

Contingent Electric Shock as a Treatment for Severe Behavior Problems¹

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Electric shock can be an effective intervention for serious behavior problems that have proven refractory to other forms of treatment. This intervention should not be confused with medical treatments such as electroconvulsive shock (ECS). There are neither convulsions nor loss of consciousness as is often the case with ECS. The shock is delivered from a hand-held device sometimes referred to as a "shock stick." This device contains from three to five 1.5-volt flashlight batteries and it is most typically designed to deliver a peak shock of 1400 volts at 0.4 mA (Harris & Ersner-Hershfield, 1978). Shock is delivered through two protruding terminals located at one end of the stick and separated .5 in. from each other. The shock travels between these two points along the surface of the skin. Subjectively, the pain has been described as being similar to that experienced when one is hit with a leather strap or a willow switch. However, shock is not as dangerous as either of these events nor does it leave a durable, radiating pain. In fact, the pain is localized and stops as soon as the shock is terminated.

The clients for whom this treatment has most often been used are those labeled as autistic, retarded, or brain damaged. Some of these individuals exhibit self-injurious behavior, and it is this behavior that is most commonly treated with shock. Self-injury takes the form of head banging (against walls or sharp

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objects), which sometimes produces deep cuts; biting, which produces puncture wounds on the arms and legs and which sometimes involves fingers being chewed off or fingernails being pulled out; eye gouging, which can result in detached retinas and blindness; and striking the face with the knees or hands so that extensive bruising and occasionally a broken nose are produced. One child with whom we are currently working has hit his ears repeatedly so that they are swollen to the size of tennis balls. He has broken his nose and injured his kneecap by striking his face with his knee. Further, by repeatedly pummeling the side of his body with his elbows, he has produced kidney damage. Clearly, such behavior is dangerous, so much so that individuals exhibiting this behavior are usually institutionalized and often placed in physical restraints to prevent extensive self-inflicted injuries from occurring. Although shock has been used primarily to control this type of behavior, it is sometimes also used to control severe aggression or chronic, non-organically based vomiting.

In what follows, we shall discuss the procedural and ethical issues surrounding the therapeutic use of shock. Next, we shall examine the effects and side effects of this treatment. Finally, we shall outline some methods for producing generalization and maintenance of therapeutic gains that result from the application of this intervention.

PROCEDURAL AND ETHICAL ISSUES

One does not begin the treatment of severe behavior problems by using electric shock. Instead, a number of other procedures are tried first. More specifically, nonaversive or mildly aversive procedures are tried before introducing strong aversive procedures such as shock.

The initial treatment of choice is typically the differential reinforcement of other behavior (DRO), a procedure in which the client earns social and primary reinforcement for gradually extended periods in which no self-injury occurs. Unfortunately, this technique is time consuming and therefore difficult to implement on understaffed wards, particularly when the staff on such wards is unskilled in the behavior shaping techniques required by this procedure (Bucher & Lovaas, 1968). Nonetheless, DRO is the basic procedure involved in the treatment of severe behavior problems. Therefore, unless a sufficient number of competent personnel are available to provide the enriched environment that is the hallmark of a DRO contingency, treatment efforts will most probably fail.

If DRO used by itself is ineffective, then it may be combined with extinction—that is, the withholding of previously given reinforcement contingent upon the emission of the problem behavior. The rationale for using extinction is that, in many cases, problem behaviors such as self-injury are maintained by social reinforcement and therefore the withdrawal of that reinforcement should

eliminate the behavior (Lovaas, Freitag, Gold, & Kassorla, 1965; Lovaas & Simmons, 1969). Unfortunately, it is often difficult to identify the reinforcers that are maintaining the behavior. Further, since the behavior is likely to have a long history of intermittent reinforcement, it will be particularly resistant to extinction. In other words, extinction will require a long time to occur, and in the meantime, the individual may emit thousands of self-injurious responses (Lovaas & Simmons, 1969). This pattern heightens the risk of serious physical injury. In the same vein, an additional consideration is that the rate of self-injury often shows an increase, or "burst," at the start of extinction. This effect can be extremely dangerous in some cases of severe self-injury, for example, head banging or eye gouging. Indeed, the child described earlier, who did kidney damage by pummeling his sides, might very well die if allowed to engage in a prolonged extinction burst. A final factor mitigating against the widespread use of extinction has to do with the demoralizing effects of extinction on the treatment staff. Many staff find it aversive to stand by and do nothing while an individual engages in self-injury. Some staff will attend to the behavior either inadvertently or intentionally out of compassion. The resulting intermittent social reinforcement further compromises the effectiveness of extinction.

If extinction fails or is inappropriate, the next technique to be tried, in combination with DRO, is timeout. This procedure consists of removing all sources of reinforcement for a specified period of time whenever the client emits the maladaptive behavior. This goal is usually achieved by briefly confining the client to a barren room. The main advantage of timeout is that it is quite explicit and relatively easy for the staff to carry out. Since the individual is confined in a room, the staff is not directly exposed to hundreds of instances of self-injury while at the same time being required to withhold all attention. On the other hand, the timeout procedure requires a long time to work and frequently generates a burst of responding when it is first employed. In this respect, timeout shares the same disadvantages as extinction and, like the latter procedure, would generally be limited for use with self-injurious behavior of mild intensity.

Timeout is also inappropriate if the client's self-injury is being maintained by negative reinforcement (Carr, Newsom, & Binkoff, 1976). In lay terms, some clients "want" to leave the situation they are in; their self-injury serves as an escape response. Therefore, sending them to timeout contingent on self-injury would only strengthen the behavior, making the problem worse. We must recognize that many situations regularly set off (i.e., are discriminative for) self-injurious behavior because they are frustrating or aversive to the client. For example, a school curriculum that is too difficult may induce chronic frustration and escape-motivated self-injury. The solution is to redesign the curriculum so that it can be mastered in a step-by-step fashion without repeated failure. One way of achieving this goal is to introduce well-designed fading programs that

result in errorless or near errorless discrimination learning (e.g., Etzel & LeBlanc, 1979). Other situations that frequently contribute to the maintenance of self-injury include crowded wards and the presence of untrained personnel who make unreasonable demands on the client or inadvertently reinforce self-injury. Here, the solution might involve some simple environmental engineering. That is, one might put the client on a less crowded ward with an enriched environment that provides opportunities for more normal social development. Part of this enriched environment should include the presence of personnel who have been trained to develop and carry out an array of educational and social skills training programs.

