11

Punishment

Did you know that

- punishment does not have to involve physical pain?
- when properly applied, punishment can produce permanent suppression of behavior in a single trial?
- the effectiveness of punishment is substantially reduced by delivering punishment intermittently, with a delay, or by signaling it?
- mild punishment for an initial offense may immunize the individual to subsequent punishment?
- severe punishment for an initial offense may sensitize the individual to subsequent punishment?
- the effectiveness of punishment is greatly increased by positive reinforcement of alternative behavior?
- punishment facilitates responding if it signals positive reinforcement or if the punished response is a form of escape behavior?
- when one person punishes another out of anger or frustration, the parameters of effective punishment are usually violated, and no constructive changes in behavior are produced?

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In discussing instrumental conditioning up to this point, we have relied primarily on examples of positive reinforcement—examples in which the instrumental response results in the delivery of an appetitive or "pleasant" event. Instrumental behavior can be also modified by aversive or "unpleasant" events. Perhaps the simplest aversive control procedure is punishment. In a **punishment** procedure, an aversive event is delivered contingent on the performance of an instrumental response. The expected or typical outcome is suppression of the punished behavior. However, the degree of response suppression depends on numerous factors, many of which are not intuitively obvious.

Punishment is probably the most controversial topic in conditioning and learning. It conjures up visions of cruelty and abuse, and it is the only conditioning procedure whose application is regulated by law. However, punishment need not involve unusual forms of physical cruelty or pain. A variety of aversive events have been effectively used as punishing outcomes, including verbal reprimands, monetary fines, placement in a time-out corner or a time-out room, loss of earned privileges or positive reinforcers, demerits, various restitution procedures, and even water mist or a squirt of lemon juice in the mouth. Mild electric shock is used as an aversive stimulus in animal research because its intensity and duration can be controlled precisely. Shock is used rarely if ever with people, and then only under extreme and highly controversial circumstances.

Societal concerns and lack of research funding have discouraged research on punishment in recent years, but we learned a lot from experiments on punishment that were conducted previously. The stage for the punishment debate was set by Thorndike early in the 20th century. Thorndike (1932) claimed that punishment is not particularly effective in producing significant and lasting changes in behavior and therefore should not be used. On the basis of his own studies, Skinner (1953) adopted a similar point of view. He argued that we should make every effort to eliminate the use of punishment in society because punishment is cruel and ineffective. Whether punishment is cruel cannot be decided by means of empirical evidence. However, the claim that punishment is ineffective can be examined experimentally. Contrary to the early claims of Thorndike and Skinner, systematic research has indicated that punishment can be very effective in suppressing behavior, provided that punishment is properly applied.

EFFECTIVE AND INEFFECTIVE PUNISHMENT

Casual observation suggests that Thorndike and Skinner may have been correct in saying that punishment is ineffective. Violations of traffic laws are punished by fines and other unpleasant consequences. Nevertheless, people continue to drive through red lights and often drive faster than the posted speed limit. Grade-school children scolded by a teacher for not having their homework completed do not necessarily finish their next assignment on time.

And drugs dealers apprehended for selling illicit drugs are likely to return to their trade once they are released from jail.

In contrast to the preceding examples, punishment is sometimes remarkably effective. A boy who accidentally gets shocked while playing with an electric outlet is never going to poke his fingers into an outlet again. A woman who falls and hurts herself rushing down a wet walkway will slow down the next time she has to negotiate it in the rain. Someone who tips over a canoe by leaning too far to one side will be much more careful about staying in the middle of the canoe after that.

Why punishment is highly effective in suppressing behavior in some cases but not others has been the subject of extensive laboratory research, conducted mainly with rats and pigeons in the 1960s (Azrin & Holz, 1966; Church, 1969). In this chapter, we describe the major findings from these experiments and relate them to situations people encounter in their daily lives. Keep in mind, however, that the empirical foundations of our claims come primarily from research with laboratory animals. Let us first consider the cases in which punishment fails.

