonstrated the effect of competing discriminative stimuli on schizophrenics' performance. When schizophrenics had to report the presence of a letter in a one-letter display, they were as effective as normals; when they had to do so for an eight-letter display, their performance was worse than that of normals. Although the authors ascribed this effect to differences in span of apprehension and one can speak of differences in information-processing time, what underlies these explanations is the increased number of different discriminative stimuli competing for control of the patients' responses. In other words, the schizophrenics were more subject to increased stimulus control by irrelevant or distracting discriminative stimuli.

The use of a disease model for abnormal behavior has led to a de-
emphasis of the role of discriminative stimuli in the environment. However, the experimental literature shows that physiological measurements are significantly affected by the environment (e.g., Shapiro & Schwartz, 1970).

Gaviria (1967) presented prerecorded sentences to normal subjects: “May I have your attention, please?” as spoken by the listener himself, his spouse, an unfamiliar male voice, and an unfamiliar female voice. The rate of habituation of skin resistance and blood pressure was slowest for the subject’s own voice and the spouse’s voice and faster for the unfamiliar voices. One can expect, therefore, that the instructions read to a subject in an experiment will influence his subsequent physiological behavior.

McBride, King, and James (1965) used the distance of the experimenter from a normal subject and the type of visual regard as discriminative stimuli (CSs?). As the experimenter-subject distance decreased, the galvanic skin response increased. The increase was greatest when the experimenter approached the subject frontally.

Finally, Hicks (1970) instructed normal subjects to identify the words exposed to them in a typical perceptual defense paradigm. Some of the four-letter words shown were taboo, and some were neutral. The data consisted of detection rate, vasoconstriction, heart rate, and palmar conductance responses. The three experimental conditions may be viewed as different discriminative stimuli.

1. Automated—a sign on the door asked the subject to turn on a tape recorder, which supplied the instructions as read by an experimentally naive male. The tables were covered with surgical sheets, and the recording apparatus was connected to the subject by a male experimenter dressed in a surgical gown, with mask, cap, and sunglasses.

2. A reserved female experimenter—subjects described her as “reserved, business-like, unimpressive, and formal”; there were no surgical sheets on the table.

3. A “sociable” female experimenter—subjects described her as “amusing, friendly, surprising, indifferent, and crass.”

Both the automated and the reserved experimenter’s groups produced a significantly larger number of correct guesses for the socially acceptable than for the taboo words. The sociable experimenter’s group, however, failed to show similar differences; the data, on the contrary, tended to reveal a higher rate of correct identification of the taboo than of the socially acceptable words. As to the physiological measures, heart rate and sweating increased for the taboo words in the automated and in the reserved experimenter’s group but decreased in the sociable experimenter’s group. Furthermore, vasoconstriction occurred for the taboo words in the automated
group only. Thus we find that the experimenter, even though naive to the hypothesis being tested, is a critical variable not only with respect to overall level of performance but, even more important, with respect to the differences obtained among responses relative to different classes of stimuli.

REINFORCEMENT OF ABNORMAL BEHAVIOR OUTSIDE THE LABORATORY

Behavior has consequences, and these consequences influence the probability with which similar behavior will be emitted in the future. It is not sufficient to state that the reinforcement parameter is being kept constant since it may well interact with the function that one is trying to study. Experimenters sometimes state that they are leaving out the reinforcement variable by providing no consequences for patients’ responses. However, a condition of no reinforcement is an extinction period, which has its own special characteristics. Extinction is usually characterized first by an increase in response rate and later by a decrease. Furthermore, extinction often generates emotional behavior. Therefore the idea that one is controlling for reinforcement is not correct; by omitting reinforcement from an experiment one is testing the behavior in question under one special set of circumstances.

The comparison of contrasting groups such as schizophrenics and normal individuals introduces still another complication. Even the delivery of reinforcement in equal measures does not guarantee equal effects, for the two groups may also differ in the way in which they respond to the same type of reinforcement.