If the above procedures are ineffective, the next intervention that can be combined with DRO is positive practice overcorrection (Azrin, Gottlieb, Hughart, Wesolowski, & Rahn, 1975). In this procedure, the individual is required to practice a more appropriate alternative behavior to the one being suppressed, each time the inappropriate behavior is exhibited. Although overcorrection is a promising treatment modality (see Chapter 6), it has two potential disadvantages. First, the procedure can be time consuming and require many staff. Second, some individuals will resist the positive practice procedure. When this happens, force may be exerted in proportion to the client's resistance, an escalation that can lead to physical injuries. Such outcomes must remind practitioners that any procedure is capable of being abused. Milder forms of overcorrection may appear to be relatively nonaversive, but this should not blind personnel to the fact that overcorrection, under certain circumstances, functions primarily as a punishment procedure.

If the procedures described in the preceding discussion are ineffective or inappropriate for specific clients, electric shock may be considered as a final alternative.

Preliminary Considerations in the Use of Shock

At the outset, three questions must be answered. First, when should the shock procedure be considered? Second, who will be accountable for the implementation of the procedure? Third, who will carry out the procedure? We have already answered the first question. Shock should be considered only after other procedures have been tried without success or are deemed inappropriate. With respect to the second question—namely, accountability—it is necessary to establish a committee of professional people to oversee the scientific and ethical aspects of treatment. This committee is normally composed of a teacher, nurse, psychologist, and physician, but others may be added as necessary. The physician should be consulted and a medical examination performed to verify that

the individual to be treated does not have a cardiac, respiratory, or any other condition that might be exacerbated by shock treatment. Following this examination, the physician should file a written report documenting that the client does not have any physical condition that might contraindicate the use of shock.

The third question concerns who will oversee the implementation of the procedure—that is, who will be chosen to supervise and train other people, such as ward aides and parents, in the use of shock? It is critical that the appointed individual have an appropriate professional background, including a thorough familiarity with child psychopathology and its treatment as well as academic and/or supervised experience in applying principles derived from the psychology of learning. The individual should know the research literature on punishment with humans and lower organisms and should have some skill in experimental design and the use of techniques for objective evaluation of treatment outcomes. A general knowledge of behavior modification is not sufficient, however. The individual must have had hands-on experience in using shock treatment for self-injury under the tutelage of an expert. Since DRO should be part of any competently run shock program, the individual must also have had some background in educational planning and curriculum development so that he or she will be prepared to replace self-injury, once it is suppressed, with more socially appropriate behaviors. This combination of skills is rarely found in the school or ward physician. For that reason, institutions that automatically appoint such individuals to oversee the day-to-day treatment are making a serious error of judgment that may well adversely affect treatment outcome. The professional most likely to have the requisite background is a clinical or educational psychologist. Finally, since shock treatment does not lend itself to a cookbook type of approach, much clinical judgment and sensitivity are required in implementing this procedure. Therefore, the individual who carries out the treatment must also be examined from the standpoint of his or her personal limitations. How will the individual react to the intense social pressures brought to bear by a desperate family or a ward staff reeling from repeated crises? Does the individual have a history of being short tempered when under pressure? Is there anything in the individual's behavior suggesting harshness or sadism? These are difficult questions to answer, but they cannot be ignored. Few individuals have the strength to withstand these pressures. Therefore, what is needed is a fail-safe mechanism. For example, other experts as well as members of the committee should monitor the supervisory agent, offering him or her social support as well as corrective feedback when necessary.

Since the supervisory agent will run only a small portion of the treatment sessions, care must be taken in selecting "line staff"—that is, those individuals who will interact with and treat the client on a moment-to-moment basis. It is

imperative that the supervisory agent and the line staff already have a good working relationship and are able to communicate with each other easily. In the case of a ward situation, line staff must know the client well so that they can provide effective, individualized educational programming. These staff should have 6 months or more tenure at the institution so that they are knowledgeable about daily routines and institutional protocol. The use of transient staff should be avoided so as to reduce the risk of confusion and inconsistency. Finally, as was the case with selecting a supervisory agent, great care must be taken in choosing line staff who have the appropriate personal qualities. Staff who respond angrily to pressure or who are prone to harshness should not be part of the treatment team. Judicious selection of staff minimizes the possibility of abuse.

Selecting Behaviors for Treatment

The next issue to be considered concerns which behaviors are to be targeted for treatment with aversives. Three ethical principles are relevant to this issue. First, aversives such as shock are only justified if the *individual* is the primary beneficiary of treatment. That is, the procedure should never be used solely for the convenience of the institution at which the individual resides (Martin, 1979). Second, the use of shock is justified for certain classes of behavior only. One class involves those behaviors that pose threats to the client's biological survival. Certain forms of severe self-injury, such as head banging or ingesting sharp objects, fall into this category. Another class of behaviors would comprise those that endanger the client's social, emotional, and intellectual growth to a degree that ensures lifelong institutionalization. The issue here is one of human dignity, and the argument is that it is appropriate to use shock to eliminate those behaviors that act to keep the individual in a regressed and ineducable state leading to permanent hospitalization. A final class of behavior concerns those that involve serious threats to others who are physically weaker than the client (e.g., a younger sibling) and whose safety would therefore be in jeopardy if the behavior problem were not suppressed. Severe forms of aggression fall into this category. The third guiding principle is that when shock is used, it must entail a small amount of pain and discomfort relative to the amount of pain that would result if the behavior problem were left untreated. The key question is how long treatment will take (Baer, 1970). In the case of severe self-injury, a small amount of pain resulting from brief, effective shock treatment is justifiable if one considers the lifetime of pain in the form of physical restraint and drug-induced stupor that would occur if the behavior were left untreated. By the same token, shock treatment is warranted for high-frequency aggression, such as that involving severe biting of others, when the only other alternatives are physical restraint, forcing the client to wear a face mask, extraction of the teeth, or psychosurgery. Finally, shock is indicated in the case of chronic, uncon-

trollable ingestion of dangerous objects that necessitates multiple abdominal surgeries.

Baseline Evaluation and Consent Procedures

Once it has been decided that shock may be appropriate, it is critical to set up evaluation procedures to assess the severity of the problem and to monitor the effectiveness of the treatment intervention. The first step is to take a baseline of 1–2 weeks duration in order to determine if there are significant trends in the rate at which the client is displaying the problem. For example, if there is a declining rate, aversive procedures may be contraindicated since the problem may disappear spontaneously with time. If, however, the rate is stable or increasing, then we may seriously consider shock treatment. At this point, the committee should alert the parents of the client and the person in the institution who is legally and morally responsible for treatment, which in most cases will be the school principal or the medical director.