When Punishment Fails

Why do drivers often exceed the speed limit even though speeding can result in a fine? Punishment in the enforcement of traffic laws is similar to punishment in much of the criminal justice system and in many social situations. In all these cases, punishment is administered by an individual rather than being an automatic environmental consequence of a response. Unlike a canoe, which tips over automatically when someone leans too far to one side, drivers do not automatically get a ticket when they drive too fast. A police officer has to detect the transgression, and an officer of the court has to judge the severity of the offense and decide on what penalty to apply. Requiring officers to detect the response to be punished and administer the aversive stimulus can make punishment ineffective for a variety of reasons.

One consequence of needing a police officer to detect speeders is that drivers are not caught every time they exceed the speed limit. In fact, the chances of getting caught are pretty slim. A driver may exceed the speed limit 50 times or more without getting caught for each time his excessive speed is detected and recorded by a patrol officer. Thus, punishment is highly intermittent. On the rare occasion when a speeding driver is detected, chances are that he is not detected right away but only after he has been going too fast for some time. Thus, punishment is delayed after the initiation of the behavior targeted for punishment. Further delays in punishment occur because fines do not have to be paid right away. The guilty party usually has a week or two to pay the fine. Traffic tickets can also be appealed, and an appeal may take several months.

If the appeal is unsuccessful, punishment for the first offense is likely to be fairly mild. The driver will probably just have to pay a fine. More severe penalties are imposed only if the driver is repeatedly ticketed for speeding. Thus, punishment is initially mild and increases in severity only after repeated offenses.

This gradual escalation of the severity of punishment is a fundamental feature of how punishment is administered in our society. For most forms of illegal conduct, the first or second offense is not treated as harshly as the fifth or sixth transgression. We get serious about punishing someone only after repeated offenses.

Another reason punishment is not effective in discouraging speeding is that drivers can often tell when their speed is about to be measured by a patrol officer. In some cities, the location of radar checkpoints is announced each day. The presence of an officer is also obvious from the distinctive markings of patrol cars. Some drivers make use of an app like Waze that crowd sources when police are present in specific locations. Seeing a patrol car and information about when and where patrol officers are located provides discriminative stimuli for punishment. Thus, punishment is often signaled by a discriminative stimulus and this allows the transgressor to determine when the punishment contingency is in effect and when it is not. (See Table 11.1.)

When Punishment Succeeds

In contrast to the ineffectiveness of punishment in discouraging speeding, why does punishment work so well in discouraging a child from poking his fingers into an electric outlet? A child shocked while playing with an electric outlet is unlikely ever to do that again and may in fact develop a strong fear of outlets. What are the critical differences in the punishment contingencies involved in driving too fast and in playing with an electric outlet?

First, punishment occurs consistently for sticking your fingers into an electric outlet. Every time you do that, you will get shocked. If you touch an outlet and come in contact with the electrodes, you are sure to get shocked. The physical configuration of the outlet guarantees that punishment is delivered every time.

Second, punishment is immediate. As soon as you make contact with the electrodes, you get shocked. There is no elaborate detection or decision process involved to delay delivery of the aversive stimulus.

Third, punishment is intense for the first transgression. The outlet does not give you a warning the first time you touch the electrodes. The first offense is treated with the same severity as the 10th one. Each and every time you make the response, you get an intense shock.

Finally, punishment is not limited to times when a police officer or observer is watching. Thus, punishment is not signaled by a discriminative stimulus. There is no light or buzzer to tell you when the outlet will be "hot." No matter who is present in the room or what else may going on, sticking your fingers into the

TABLE 11.1. Characteristics of Punishment

For driving too fast	For poking fingers into an electric outlet
Occurs intermittently	Occurs every time
Delayed	Immediate
Low-intensity aversive stimulus at first	High-intensity aversive stimulus every time
Signaled by a discriminative stimulus	Not signaled

outlet will get you shocked. Severe and immediate punishment is always in effect for each occurrence of the target response.