Attention Value of Reinforcement

Groups may differ from one another in terms of the attention value of the reinforcement. Many theories of schizophrenia involve in an important way the concept of an attention deficit (e.g., Salzinger, 1971; Venables, 1964; and also Chapter 14 of this volume; Yates, 1966). The existence of such a deficit would be expected to manifest itself, among other ways, in the schizophrenic’s response to reinforcing stimuli. Apparent differences in conditionability, for example, may reflect either a real difference, a difference in the attention value of the reinforcement, or even a difference in its detectability.

One solution for this problem might be to reinforce both populations to the same level of performance before bringing to bear the particular variable of interest in the experiment. This might well be more appropriate than the customary way of equating two groups, that is, in terms of sameness of procedure, independently of initial performance level.
Reinforcement History

Another important reason for a differential response to stimuli is the reinforcement history that the person brings to the situation. Ullmann and Krasner (1969) view schizophrenia as essentially the product of extinction of attention responses to social stimuli, such stimuli being of course among the most potent reinforcements for normal persons.

We must consider the relationship between the behavior reinforced in the environment in which the patient lives and that emitted during testing or the interview. Differences in test behavior are bound to reflect what is reinforced on the ward; take, for example, patients who live on a chronic back ward, where minding one's own business is the behavior most highly prized, as opposed to patients living on acute wards, where participation is more often sought.

Reinforcement during the Course of Experiments

Reinforcements administered by the experimenter are usually better specified than past reinforcement history variables, or at the very least more precisely determined before, and independent of, the behavior that the patient brings to the experiment. Nevertheless, some very important periods of time, such as those involved in bringing the patient to the laboratory, the rest periods in the middle of the experiment, the conversation which takes place in the course of inviting the patient into the experimental room and making sure that he has heard and understood the instructions, provide a great deal of opportunity for the reinforcement of various response classes in different patients and by different experimenters or interviewers.

Reinforcement in the Patient’s Living Environment

Goffman (1961) characterizes the hospital, including the state hospital, as a “total institution” with the power to mete out privileges and punishments or, in the language of behavior theory, positive and negative reinforcements. He points out that some of the events that become positive reinforcements for patients do so only because they are objects and behaviors of which the patients have been arbitrarily deprived and to which they formerly had free access. In these circumstances the conditions of delivery of what is ordinarily a positive reinforcement can become aversive because they constitute a reminder of the deprivation of these reinforcements.

Interesting and successful attempts to change the arbitrary character of the delivery of positive and negative reinforcements in the total institution have been achieved by establishing “token economies” in the hospital. There are small models of relatively closed social and economic systems in which all the patients function according to the rules of the system. Token
economies where reinforcements are meted out according to specific schedules and behavior contingencies are quite effective in the control and modification of the behavior of very disturbed patients (Atthowe & Krasner, 1968; Aylon & Azrin, 1968; Davison, 1969).

The operation of the total institution differs critically from that of the token economy. In the token economy "healthy" behaviors are defined and brought under the control of reinforcement contingencies. Too often in the total institution the behavior reinforced by the staff is subservience, often involving behavior whose very emission is aversive to the patient. For example, the patient may have to ask for a cigarette despite the fact that the cigarettes were left specifically for him by his relatives or, more often than not, were even bought with his own money.

Also important is the attempt in the token economy to standardize the behavior requirements for the acquisition of reinforcement rather than to rely on the idiosyncratic and arbitrary requirements set forth by different members of the staff in the total institution setting.

Finally, both the behavior expected of the patient and the reinforcements he receives as a consequence of his behavior are essential to the patients' very existence in the token economy. Items such as bed and board are an integral part of the economy and must be earned by healthy active behavior. On the other hand, in the total institution the emission of important behaviors is usually unrelated to the custodial care of the patients.