The client's parents are asked to give their consent for the shock procedure but only after they have been fully informed about the treatment to be undertaken. Informed consent has several components. First, the parents are asked to read objective material relevant to aversive conditioning. Second, they are asked to bring up any points that they do not fully understand; such points are elaborated on by the committee members until it is clear that each parent comprehends the material. Third, all possible deleterious effects of the treatment are explained in a straightforward manner. Fourth, the parents are informed about the time and place of treatment sessions. Both they and all committee members may see any treatment session. Fifth, the parents and members of the committee are invited to experience the shock. There are good reasons for this latter component. Specifically, many parents feel considerable guilt about employing such a procedure; others attribute a mystique to the procedure that may lead to confusion and unrealistic expectations. Once the parent experiences the shock, he or she will be less anxious and more objective about the intervention. Put another way, the parent learns that there is no magic involved in this procedure.

Finally, one should consider alerting the local news media and selected individuals in the community. The reason for this is that shock involves behavior control, and in a democratic society, important decisions about behavior control are made by the community at large. Therefore, the community must have input. This process can be viewed as one of reciprocal education. The community learns about the complexities of treatment intervention for serious behavior problems. In turn, professionals benefit from the public feedback and discussion that engenders a greater sensitivity to and awareness of community standards and concerns.

Specific Intervention Procedures

We may briefly illustrate the use of shock within the context of treating a self-injurious client. It is worthwhile to emphasize again at this point that shock intervention is an involved procedure. A cookbook approach is not possible. One cannot learn to use shock in a professional manner simply by reading about it in a book and then applying it. There is simply too much clinical judgment and sensitivity required. Therefore, what follows is not a fixed set of procedures but rather some useful guidelines that summarize our clinical experiences with shock treatment.

To begin with, as soon as the client hits him- or herself, the shock stick is applied for 1 or 2 sec on the client's leg or arm. Simultaneously, the therapist shouts "No!" Typically, the client will now delay the next self-injurious response for a period of 5–30 sec. During this delay, the client should receive a great deal of reinforcement for non-self-injurious behavior. That is, a DRO contingency is put into effect as soon as the client stops the self-injury. When the next self-injurious response is made, the procedure is repeated. This causes an even greater delay. After 5–10 shocks, the rate of self-injury should be virtually zero, at least in one situation. However, if the client should be put in a new situation, there may be no generalization. That is, the client may continue to engage in self-injury, a problem that is discussed at length later. In general, unless there is a marked decrease in the rate of self-injurious behavior in at least one situation in the presence of at least one therapist following 5–10 shocks, the procedure will probably fail and should be discontinued (Lovaas & Newsom, 1976). In consulting work, we have seen cases in which a thousand or more shocks have been applied with minimal effect. This level of shock use violates the ethical dictum that the amount of pain due to treatment must be less than the amount of pain that the client would experience if the problem behavior were left untreated. Professionals who discover such a situation have a legal and moral obligation to make a full report of such misuse to the relevant authorities.

A number of aspects to the shock procedure outlined in the preceding discussion merit further consideration. The most important of these are the following.

1. The suppression of the target behavior following shock treatment will be temporary unless reeducation of the client is attempted. That is, problem behaviors, however bizarre, do serve a function, and if the client is not taught some appropriate, alternative way of satisfying this function, he or she is almost certain to return to the problem behavior at some time in the future. That is why it is essential that DRO form the basis of any remediation program. Since there is typically considerable suppression of the target behavior at the start of treatment, it is best to begin to replace this behavior with more appropriate alternatives at this time. Those clients who do not have alternative behaviors to

replace those that have been suppressed must be taught such behaviors. Consider the case of developing alternatives to replace self-injury. The best strategy to use in selecting alternatives is to consider the communicative or functional properties of the behavior. Self-injury can serve at least three functions: attention getting, escape, and self-stimulation (Carr, 1977). Some clients engage in self-injury because the behavior is maintained by intermittent social reinforcement from adults or because the behavior is effective in getting various types of reinforcement reinstated (Carr & McDowell, 1980; Lovaas, Freitag, Gold, & Kassorla, 1965; Lovaas & Simmons, 1969). In such cases, the self-injury communicates the message "Pay attention to me" or "Give me back the reinforcer you took away." An effective treatment strategy might therefore be to teach the client to make specific verbal requests for those reinforcers that appear to be sought after. Alternatively, in the case of nonverbal children, the critical reinforcers may be presented at times when the client is not exhibiting self-injury. In this manner, more appropriate behavior will be strengthened and the maladaptive behavior will decline in frequency.

Some clients engage in self-injury because the behavior is maintained by negative reinforcement in the form of escape from an aversive situation (Carr *et al.*, 1976). In such cases, the self-injury communicates the message "This task is too difficult for me; let me out of here," or "I am afraid," or "I don't want to be in this situation anymore." These messages suggest several plausible alternative behaviors that can be taught. First, the client can be taught to verbalize that the task is too difficult, at which point the teacher should respond by breaking the task down into simpler components, thereby reinforcing the verbalization. Second, the client can be taught to relax in the feared situation by engaging in deep breathing exercises (Creedon, 1975). Third, the client can be taught an appropriate, alternative escape response whereby he or she is permitted to leave the aversive situation whenever this response is made (Carr, Newsom, & Binkoff, 1980).

Finally, some clients engage in self-injury because the behavior is maintained by intrinsic reinforcement; that is, the behavior is self-stimulatory in nature (Berkson & Mason, 1964). In such cases, the self-injury may be communicating the message "My environment is unstimulating/boring." An effective treatment strategy here might be to provide the client with toys or other activities that increase the level of sensory stimulation available to the client (Collins, 1965). In sum, by isolating the specific function that each instance of self-injury appears to serve, the therapist has a basis for deciding which alternative behaviors should be trained and reinforced in order to replace the self-injury as shock treatment is faded out.

2. The therapist who administers the shock should also experience it at the start of each treatment session. Such an experience will serve to remind the

therapist that the procedure being used is a powerful one with some degree of pain associated with it. Thus, only the minimum number of shocks necessary to achieve the treatment objective should be applied.