RESEARCH EVIDENCE ON PUNISHMENT

All the factors that characterize the punishment for touching the electrodes in an electric outlet have been found to be important in carefully conducted laboratory research. Moreover, research has identified several additional factors that strongly determine the effectiveness of punishment. Ironically, much of the research was done under the leadership of one of Skinner's former students, Nathan Azrin (Azrin & Holz, 1966). Complementary studies were performed in a research program conducted by Church (1969). Azrin used pigeons for much of his research, whereas Church used laboratory rats. Contrary to the early claims of Thorndike and Skinner, these experiments demonstrated that punishment can be a highly effective technique for producing rapid and long-term changes in behavior.

Response–Reinforcer Contingency

Punishment is similar to positive reinforcement in that it involves a positive contingency between the instrumental response and the reinforcer. The reinforcer is delivered only if the organism has previously performed the target response. The primary difference between punishment and positive reinforcement is that the outcome of the response is an aversive rather than an appetitive stimulus.

As with other instrumental conditioning procedures, a fundamental variable in punishment is the response–reinforcer contingency, which is the extent to which delivery of the aversive stimulus depends on the prior occurrence of the target response. If an aversive stimulus is administered independently of the target response, the procedure is a form of Pavlovian aversive conditioning rather than punishment. As we saw in Chapter 4, Pavlovian aversive conditioning results in the conditioning of fear, which results in freezing and a general suppression of ongoing behavior.

Punishment procedures sometimes also produce a general suppression of ongoing behavior. However, this is not an inevitable outcome because punishment also produces behavioral suppression specific to the target response (Camp et al., 1967; Goodall, 1984). The specificity of the behavioral suppression produced by punishment depends on the contingency between the target response and the aversive reinforcer. The stronger the response–reinforcer contingency, the more specific is the response suppression produced by punishment.

Response–Reinforcer Contiguity

As we previously described for positive reinforcement, the response–reinforcer contingency is just one aspect of the relation between an instrumental response and a reinforcer. Another important factor is the response–reinforcer contiguity—that is, the interval between the target response and delivery of the reinforcer.

In a punishment procedure, this is the interval between the target response and the aversive consequence.

Response–reinforcer contiguity is just as important with punishment as it is with positive reinforcement. Punishment is most effective if the aversive stimulus is presented without delay after the target response (Camp et al., 1967). If punishment is delayed after the target response, some suppression of behavior may occur (because of the Pavlovian conditioning of fear to background contextual cues). However, the response suppression will not be specific to the punished response and will not be as profound.

Intensity of the Aversive Stimulus

As one might suspect, the response-suppressing effects of punishment are directly related to the intensity of the aversive stimulus. Research with rats and pigeons has shown that low intensities of punishment produce only mild suppression of behavior. In contrast, dramatic suppressions of behavior result from the use of intense aversive stimuli (Azrin, 1960). More importantly, the effects of the intensity of punishment depend on the participant's prior experience with punishment (e.g., Fontes & Shahan, 2022). In general, individuals tend to respond to a new level of punishment similarly to how they responded during earlier encounters with punishment.

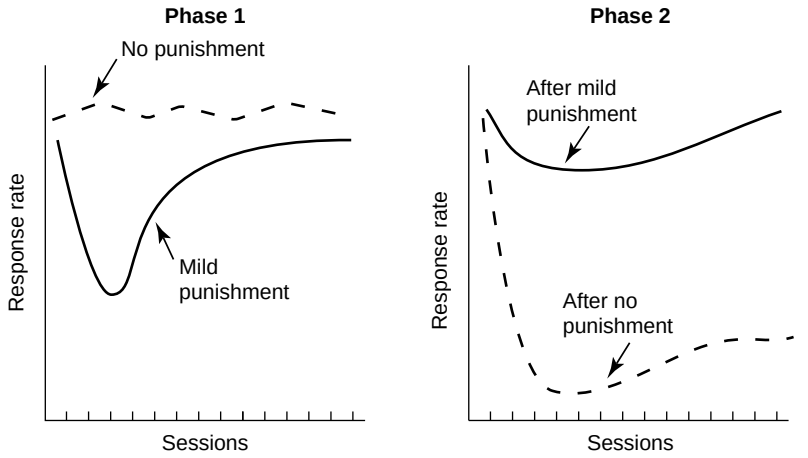
The historical effects of exposure to punishment can lead to somewhat unexpected results. Consider, for example, individuals who are initially exposed to a low intensity of punishment. Weak aversive stimuli produce only mild, if any, suppression of responding. Animals exposed to low-intensity punishment habituate to the aversive stimulus and learn to continue responding with little disruption in their behavior. This persistent responding in the face of mild punishment continues when the intensity of the aversive stimulus is subsequently increased (Azrin et al., 1963; N. E. Miller, 1960). In a sense, exposure to mild aversive stimulation serves to immunize individuals against the effects of more intense punishment as a result of the operation of a habituation process (see Figure 11.1).