**Reinforcement of Specific Behaviors**

Reinforcement procedures have proved to be effective in modifying abnormal behavior in less comprehensive situations as well. Aylon and Michael (1959) used avoidance conditioning to increase self-feeding in a patient who suffered from a severe eating problem and a correlated delusion of being poisoned.

Aylon, Haughton, and Hughes (1965) used reinforcement to produce the abnormal behavior of broom holding. The behavior was first conditioned and then extinguished. The psychiatrists, whose observations of the topography of the behavior alone omitted the discriminative stimuli and reinforcements operating during acquisition of the behavior, were entirely incorrect in their description of the etiology and subsequent development of the behavior. Clearly no observation of a patient's behavior that neglects to observe the stimuli preceding and following the behavior can be considered complete.

Salzinger and his colleagues (Salzinger & Pisoni, 1958, 1960, 1961; Salzinger & Portnoy, 1964; Salzinger, Portnoy, & Feldman, 1964) manipulated in an interview situation the behavior termed "shallowness of affect," which is prominent as a symptom in the diagnostic literature on schizophrenia (Zubin, Sutton, Salzinger, Salzinger, Burdock, & Peretz, 1961).
Although these studies were, strictly speaking, experiments, they are included here rather than in the following section, because the subjects considered them to be interviews and because they have important implications for the nonexperimental interview. The response of self-referred affect was reliably defined operationally as any statement beginning with the pronoun “I” or “we” and ending in a predicate referring to a state of emotion. In most of the studies, the interview was divided into three 10-minute periods: an operant level in which the interviewer asked questions of a general kind only and delivered no reinforcements; a conditioning period in which verbal positive reinforcement was delivered after the emission of every self-referred affect statement; and an extinction period in which the procedure was the same as in the operant level. The number of self-referred affect statements increased from operant level to conditioning and decreased to extinction. Thus it was clear that the degree of shallowness of affect in a patient depended on the interviewer’s response to such statements. An interview cannot be considered a nonparticipant method of obtaining information; it is a situation in which the observer, by means of his own behavior, determines, at least in part, what it is he will observe.

Two other findings are important in evaluating the validity of shallowness of affect as a characteristic of schizophrenia. The first relates to normal/schizophrenic differences. No differences in affect were found between normal and schizophrenic subjects during operant level or conditioning. However, when matched for operant level and number of positive reinforcements, the patients extinguished faster than the normals. It would seem that the particular response class used in the conditioning paradigm was not as important as its interaction with the rate of extinction (Salzinger & Pisoni, 1961).

The second finding relates to the oft-cited relationship between affect and prognosis. Salzinger and Portnoy (1964) found that patients who increased their rate of self-referred affect during conditioning had a higher probability of being outside the hospital after a period of six months than those who did not. Again we find that a reinforcement contingency is critical in the conclusions drawn about a characteristic in the behavior of a patient.

**REINFORCEMENT OF ABNORMAL BEHAVIOR EVOKED UNDER EXPERIMENTAL CONDITIONS**

**Interaction Effects Involving Reinforcement**

When considering the effect of reinforcement on specific experimental behaviors, we must take into account the situation from which the patient comes.
Eisenberger (1970), reviewing studies on social deprivation and satiation, showed that the delivery of social reinforcement during experiments produced a more powerful conditioning effect on normal subjects coming from a social deprivation condition than on those receiving a great deal of social reinforcement just before the experiment. The effect of the preceding condition (deprivation versus satiation) on conditionability is not always simple and straightforward. Although its effect was clearly demonstrated on choice behavior, it was equivocal when no choice was called for.

Another interaction is found between the effect of reinforcement and the type of environmental stress acting upon subjects. In a review of studies of environmental stressors with normal subjects, Wilkinson (1969) showed that, although motivation (reinforcement) usually mitigates the effect of stress on performance, as in the case of sleep deprivation, it does not do so when the stress is noise or the intake of moderate amounts of alcohol. In fact, in the latter conditions, increased motivation appears to reduce performance level.