3. The behavior to be punished must be defined operationally in order to avoid any confusion or misuse with respect to the shock procedure. With respect to *misuse*, one must remember that reinforcement principles apply to therapists as well as clients. Thus, therapists who discover that shock is a potent means for controlling one problem behavior may be reinforced for using shock and tempted to apply the procedure to a wide variety of other problem behaviors not specified in the original treatment plan (Baer, 1970). The solution to this difficulty lies in formulating a written document at the outset of treatment that specifies which behaviors are to be subject to shock and how other problem behaviors are to be treated. This document (which should be part of the informed consent agreement) must be signed by the committee members, the parents, and the director of the institution at which the treatment is taking place. With respect to *confusion* regarding the use of shock, there is at least one instance in which it will be necessary to define the target behavior more explicitly than usual. The instance to which we refer concerns the treatment of chronic, non-organically based vomiting. In this case, it is *not* the vomiting behavior per se that is punished but rather the observable *precursors* of this behavior (Kohlenberg, 1970; Lang & Melamed, 1969; White & Taylor, 1967). The shock may be applied, for example, upon observing a coughing gesture (White & Taylor, 1967) or a visible abdominal contraction (Kohlenberg, 1970). These behaviors rather than the vomiting per se are punished, and this must be made clear to all therapists so as to avoid confusion.

4. Shock must be applied *immediately* following the occurrence of the target behavior in order to be maximally effective. There is some evidence that shock is still effective with delays of 30–35 sec (Tate & Baroff, 1966); however, we do not recommend delayed punishment, since the chances are too high that at the end of the delay, when shock is applied, the client may no longer be exhibiting the problem behavior. In this case, appropriate behavior may inadvertently be punished, and the contingency between maladaptive behavior and shock will be difficult for the client to learn. Immediacy is particularly critical in the case of lower functioning clients, who are often involved in shock programs. Such clients typically have great difficulty in learning delayed contingencies.

5. It is better to use a few painful shocks than many mild shocks. With mild shock, there is considerable risk that the client will adapt to the stimulus and the treatment will therefore be ineffective. Also, the shock should be introduced from the beginning at full strength. Research evidence suggests that gradually increasing the intensity of a punishing stimulus over time does not produce as much response suppression as when the punishing stimulus is introduced at full intensity right from the start (Masserman, 1946; Miller, 1960). In other words,

the sudden introduction of shock at full intensity is less likely to result in adaptation effects.

6. A shock duration of .5–2 sec has been found to have adequate suppressive properties (Bucher & Lovaas, 1968; Risley, 1968; Tate & Baroff, 1966).

7. The shock is applied to a fleshy area of the body, such as the outer thigh, upper arm, or buttocks. In order to avoid adaptation effects, the application of shock is varied across different body parts (e.g., left thigh, right arm, left buttock). Shock is never applied to the face, abdomen, or chest. It is important to note that the case of the shock stick is connected to one of the electrodes. Therefore, if the client should touch the case while being shocked, the current path could pass through the heart (Butterfield, 1975). To avoid such a possibility, the case should be wrapped in several layers of insulating tape.

8. When a client exhibits multiple behavior problems, the therapist may use either of two punishment strategies. In the first strategy, a *single* problem behavior is initially punished in *all* situations. Once suppression has been achieved, a second problem behavior is punished until it too is eliminated in all situations. This procedure is repeated until all the problem behaviors have been suppressed. Consider, for example, the case of a self-injurious client who engages in head banging, self-biting, and face slapping. One might begin by shocking head banging in all situations. That is, many different therapists would shock head banging in many different settings. Once head banging had been suppressed, the procedure would be repeated first for self-biting and then for face slapping. The disadvantage of this strategy is that, right from the start, a number of people must be trained to carry out treatment in a number of settings. The advantage is that, by shocking a behavior in all situations at the outset of treatment, we help to ensure that the client will not form discriminations—that is, be under control in one situation while exhibiting self-injury in many other situations.

In the second strategy, *all* behavior problems are punished initially in a *single* situation until the problems are eliminated. Then the treatment is applied sequentially in a number of new situations (i.e., using new therapists and exposing the client to new settings). Thus, in the preceding example, head banging, self-biting, and face slapping would all be shocked initially in one situation. Then, once the behaviors were under control, they would be shocked in a second situation, a third, and so on until they were eventually under control in all situations. The advantage of this strategy is that, since all the behavior problems are treated at once, one can see fairly rapidly whether the various problems will respond equally well to treatment. The disadvantage is that, since the treatment takes place in only one situation to begin with, discriminations are likely; that is, the client will typically display problem behaviors in untreated situations. It is important to note, however, that, if treatment is successful in one situation, the problem behaviors can generally be treated and eliminated in others as well,

often using fewer shocks than were required to produce suppression in the initial situations (Lovaas & Simmons, 1969).

Either of these strategies is potentially feasible. It is up to the therapist who is coordinating the treatment effort to review the advantages and disadvantages of each strategy as outlined and then to select the one that appears most workable for a given client.

9. Each instance of the target behavior should be shocked. The basic research literature suggests that continuous punishment produces greater response suppression than intermittent punishment (Azrin, Holz, & Hake, 1963).

10. Precautions must be taken in order to ensure that unauthorized escape or avoidance of the shock does not occur. If the client learns that, by aggressing against the therapist, he or she can cause the therapist to terminate the treatment session, the shock procedure will fail. Therefore, adequate staffing must be available to safeguard against this possibility. More than one therapist may have to be present in order to physically manage an extremely resistant client.

11. Large amounts of punishment should be avoided, otherwise adaptation to the shock is likely to occur (Azrin, 1960). Typically, only a few shocks are needed to produce initial suppression and maintain that effect (Lovaas & Newsom, 1976). If a client shows no suppression, it may be that adaptation has occurred and that a higher (but safe) level of shock intensity should be considered. If increasing the intensity has no effect, then the therapist should discontinue treatment.

12. Conditioned aversive stimuli should be developed that can eventually be used in place of the shock. Typically, this procedure consists of pairing the word "No!" or "Stop!" with each presentation of shock. After many such pairings, presenting the verbal command by itself should be sufficient to suppress any remaining instances of problem behavior (Birnbrauer, 1968; Lovaas, Schaeffer, & Simmons, 1965; Lovaas & Simmons, 1969; Merbaum, 1973).

13. Both during the course of shock treatment and after the termination of such treatment, data must be collected in order to evaluate whether the treatment has been effective in eliminating the target behavior and in maintaining this improvement over time.