Interestingly, a history of exposure to intense punishment can have just the opposite effect. Initial exposure to intense punishment can increase the impact of subsequent mild punishment (see Figure 11.2). High-intensity aversive stimulation produces dramatic suppression of the punished response, and this severe suppression of responding persists when the intensity of the aversive stimulus is subsequently reduced (Church, 1969). Thus, mild punishment produces much more severe suppression of behavior in individuals who have previously received intense punishment than in individuals who have not been punished. Here, exposure to intense punishment results in sensitization to subsequent mild aversive stimulation.

Signaled Punishment

Some punishment contingencies are always in effect. However, more commonly, the punishment contingency is only in effect in the presence of particular

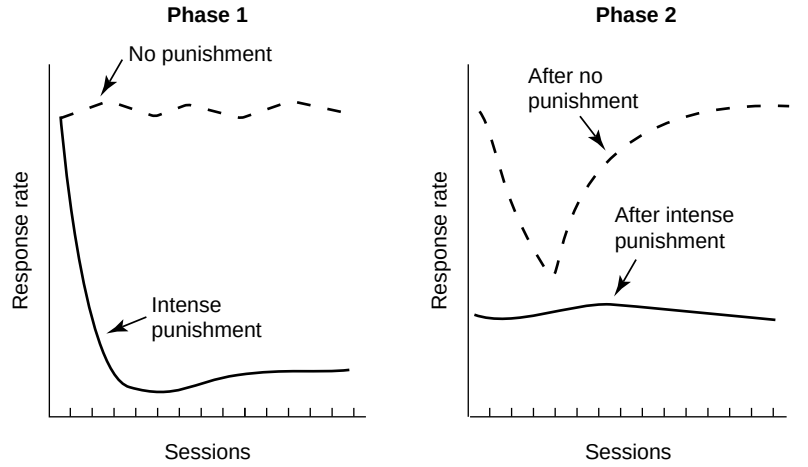
FIGURE 11.1. Immunizing Effects of Prior Experience With Mild Punishment



Note. During Phase 1, one group of participants is exposed to mild punishment, while another group is permitted to respond without punishment. During Phase 2, both groups receive intense punishment. Data are hypothetical.

stimuli, which are usually provided by the person who administers the punishment procedure. If punishment is signaled by a distinctive stimulus, the procedure is called **discriminative punishment**. A child, for example, may be reprimanded for running through the living room when her parents are home but not when her grandparents are in charge. In this case, punishment would be signaled by cues associated with the presence of the child's parents. The parents would be discriminative stimuli for punishment.

FIGURE 11.2. Sensitizing Effects of Experience With Intense Punishment



Note. During Phase 1, one group of participants is exposed to intense punishment, while another group is permitted to respond without punishment. During Phase 2, both groups receive mild punishment. Data are hypothetical.

As you might suspect, a child reprimanded by her parents but not by her grandparents will avoid running through the living room when her parents are home but will not show such restraint when the grandparents are in charge. Discriminative-punishment procedures result in discriminative suppression of behavior (Dinsmoor, 1952). Responding becomes suppressed in the presence of the discriminative stimulus but continues unabated when the discriminative stimulus is absent.