Another source of interaction relates to the criterion that the subject sets for himself before making a perceptual response. Clark and his colleagues (Clark, 1966; Clark, Brown, & Rutschmann, 1967) examined the measurement of critical flicker fusion thresholds in schizophrenics from this point of view. The problem of response bias versus sensory sensitivity in psychophysical measurement raises questions about the validity of many generalizations found in the literature which describe schizophrenic performance as being inferior to that of normal individuals (cf. Chapter 10 of this volume). Such experiments must be redone under conditions in which the reinforcement parameter is systematically manipulated.

In one such experiment on reaction time in schizophrenics and normals (Klein, Cicchetti, & Spohn, 1967), negative reinforcement in the form of the experimenter’s verbal comments was contingent upon the subject’s performance. Under this condition the widely held generalization that schizophrenics react more slowly than normals did not hold up.

Differences between normal and abnormal behavior have been produced as well as eliminated by the inclusion of reinforcement contingencies. Hare and Thorvaldson (1970) showed that psychopaths do not differ from nonpsychopaths in their tolerance level for electrical stimulation under conditions of no reinforcement; however, the inclusion of a reinforcement contingency significantly increased the tolerance level for the psychopaths above that of the nonpsychopaths.

The Effect of Reinforcement on “Basic” Abnormal Behavior

Meichenbaum (1969) showed that the presence of difficulty of communication, typically attributed to schizophrenics (cf. Salzinger references previously cited on shallowness of affect), depends on the reinforcement
contingency operating on that behavior. He obtained a measure of “healthy talk” from the verbal behavior evoked in conversations and a measure of “abstractness” of interpretation from the verbal behavior obtained from proverb interpretation. He reinforced the healthy talk of schizophrenics in one group and the abstract interpretation in another in eight training sessions of 30 minutes each. He then tested for generalization between healthy talk and abstract interpretation and from these to the similarities test of the WAIS (intelligence test), to the Kent-Rosanoff word association test, and to talk between a trained and an untrained patient. The results were unequivocal. Both response classes increased in frequency. Generalization was also found between them. Finally, the proverb interpretation of schizophrenics was, after training, as abstract as that of the normal control group. Once more we find that even the most basic characteristics of psychopathology are modifiable by an appropriate environmental intervention.

SUMMARY

This chapter has argued in favor of a more comprehensive behavior theory approach to the analysis of abnormal behavior and therefore indirectly against the traditional medical model approach. It defined the critical behavior theory concept as the reinforcement contingency, consisting of the behavior itself, the stimuli that precede it (discriminative stimuli), and the stimuli that follow it (reinforcing stimuli).

This chapter discussed the control exerted over abnormal behavior by the discriminative stimulus outside and inside the laboratory. The problem of identifying the controlling discriminative stimuli for behavior was raised. A number of discriminative stimuli were cited as affecting the emission of behavior: the physical environment, the group constitution, the patient’s perception of his own behavior and the behavior of others, the instructions, and the experimental conditions. It was concluded that behavior must be tested under more than one discriminative stimulus condition.

The chapter went on to discuss the control exerted over abnormal behavior by the reinforcing stimuli both outside and inside the laboratory. It pointed out that reinforcement is always a variable—that it cannot be excluded and must therefore be identified and manipulated. Its relationship to behavior is not always simple because of differences in its interaction with other stimuli and with characteristics of the subjects, such as attention value and past reinforcement history. The reinforcing characteristics of the “total institution” and the “token economy” were described and compared to explain the differences in the functioning of patients in each
setting. A number of characteristics assumed to be basic to schizophrenia were shown to be modifiable by conditioning variables. And, finally, the problem of response bias versus sensory sensitivity in psychophysics was related to abnormal behavior.

We conclude that the medical model has failed because of its exclusion of the stimuli critical in the determination of behavior—and that behavior theory, in recasting psychopathology in terms of behavior, makes possible its study and its modification.

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