14. We have already alluded to the pressure that shock treatment places on the therapist. Many therapists find it an anxiety-provoking experience. Moment-to-moment treatment decisions are difficult if not emotionally draining, hence the need for social support mechanisms and close monitoring by other experts and professionals. Just as seriously, some therapists react with frustration and anger. For certain clients, an angry reprimand contingent on the occurrence of problem behavior acts to suppress the behavior; however, for other clients, angry statements function more like attention and serve only to reinforce the behavior. In the latter case, a deteriorating situation may develop in which the therapist gets more and more angry and the client displays more and more

problem behavior. The danger here is that the treatment procedure may be abused and employed in a vindictive manner. We must be sensitive to this possibility and take preventative measures. The best tactic is to ensure that no therapist has to work in continuous isolation away from public scrutiny. Monitoring by other professionals, coupled with honest and corrective feedback from them when necessary, provides the kind of social support and sharing of responsibility that helps facilitate the humane, ethical, and effective use of aversives.

EFFECTS OF SHOCK TREATMENT

Most of the research literature on the use of contingent shock is based on the treatment of self-injurious behavior, and we will therefore focus our discussion on this behavior.

The case of John, described by Lovaas and Simmons (1969), is representative of the effects of shock on self-injury. John was an 8-year-old boy who was diagnosed as severely retarded. He had no expressive speech and could understand only simple commands. His social behavior was minimal, and he had no self-help skills. He could not imitate and had no play behavior. His self-injury began when he was 2 years old. Typically, he would bang the temple and forehead area with his fists to a degree in which serious bruising would result. At the outset of treatment, he was in full restraints in an institution. The combination of drugs that he was being given had no effect on the rate of self-injury.

During a 15-day baseline period, John averaged about 250 self-injurious acts per 5-min session. When shock was first introduced, self-injury declined dramatically to a near zero level. After a total of 12 shocks distributed over four sessions, John's self-injurious behavior was eliminated in the treatment situation. (As will be noted later, however, self-injury remained high in situations in which shock had not been introduced.) With some exceptions (e.g., Romanczyk & Goren, 1975), the general published finding has been that the effect of contingent electric shock on self-injury is to produce a dramatic, immediate decrease in the rate of the behavior and that, following a small number of additional shocks, the behavior is eliminated in the treatment situation (Corte, Wolfe, & Locke, 1971; Lovaas, Schaeffer, & Simmons, 1965; Merbaum, 1973; Risley, 1968; Tate & Baroff, 1966). Finally, it can be noted that the immediate emotional effect of shock is to produce a startle reaction from the client (Merbaum, 1973; Tate & Baroff, 1966).

A question that is frequently raised has to do with why the brief pain associated with shock has any effect at all given that the client is able to withstand the much more severe pain that the self-injurious behavior presumably engenders. Based on the animal research literature, there are two possible ex-

planations (Lovaas & Newsom, 1976). First, although the client has had ample opportunity to adapt to the pain of his or her repetitive self-injurious acts, no such opportunity is available for adapting to the pain of the shock. Shock is introduced abruptly and at full strength. Several studies (Masserman, 1946; Miller, 1960) have shown that little suppression of responding will occur if the intensity of an aversive stimulus is increased very gradually to some final high value; however, if the aversive stimulus is introduced at full strength (i.e., at its final high value) right from the start, considerable suppression of responding will occur.

Second, aversive stimuli that are differentially associated with positive reinforcement can become discriminative stimuli for reinforcement. When this situation develops, the rate of punished responding may actually increase in the presence of the aversive (i.e., punishing) stimulus (Holz & Azrin, 1961). Thus, if the client gets attention when emitting self-injurious responses but is ignored when not emitting the behavior, the pain of self-injury may become a discriminative stimulus for social reinforcement. For this reason, the pain resulting from self-injury may set the occasion for even more self-injury. Since the shock stimulus will not have had such a reinforcement history, it is not discriminative for self-injury. Thus, the pain of the shock per se may be the most salient dimension for the client with the result that self-injury is suppressed.

Finally, there is a third possible explanation—namely, that the client, by repeatedly striking a small area of the body, may be successful in destroying the peripheral nerve tissue of that area. The area then is effectively anesthetized. This last explanation may be particularly plausible in light of cases we have seen in which clients showed no pain reaction when the physician put in sutures on unanesthetized scalp tissue consequent to severe acts of head banging. Yet, these same clients responded well to contingent shock, probably because the shock was applied to areas of the body that had not been anesthetized.

SIDE EFFECTS OF SHOCK TREATMENT

Notwithstanding the rather powerful effects that shock has on decreasing self-injury, many professionals have expressed misgivings about the putative side effects of shock. Some of the more commonly raised objections have been discussed by other researchers concerned with the punishment procedure (namely, Azrin & Holz, 1966; Risley, 1968; Solomon, 1964). One criticism is that shock produces undesirable emotional states of a chronic nature. Second, shock could cause serious social disruption. For example, the client may change his or her emotional relationship with the therapist, since the latter has become a source of pain. The presence and attention of the therapist, formerly reinforcing, may now become somewhat aversive, and the client therefore may no

longer seek social reinforcement from the therapist. Third, it is claimed that shock will suppress desirable as well as undesirable behaviors; that is, the suppressive effects of shock will be uncontrollable and widespread. Fourth, some suggest that new symptoms may emerge that are at least as serious as the original behavior problems. For example, aggression may develop such that the client learns to attack the therapist in order to prevent any further shock delivery. Also, elicited aggression may occur. That is, the shock acts as an unconditioned stimulus that reflexively brings forth aggressive behavior. Finally, by administering shock to the client, the therapist might be modeling aggressive behavior (cf. Bandura, Ross, & Ross, 1961), thereby promoting such behavior.

Despite all these precautions, there is little published evidence that the side effects of shock are harmful. In fact, the ratio of positive to negative side effects is about 5 to 1 in favor of the positive side effects (Lichstein & Schreiber, 1976). The evidence that supports this statement will be briefly reviewed next.

First, research suggests that an undesirable emotional state of a chronic nature does not appear following treatment with contingent shock. Instead, clients are described as becoming happier, calmer, quieter, and/or smiling more (Birnbrauer, 1968; Merbaum, 1973; Tate & Baroff, 1966). Lovaas, Schaeffer, and Simmons (1965) reported a decrease in happiness or contentment based on nurses' ratings, but such ratings followed a noncontingent shock procedure not comparable to the contingent shock procedure described here.