Discriminative control of a punished response can be problematic. A parent may try to get a child not to use foul language by punishing them whenever they curse. This may discourage cursing in the presence of the parent but will not stop the child from cursing around friends or at school. The suppression of foul language will be under discriminative control, and the parent's goal will not be achieved.

In other cases, the discriminative punishment is not problematic. If a child starts talking loudly during a religious service, they are likely to be reprimanded. If the punishment procedure is effective, the child will cease talking during the service, but this will not stop them from talking enthusiastically elsewhere. Having the response suppressed only under the discriminative-stimulus control of the church service is not a problem.

Another potential problem with signaled punishment is that one can learn to associate the signal, rather than the response, with the punishing event. This is akin to the "blocking" effect that we considered in Chapters 5 and 6. St. Claire-Smith (1979), for example, demonstrated that a punishment procedure was ineffective in reducing the lever-press behavior of rats if the punished lever press was accompanied by a brief auditory stimulus that separately predicted foot shock. In this case, it appears that the rats attributed the cause of the punishment to the signal rather than to the response, and this reduced the effectiveness of the punishment procedure.

Punishment and the Mechanisms Maintaining the Punished Response

Punishment procedures are applied to responses that already occur for one reason or another. Typically, punished responses are maintained by some form of positive reinforcement. This turns out to be important because the effects of punishment depend on the type of reinforcement and schedule of reinforcement that support the target response.

A child may talk during a church service to attract attention or to enjoy the camaraderie that comes from talking with a friend. If the child is reprimanded for talking, the aversiveness of the reprimand is pitted against the enjoyment of the attention and camaraderie. The outcome of the punishment procedure depends on how the child solves this cost–benefit problem. Research with laboratory animals has shown that, in general, punishment will be less effective if the target response is reinforced frequently. Punishment is more effective if the target response is reinforced only once in a while (Church & Raymond, 1967).

The outcome of punishment also depends on the particular schedule of positive reinforcement that maintains the target response. With variable- and

fixed-interval schedules, punishment reduces the overall level of responding but does not change the temporal distribution of the behavior (e.g., Azrin & Holz, 1961). In contrast, if the instrumental response is maintained on a fixed-ratio schedule of reinforcement, punishment tends to increase the postreinforcement pause (Azrin, 1959; Dardano & Sauerbrunn, 1964), with little effect on the ratio run.

Punishment and the Reinforcement of Alternative Behavior

As we saw in the preceding section, the outcome of punishment procedures can be analyzed in terms of the relative costs and benefits of performing the target response. This cost–benefit analysis involves not only the punished response but also other activities the individual may perform. A powerful technique for increasing the effects of punishment is to provide positive reinforcement for some other behavior (Perry & Parke, 1975). Successful parents are well aware of this principle. Punishing children on a long car ride for quarreling among themselves is relatively ineffective if the children are not given much else to do. Punishment of quarreling is much more effective if it is accompanied by an alternative reinforced activity, such as playing a video game or watching a movie on a computer tablet in the car.

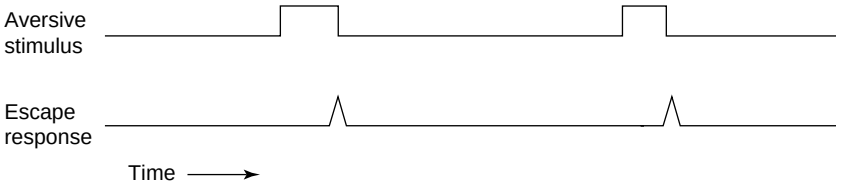
Paradoxical Effects of Punishment

The factors that we have described so far determine the extent to which punishment will suppress the target response. Punishment will not be effective if the punished response is maintained by a powerful schedule of positive reinforcement, if there is no positive reinforcement for alternative behavior, or if the punishment is mild, delayed, and involves a weak response–reinforcer contingency. Weak punishment parameters make punishment ineffective. Under some circumstances, punishment may even produce the opposite of what is intended—facilitation rather than suppression of responding.

Punishment as a Signal for Positive Reinforcement

Paradoxical facilitation of responding can occur when punishment serves as a signal for positive reinforcement (Holz & Azrin, 1961). Attention, for example, is a powerful source of reinforcement for children. A child may be ignored by his parents most of the time as long as he is not doing anything dangerous or disruptive. If he starts playing with matches, he is severely reprimanded. Will punishment suppress the target response in this case? Not likely. Notice that the child receives attention from his parents only after he does something bad and is being punished. Under these circumstances, punishment can become a signal for attention or positive reinforcement, with the outcome that the child will seek out punishment as a way to obtain attention. One of the hardest things for parents to learn is to pay attention to their children when the children are not doing anything disruptive so that punishment does not become associated with getting attention.

FIGURE 11.3. Diagram of an Escape or Negative-Reinforcement Procedure



Note. The escape response occurs during the aversive stimulus and results in its termination.

Punishment of Escape Behavior

Paradoxical effects can also occur if punishment is applied to an escape response. An escape response occurs during an aversive stimulus and serves to turn off that stimulus. If you are taking a shower and the water suddenly becomes very hot, you can escape by turning off the water. Once you perform the escape response, you quickly learn that turning off the water relieves you of getting scalded by the hot shower. The hot shower is an aversive stimulus, and the operation of turning off the aversive stimulus is called **negative reinforcement**. (We will have more to say about negative reinforcement in Chapter 12.)

The procedure for negative reinforcement is diagrammed in Figure 11.3. Each trial begins with the presentation of an aversive stimulus. The aversive stimulus remains on until the escape response is performed, at which point the aversive stimulus is terminated. Thus, escape responses always occur in the presence of an aversive stimulus. Before you can escape a scalding shower, you must first experience the hot water. This makes the aversive hot water a cue for the escape response. Escape behavior is always motivated by an aversive stimulus. Because of this, punishment facilitates rather than suppresses escape responding (e.g., Dean & Pittman, 1991). This paradoxical effect occurs because the aversive stimulus used to punish the escape response also creates motivation for escape responding. Therefore, the escape response persists even though it is being punished.

Paradoxical effects of punishment are not common, and they should not encourage us to jump to the conclusion that punishment produces unpredictable results. Rather, if a paradoxical effect of punishment is observed, one should examine the situation carefully to determine whether punishment has come to serve as a signal for positive reinforcement. If that does not seem likely, perhaps the target response was previously conditioned as an escape response.

CAN AND SHOULD WE CREATE A SOCIETY FREE OF PUNISHMENT?

As we noted at the beginning of this chapter, both Thorndike and Skinner advocated that punishment should not be used because they did not regard it to be an effective way to produce significant and lasting changes in behavior.

Their recommendation was fine, but their reasoning was wrong. Laboratory experiments have shown that punishment can be highly effective in decreasing a targeted response. Does this mean that we should go ahead and use punishment whenever we want to discourage some activity? Or should we work to build a society entirely free of punishment? Answers to these questions depend in part on what one considers to be just and ethical human conduct. Ethical questions are beyond the scope of the principles of conditioning and learning. We can consider, however, how empirical evidence about the effectiveness of punishment may inform the decisions we make about societal uses of punishment.

First, can we create a punishment-free environment? The answer to that is pretty obvious. Punishment is an inevitable consequence of various aspects of the physical and biological world in which we live. If you mishandle a cat, the cat will scratch you. If you don't hold your glass steady as you pour from a pitcher, you will spill and make a mess. If you lift a pot out of the oven without a potholder, you will burn yourself. It would be impossible to redesign our environment to eliminate all sources of punishment.

Given that punishment cannot be eliminated entirely, what kinds of punishment should we try to get rid of, and would doing so be sensible? The kind of punishment that people in our culture find most objectionable is physical pain inflicted by one person in an effort to control the behavior of someone else. We have laws against the use of corporal punishment in schools. We also have laws against child, spousal/partner, and elder abuse. Such laws are justified on moral and ethical grounds. Do such laws also make sense from the perspective of empirical principles of punishment? We believe so.