Second, shock does not produce social disruption. A general fear of the therapist does not develop (Merbaum, 1973; Lovaas & Simmons, 1969). On the contrary, widespread enhancement of social behavior is reported. Clients become more affectionate (Lovaas, Schaeffer, & Simmons, 1965; Luckey, Watson, & Musick, 1968), show positive approach behavior (Merbaum, 1973; Whaley & Tough, 1970), seek out adult company and are more responsive to adults (Lang & Melamed, 1969; Lovaas, Schaeffer, & Simmons, 1965; Merbaum, 1973), show increased eye contact (Lovaas & Simmons, 1969; Risley, 1968), are more sociable (Birnbrauer, 1968; Tate & Baroff, 1966), become more attentive (Luckey *et al.*, 1968; White & Taylor, 1967), cooperate more (Birnbrauer, 1968), display more physical contact (Lovaas & Simmons, 1969), and become more playful (Luckey *et al.*, 1968).

Third, there have been no documented reports of a general suppression of desirable behavior following contingent shock.

Fourth, the development of new "symptoms," such as aggression directed against the therapist, has not been reported. Instead, there have been demonstrations of a decrease in other problem behaviors following contingent shock treatment for self-injury. Specifically, a decrease in whining, crying, and avoidance behaviors has been reported (Lovaas & Simmons, 1969; Tate & Baroff, 1966). On the other hand, Bucher and Lovaas (1968) reported an increase in aggression displayed on the ward following shock for self-injury in another setting. This finding will be discussed further later. These same in-

investigators reported a cessation of some types of verbal behavior, such as babbling, when aversives were used; however, the effects were temporary. Finally, Risley (1968) reported an increase in chair climbing after a client's dangerous climbing on a bookcase was suppressed. However, when chair climbing was also shocked, no new problem behaviors arose.

Several other positive side effects have been observed following the use of contingent shock. For example, suppression of chronic, non-organically based vomiting is associated with weight gain in clients who had been emaciated from the vomiting (Kohlenberg, 1970; Lang & Melamed, 1969; Luckey *et al.*, 1968; White & Taylor, 1967). Also, toy play has been observed to increase following suppression of self-injury (Tate & Baroff, 1966).

In light of the intrusive nature of shock treatment, it is puzzling that so few negative side effects have been reported. In interpreting the existing literature, we might be wise to consider the possibility that some investigators have been predisposed to see only the positive side effects. A detailed experimental analysis of the effects of spanking (Ackerman, 1979) suggests that, for some children, this mode of punishment produces temporary decreases in spontaneous toy play and vocalization. It would be important to replicate this kind of detailed, objective recording of multiple behaviors with respect to shock treatment so that we could systematically determine whether or not shock also produces such negative side effects. With these data in hand, we would be in a better position to anticipate and mitigate any untoward effects of shock.

An important general question arises from the research reviewed thus far—namely, what could account for the variety of side effects that contingent shock produces? Some changes probably come about for purely mechanical reasons (Lovaas & Simmons, 1969). Thus, for example, once repetitive face slapping has been eliminated, the clients are now more free to do other things, such as displaying affectionate physical contact. Second, since the suppression of self-injury often means that clients are no longer confined to their beds in physical restraints, opportunities to come in contact with reinforcing aspects of both the physical and social environment are now possible perhaps for the first time in years (Lovaas & Simmons, 1969; Tate & Baroff, 1966). Thus, a client may more readily discover that adults control a variety of positive reinforcers and therefore seek their company. In addition, adults in turn may become disposed to reacting more positively toward clients once noxious, disruptive behaviors have been eliminated from the client's repertoire (Tate & Baroff, 1966). These changes are also likely to promote beneficial social interaction. Third, it might be that shock functions as an unconditioned stimulus to elicit stress or fear reactions that in turn reflexively elicit social behavior (Lovaas & Simmons, 1969; Tate & Baroff, 1966). That is, human beings, by nature, may behave socially in the context of extremely stressful situations (such as that produced by shock). Fourth, it is conceivable that such behaviors as whining, avoiding, and self-injury are all

members of the same response class and that punishing one member automatically produces generalized suppression across the entire response class (Bachman, 1972; Lovaas & Simmons, 1969; Tate & Baroff, 1966). Fifth, some side effects may be due to inadvertent punishment of maladaptive behaviors other than the target behavior (Bachman, 1972). For example, if self-injury and whining occur simultaneously a great deal of the time, then punishing self-injury will coincidentally also involve punishment of whining with the result that both behaviors will decline in frequency. Sixth, it has been suggested that self-injury (for example) may be the terminal link of a response chain and that punishing this behavior would therefore result in a decrease in the frequency of those responses that make up the initial links of the chain (Bachman, 1972). If these initial links consisted of other maladaptive behaviors (e.g., screaming or avoiding), then the side effects of shock would be positive. Finally, if several maladaptive behaviors—for example, self-injury and aggression—are maintained by the same set of reinforcers, it follows that suppression of one behavior, such as self-injury, may result in an increase in another behavior, namely, aggression. The increase in aggressive behavior presumably functions to maintain a high level of social reinforcement that would otherwise be lost following suppression of self-injury. This situation is likely the basis for the case reported by Bucher and Lovaas (1968) described earlier. In that study, a client became more aggressive on the ward following successful suppression of self-injury in another setting. This case further underlines the necessity of building in appropriate behaviors to replace self-injury (or other maladaptive behaviors) following successful shock treatment.

Perhaps the most interesting indirect effect of aversives such as shock centers on the use of such stimuli to build and motivate prosocial behavior. To illustrate this point, we may consider first how complexly aversives are related to behavior. At least four separate operations are involved: (*a*) the onset of shock, contingent on a given behavior, serves to *decrease* that behavior; (*b*) the pairing of a social stimulus (e.g., “No”) with the onset of shock serves to establish that stimulus as a conditioned punisher. In addition, since shock is eventually removed, two other processes may become important—namely, that (*c*) any behavior that is contingently associated with the termination of shock will be *increased* (as in escape-avoidance learning); and finally (*d*) any stimulus that is associated with the termination of shock should acquire *positive* reinforcing properties, which can be used to teach new behaviors. In other words, aversives such as shock can be used to suppress some behaviors, to increase others, and to build two separate stimulus functions—specifically, conditioned punishment and conditioned positive reinforcement.

In our early work with aversives such as shock, we tried to treat withdrawn autistic children for whom social stimuli had little if any value. We paired the reduction of shock with social closeness (i.e., affection and approval) in order to

build positive social reinforcers for these children. This use of aversive stimuli may be very important, yet it has been left essentially unexplored since we first reported these findings some 15 years ago (Lovaas, Schaeffer, & Simmons, 1965).

The effects and side effects of contingent shock on serious problem behaviors are well documented. Two important questions remain, however. First, do the effects of treatment carry over across other situations in addition to the original treatment situation; that is, does generalization occur? Second, are treatment effects durable over time; that is, does maintenance occur? We shall address these two questions next.

GENERALIZATION

The effects of shock are situation specific. That is, generalization is the exception rather than the rule. The case of John, reported by Lovaas and Simmons (1969), and reproduced in Figure 7.1, makes this point quite clearly. The top half of the figure shows the data for the situation in which John was seated on a nurse's lap. During the first 15 days, a baseline condition was in effect and his rate of self-injury was high. After he was shocked for self-injury by Experimenter 1, the rate of self-injury decreased to near zero in the presence of that experimenter. However, John continued to hit himself in the presence of Experimenters 2 and 3. Further, no suppression of self-injury was observed in other settings outside of the treatment situation. For example, the bottom half of the figure shows that the frequency of self-injury remained unchanged when John was allowed to walk around in a dormitory room located near the treatment setting. Specificity of treatment effects has been widely reported (Birnbrauer, 1968; Corte *et al.*, 1971; Risley, 1968). In fact, an increase in self-injury in one setting has occasionally been observed following suppression of the behavior in a different setting (Merbaum, 1973).

Two strategies have been used in order to solve the generalization problem. The first is to program generalization; the second is to attempt to make the treatment and extratreatment environments less discriminable from one another.

Programmed generalization can take several forms depending on the problem. When the problem consists of the client's suppressing self-injury only in the presence of the therapist who administered shock, the solution is to have other therapists deliver shock as well (Corte *et al.*, 1971; Lovaas & Simmons, 1969). For example, the top half of Figure 7.1 shows that, after Experimenter 3 delivered shock, the client suppressed self-injury in the presence of Experimenters 2 and 4, even though these individuals had never delivered shock. A particularly useful form of programmed generalization consists of training the

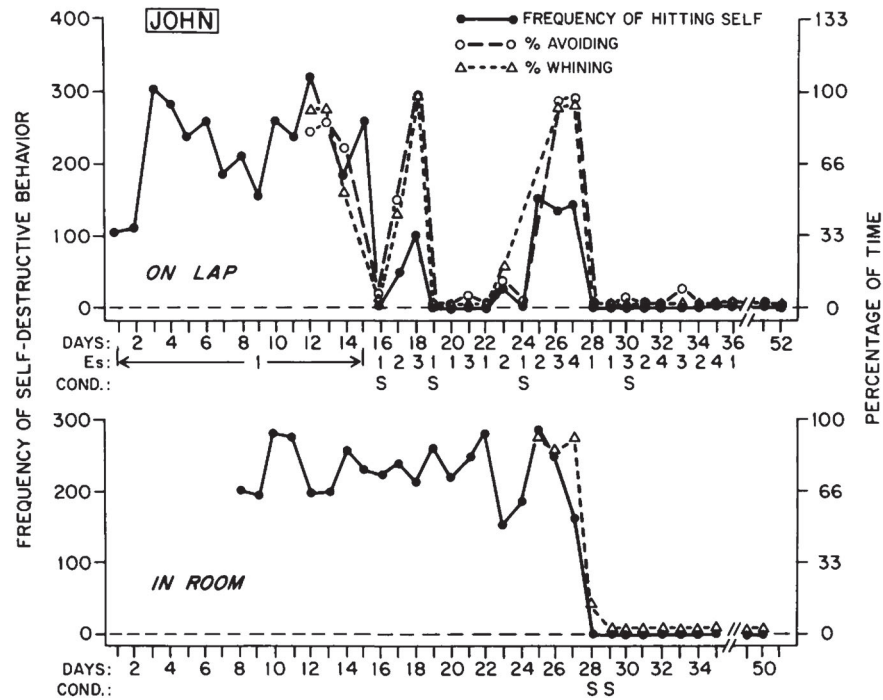


Figure 7.1. Frequency of John's self-destructive behavior and the percentage of avoiding adults and whining, as a function of shock. Data are presented for two situations: daily 5-min sessions "on the lap" (upper half) and daily 10-min sessions "in the room" (lower half). The abscissa gives the particular experimenter or attending adult present (Es), condition (cond.) that shows when shock (S) was administered, and days, which are the same for the two situations, enabling comparison between the two situations. Shock was given by Experimenter 1 on Days 16, 19, and 24, and by Experimenter 3 on Day 30, in the lap situation. It was given on Days 28 and 29 in the room situation. (From O. I. Lovaas & J. Q. Simmons, Manipulation of self-destruction in three retarded children, *Journal of Applied Behavior Analysis*, 1969, 2, 143-157, Fig. 2. Copyright 1969 by the Society for the Experimental Analysis of Behavior, Inc.)

parents of the client to use contingent shock in the home environment. This procedure can be quite effective (Merbaum, 1973; Risley, 1968). If parents are involved, however, the therapist must take special care to establish a close working relationship with them. Such a relationship is essential so that the therapist can anticipate and prevent any hint of child abuse stemming from the inappropriate use of shock. Ultimately, the therapist must train the parents so that they become thoroughly able to implement treatment without constant supervision. The parents, in short, must reach a level of expertise in which they function as peers of the therapist and not mere apprentices.

Finally, if the client is shocked in one setting and shows no generalization to other settings, shock may have to be introduced into these other settings as well. In Figure 7.1, we can see that, although suppression of self-injury in the lap situation (top half of figure) did not generalize to the room situation (bottom half of figure), the introduction of contingent shock in the room situation produced rapid suppression of the behavior. Further, whereas it took 12 shocks initially to suppress self-injury in the lap situation, it took only 4 shocks to suppress it in the room. Typically, it requires far fewer shocks to suppress self-injury in other situations than it does to suppress the behavior in the original treatment situation (Corte *et al.*, 1971; Lovaas & Simmons, 1969).

To sum up, generalization may be achieved by having a number of different people shock the client's self-injurious responses in a number of different settings. Sometimes it is possible to suppress self-injury in new settings merely by contingently delivering a conditioned aversive stimulus (e.g., shouting "No!") that has been developed earlier in treatment by pairing that stimulus with the delivery of shock (Lovaas & Simmons, 1969).