Interpersonal interactions involving punishment require one individual to inflict pain on another. An important factor is the willingness of the person administering the punishment to hurt the recipient. A parent may claim to be punishing a child for having received a poor grade in school or a husband may say that he is punishing his wife for getting home late. However, whether the punishment occurs is often related to the emotional state of the person who administers the punishment. People are more likely to punish someone if they are frustrated and angry (Holden et al., 2014). Consistent with this, there is considerable laboratory evidence with rats and pigeons that frustration and pain both elicit aggression (Azrin et al., 1966; Ulrich et al., 1965).

If a person is lashing out against another individual out of anger and frustration, principles of effective punishment are probably furthest from their mind. A poor grade on a school assignment may aggravate a parent only when the parent is frustrated and angry, which makes the punishment intermittent. Frustrative punishment is also likely to occur with a long delay after the transgression occurred. A parent may become abusive when a child brings home a poor report card, even though the responses that contributed to the poor grades occurred earlier over a period of weeks.

Another disadvantage is that frustrative punishment is often under discriminative stimulus control, with the discriminative stimulus being unrelated to the punished behavior. A parent may become upset by a poor report card when

the parent's emotional resources are strained by difficulties at work, ill health, or drug abuse. Under these circumstances, the likelihood of punishment will be signaled by the parent's irritability, and in such cases, children will learn that they can get their report card signed without being punished if they just wait until the next day or the weekend when their mother is in a better mood.

Another problem is that frustrative punishment is rarely accompanied by positive reinforcement of alternative behavior. When a parent punishes a child out of irritability and anger, the parent is not likely to have the presence of mind to accompany the punishment with a programmatic effort to provide positive reinforcement for more constructive activities.

Punishment as an act of aggression and frustration violates many of the parameters of effective punishment and therefore does not produce constructive changes in behavior. Because punishment out of frustration is poorly related to the targeted behavior, frustrative punishment is abusive and cannot be justified as a systematic behavior modification procedure. Societal prohibitions against the use of punishment serve to reduce instances of punishment that are motivated by frustration and anger rather than a thoughtful programmatic effort to promote better behavior. (For a discussion of other problems related to the use of punishment in society, see Gershoff, 2013, 2016.)

ALTERNATIVES TO ABUSIVE PUNISHMENT

Abusive punishment cannot be justified on either ethical or empirical grounds. But undesired responses are bound to occur in homes, classrooms, and other settings. What are we to do about them? What alternatives are there to abusive punishment? Unfortunately, there are no easy answers. It has become clear that whatever procedure is adopted to suppress undesired responses, that procedure must be applied as part of a systematic program that considers not only the response to be suppressed but also other activities and other sources of reinforcement of the client. We discussed in Chapter 9 how the effects of positive reinforcement depend on a broader behavioral context. The same thing is very much the case for punishment.

Time-Out

A popular alternative to physical punishment in educational settings is the time-out procedure (Hagopian et al., 2013; Slocum et al., 2019). In a **time-out** procedure, the opportunity to obtain reinforcement is removed. This may involve removal of the participant from the situation where reinforcers may be obtained. In fact, many classrooms have a time-out chair where students sit if they are being punished. In a time-out procedure, the consequence of making an undesired response is not a physically aversive event but time out from sources of positive reinforcement. A teenager who is "grounded" for a week for having taken the family car without permission is undergoing a

form of the time-out procedure. Time-out is also being used when a child is told to "go to your room" as a form of punishment.

As with other instrumental conditioning procedures, the effectiveness of time-out depends on the delay between the target response and the time-out consequence. The effectiveness of the procedure also depends on how consistently it is applied. In addition, time-out involves some special considerations. To be effective, the procedure should result in a substantial reduction in the rate of positive reinforcement. A child who has many fun things to do in her room will not be discouraged by being sent to her room as a form of time-out. (Recall the concept of substitutability that we considered in Chapter 9.)