It is worth noting that beneficial *response* generalization may also occur during shock treatment. More specifically, as can be seen in Figure 7.1, when self-injury is suppressed, such problem behaviors as avoiding and whining decrease too even though they were not targeted for treatment.

The second strategy consists of making the treatment and extratreatment environments less discriminable from one another. Often clients will learn that self-injury will be punished only when an adult is present. Since the presence versus absence of adults is easily discriminated, the client may continue to engage in self-injury when adults are absent. To remedy this situation, Corte *et al.* (1971) had the adult therapist hide from the client and yet still observe the client's behavior. Now when the client engaged in self-injury, the "absent" therapist emerged from his hiding place and delivered a shock. Under this treatment regimen, suppression of self-injury generalized to situations in which the adult was absent. In a similar vein, Tate and Baroff (1966) monitored their client's self-injury using closed-circuit television. Using this device, they were able to detect and then punish self-injurious responses made in the absence of adults. Risley (1968) also used the hidden observer strategy to promote generalization. Finally, some researchers have used remote-control shock in order to remove adults *per se* as a discriminative cue for punishment (Johnson, Williams, & Landrum, 1965).

An important, although unresearched, variable related to generalization concerns the age of the client. Very young clients presumably would have had much less practice in discriminating one setting or adult from another than would older clients. Perhaps this accounts for the clinical observation that it is often easier to obtain generalized suppression of problem behaviors with young clients. This would suggest that it may be important to begin treating severe

behavior problems at an early age so as to maximize the likelihood of widespread generalization.

MAINTENANCE

The effects of shock can be quite durable, lasting from several months to several years (Corte *et al.*, 1971; Griffin, Locke, & Landers, 1975; Merbaum, 1973; Whaley & Tough, 1970); however, there have also been reports of failure to produce maintenance (Birnbrauer, 1968; Romanczyk & Goren, 1975). The difficulty may be that some clients discriminate that the treatment contingencies are no longer in effect, and thus they revert to exhibiting behavior problems. For other clients, the pain produced by shock is probably minor compared to the pain produced by self-injurious behavior. Therefore, one would expect such clients to adapt rapidly to the shock.

Such discrepancies in outcome have prompted researchers to try to identify those factors that are conducive to producing maintenance. Systematic research in this area is still in its infancy, but several strategies are promising.

The first and most important strategy consists of strengthening appropriate, alternative behaviors as the self-injurious behaviors are suppressed. This is critical especially if adaptation effects such as those noted occur. By itself, the effect of shock treatment is typically short lived. Shock merely provides an opportunity to inhibit self-injury long enough for the therapist to teach more appropriate behaviors and then to strengthen them. Earlier in this chapter, we discussed some general principles that can be used to select specific behavioral alternatives to self-injury. At this point, we wish to focus on why strengthening such alternatives is critical for maintenance. Consider the case of a client whose only means for getting adult attention is to emit a severe, self-injurious response. If the only treatment we provide for this client is to suppress self-injury through shock, then in fact we are depriving the individual of his or her only means of getting attention. It is almost a certainty that over time the same adult-attention-seeking factors that helped increase self-injury in the first place will reassert themselves and bring about a reversal of treatment effects. In short, the client will use the only means at his or her disposal for obtaining the valued social reinforcer of adult attention. Only when we provide the client with an alternative means for securing this reinforcer may we reasonably expect permanent suppression of the undesired behavior. This expectation has been verified in the basic research literature (Azrin & Holz, 1966). Systematic extension of such research to the treatment of severe behavior problems should be a high priority for those concerned with resolving the kinds of difficulties we have been discussing.

A second suggested strategy for producing maintenance is to systematically

program booster sessions (Eysenck, 1963; Kohlenberg, 1970). That is, rather than wait for the behavior problem to increase again to pretreatment levels, the therapist should consider periodically instituting shock procedures at the first sign that the treatment gains are beginning to reverse. Early intervention would appear to be the key. That is, by applying the treatment procedure at the first signs of behavioral deterioration, very few shocks would be required and the client would therefore be unlikely to adapt to the punishing stimulus. Booster sessions should also include provisions for enhancing the development of socially appropriate behavioral alternatives.

The preceding strategies are promising, but no strategy will work unless those who are involved in providing treatment are aware of the conditions that helped strengthen self-injury in the first place. If the individuals who work with the client again begin to pay attention to self-injury, if the environment is allowed to become barren and unstimulating, if unreasonable and frustrating demands are reintroduced into the educational curriculum, then self-injury will probably recur. One cannot expect treatment durability if the factors responsible for maintaining self-injury in the past are allowed to become established once again.

CONCLUDING COMMENT

Shock should not be applied to all cases of severe behavior problems. For example, the kinds of ritualistic self-injury observed in institutionalized delinquents responds best to peer behavior modification programs (Ross & McKay, 1979); shock is simply not relevant for this group of individuals. The shock procedures that we have been describing are likely to be of greatest benefit to those individuals who are labeled severely retarded or psychotic.

Contingent electric shock is a complex procedure that requires a great deal of training and clinical expertise from the therapist using it. It is imperative, therefore, that anyone considering a shock program for a client should seek out expert professional consultation. A poorly conceived and poorly executed shock program is more destructive in the long run than no program at all.

We cannot emphasize enough that electric shock is a *temporary* procedure designed for the sole purpose of suppressing serious behavior problems so that the client will be in a position to benefit from a variety of other academic, social, and vocational training programs.

Finally, we would like to raise the issue of whether shock has become an outmoded procedure. A number of less intrusive interventions are available today. For example, we find that for some, but certainly not all, clients delivering a puff of air into the client's eyes or making the client do sit-ups or jog may be just as effective as shock in suppressing serious behavior problems. By using a

number of such aversives in rotation, we are sometimes able to obtain good suppression. Thus, an astute clinician may be able to develop a number of subtle but effective aversives that obviate the need for using more dramatic procedures, such as shock.

Perhaps aversive control in general may be less necessary in the future as greater attention is paid to the issue of prevention. The research that we have been describing demonstrates the powerful control that environmental factors exert. It may be possible to capitalize on this control by designing environments that exclude problematic variables, thereby preventing behavior disorders from developing in the first place. At that point, aversive procedures, such as the ones we have been discussing, would no longer be needed.

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