Another important consideration is how much reinforcement was available before the time-out was administered compared with how much reinforcement is available in the time-out situation. Time-out is unlikely to suppress behavior if the individual is not getting much positive reinforcement anyway. A child who is not enjoying any aspect of being in a classroom will not experience much of a loss of reinforcement when they are put in time-out.

Differential Reinforcement of Other Behavior

Another alternative to abusive punishment is **differential reinforcement of other behavior** (DRO; Jessel & Ingvarsson, 2016). A DRO procedure involves a negative contingency between a target response and a reinforcer. We previously discussed learning produced by a negative contingency in connection with inhibitory Pavlovian conditioning. There the negative contingency was between a conditioned and an unconditioned stimulus. The inhibitory conditioned stimulus indicated that the unconditioned stimulus would not occur. In a DRO procedure, the negative contingency is between a target instrumental response and presentations of a reinforcing stimulus. Occurrence of the target response leads to the omission of the reinforcer.

In a DRO procedure, the reinforcer is scheduled to be delivered at set intervals (every 30 seconds, for example). Occurrence of the target response causes cancellation of these scheduled reinforcers for a specified period or resetting of the DRO clock. This contingency results in suppression of the target response. Because the DRO procedure involves a negative response–reinforcer contingency and suppresses responding, DRO is sometimes called *negative punishment* (Lattal, 2013).

Cancelling a teenager's weekly allowance because she stayed out too late one night is an example of a DRO schedule. The allowance is provided on a regular basis. However, the occurrence of a target undesired response results in suspension of the allowance for a specified period.

DRO is different from the time-out procedure described in the preceding section in several respects. In a DRO, reinforcers are not cancelled by having the individual go to a specific time-out chair or time-out room. Rather, previously scheduled reinforcers are omitted for a certain amount of time after the target response. Another important difference is that in the DRO procedure

reinforcers are explicitly provided when the target response does not occur. Thus, activities other than the target behavior end up getting reinforced. This is why the procedure is called "differential reinforcement of other behavior." It does not matter what those "other" behaviors are. Because individuals are always doing something, alternatives to the target response come to be performed more frequently in a DRO procedure (Jessel et al., 2015).

A DRO procedure is more difficult to administer than the more common time-out procedure because it requires providing a reinforcer periodically when the target response is not made. To employ a DRO procedure, a convenient reinforcer must be identified, and arrangements have to be made to deliver the reinforcer periodically over extended periods of time. Thus, the DRO procedure requires interacting with the participant for long periods of time even if the response of interest does not occur. Nevertheless, this procedure can be an effective one for selectively decreasing an undesired response while increasing the rate of other more suitable behaviors.

SUMMARY

In a punishment procedure, an aversive stimulus is presented contingent on the instrumental response. Punishment is highly effective in suppressing the target response if it is administered without delay, at a high intensity from the beginning, and each time the target response is made. The effectiveness of punishment can be further increased by providing positive reinforcement for alternative activities. Exposure to mild punishment at the beginning can result in learned resistance to the suppressive effects of more intense punishment, and signaling punishment can limit the response suppression to the presence of the signal. Punishment can result in a paradoxical increase in responding if it serves as a signal for positive reinforcement or if it is applied to escape behavior that is aversively motivated.

In daily life, the use of punishment is often related to the emotional state of the person who administers the aversive stimulus. People are likely to use punishment when they are frustrated and angry. Under these circumstances, many of the requirements of effective punishment are violated, with the result that no constructive changes in behavior are produced. Problems with the use of punishment have encouraged the use of alternatives such as time-out and differential reinforcement of other behavior. Successful application of any response-suppression procedure requires considering not only the undesired response but also the individual's other activities and other sources of reinforcement.

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TECHNICAL TERMS

punishment, page 174
discriminative punishment, page 179
negative reinforcement, page 182
time-out, page 184
differential reinforcement of other behavior, page 185

For chapter summaries and practice quizzes, visit https://www.apa.org/pubs/books/essentials-conditioning-learning-fifth-edition (see the Student Resources tab).