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DIRECT AND INDIRECT EFFECTS OF POSITIVE AND NEGATIVE
EVALUATIVE COMMENTS IN LEARNING

The University of Nebraska - Lincoln

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NEGATIVE EVALUATIVE COMMENTS IN LEARNING

by

Daniel A. Leggiadro

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Under the Supervision of Professor Roger Bruning

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TITLE

DIRECT AND INDIRECT EFFECTS OF POSITIVE AND NEGATIVE

EVALUATIVE COMMENTS IN LEARNING

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D.A.L.

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CHAPTER I

INTRODUCTION

For over seventy years there has been extensive research on variables which influence the learning process. Among these variables, the consequences of behavior, particularly reinforcement, are considered by most educational psychologists to be among the crucial determinants of learning.

The role of reinforcement in learning has received particular emphasis with the advent of behavior analysis as a philosophical and technological movement. Reinforcement is viewed by most behavioral theorists as playing a central role in both animal and human learning; the following principles of reinforcement summarize some of the most important tenets of behavior analysis: (1) Within limits, the greater the amount of reinforcement, the more rapid the rate of learning; (2) The shorter the delay between performance of a correct response and reward, the more rapid the learning; (3) Intermittent reinforcement produces slower initial learning than continuous reinforcement, but once reinforcement is discontinued, the learning is significantly more resistant to extinction; (4) Variable-ratio and variable-interval schedules of reinforcement produce high response rates which are less likely to fluctuate over time than performance under fixed-ratio or fixed-interval schedules of reinforcement.

The effectiveness of reinforcement in both laboratory and applied learning settings has been substantiated by a vast amount of

research, and, as a result, many fundamental research questions relating to principles such as those stated above are no longer being asked. Instead, there has been increased consideration of philosophical questions such as who should control behavior. The efficacy of reinforcement in the learning process is now generally taken for granted, and the emphasis is now placed on the various applications of reinforcement principles throughout society and on the ethical concerns which logically follow.

Recently, however, some researchers (e.g., Lepper & Green, 1978) have begun to argue that the indiscriminate use of reinforcement may produce detrimental effects. Others such as Walters and Grusec (1977) suggest that reinforcement may have its limitations as a behavioral change technique, and propose that, under certain conditions, punishment may be more effective. Nonetheless, reinforcement is portrayed in most current literature as a benign and effective process which provides better and more stable learning, more positive attitudes towards learning, and little, if any, negative side effects. Punishment, on the other hand, is almost invariably presented as a maladaptive, ineffective, and even wasteful technique that generates numerous negative side effects and has little to offer to the enhancement of learning.

Indeed, few topics elicit as many emotional responses as does the mention of the use of punishment, whether it be in the home, school, or prison system. We are at a time when school boards are establishing rules and guidelines for reinstating the use of corporal punishment

within the schools. As a result, what may develop are attitudinal changes toward punishment in general and an increasing tolerance for use of noncorporal punishment in the classroom. Given the rising concern of many parents and educators with "discipline" in the schools, noncorporal punishment may be increasingly suggested as a means for managing behavior and for facilitating learning in the classroom.

A number of forms of punishment have always been used in the schools; teachers give students reprimands for being too noisy or not paying attention, and teachers send students to the principal's office for misbehaviors. However, even though procedures such as these are widely used, most of them are not generally sanctioned, applied in a systematic fashion, nor thought of positively.

Whether or not there is a general revival of the use of punishment in the schools, however, many unanswered questions still exist about its use, its effectiveness relative to that of reinforcement, and its side effects. If educational psychologists are to make suggestions or to give opinions about the efficacy of reinforcement or punishment, then these suggestions or opinions should be based as solidly as possible on empirical evidence and not on speculation or conjecture.

The reality of the situation is that both reinforcement and punishment are too complex for simple, easy generalizations. The assertion that punishment is ineffective and reinforcement is effective is an oversimplification. Under certain conditions a good case might be made for punishment being a better behavioral change technique than reinforcement. For instance, socialization research carried out with

children suggests that punishment for incorrect behavior may lead to faster learning than does reinforcement for correct behavior, and that a combination of reinforcement and punishment may be more effective than punishment alone (Meyer & Offenbach, 1962; Spence, 1966; Penney, 1967; Hamilton, 1969; Witte & Grossman, 1971; Paris & Cairns, 1972). Although such studies indicate that for some purposes it may be effective to punish incorrect behavior, no studies to date have examined the conventional forms of verbal feedback most commonly used in educational situations, the side effects of punishment and reinforcement, or the self-statements that people make when they are presented with either positive or negative evaluative feedback.

The present study was a detailed experimental investigation directed toward the fundamental question of whether it is more effective and appropriate to reward for correct behavior, to punish for incorrect behavior, or to use a combination of both reinforcement and punishment. This is a relevant question to those people interested in promoting learning whether it be in education, business, socialization and child-rearing, or any other aspect of society. Direct measures were taken of learning under various experimental conditions, while indirect measures were gathered on a number of variables judged to be indices of side and residual effects of either reinforcement or punishment.

CHAPTER II

THEORETICAL AND RESEARCH BACKGROUND

A Historical Perspective

Although there has been a history of research on punishment, it was not until the early 1960's that punishment research joined the mainstream of learning research. In a survey of articles published between 1902 and 1966, Boe (1969) documented a dramatic increase in the amount of experimentation in the area of punishment in the early 1960's. This expansion was mainly stimulated by the analytical review articles published by Church (1963), Solomon (1964), and Azrin and Holz (1966). During this time researchers went back to the laboratory to ask very basic questions and according to Walters and Grusec (1977), "the first systematic analysis of punishment had begun" (p. 12).

Research in punishment became much more pervasive because its context now included many more manipulations that were considered to be punishing operations. The traditional experimentation (i.e., the period prior to 1960) involving both reinforcement and punishment regarded the latter as a discrete event in time and usually defined it as the presentation of aversive stimulus. The effect upon behavior was unspecified. Prior to 1950, the contingent and noncontingent presentation of punishment for a particular response were seen as equally meaningful. Response contingency was not considered necessary for the implementation of the punishment procedure.

Throughout the early 1900's until about 1930, experimental and theoretical work on punishment was dominated by the views of E. L. Thorndike. Both reinforcement and punishment were considered in Thorndike's Law of Effect, which refers to the strengthening or weakening of a connection as a result of its consequences. Reinforcement strengthens a response by means of "satisfiers" and punishment weakens a response by means of "annoyers." The rewarding and punishing effects of stimuli were seen as equal but in the opposite direction. For Thorndike, a response that was "stamped in" by a positive reinforcer could be likewise "stamped out" by a noxious event. The distinction was that both reinforcement and punishment changed the response strength to a considerable degree, but in opposite directions.

In 1932, Thorndike made a radical change in his theory. On the basis of several experiments, one of which will be discussed later, he decided that punishment really has no inherently weakening effect upon behavior. Whenever punishment appears to weaken a response, it has only done so indirectly by simply telling the organism what not to do. Punishment carries no information by itself which tells the organism what particular course of behavior it should follow. Thorndike retained only the positive aspect of the Law of Effect, and concluded that a punisher only shifts the attention of the organism to another response rather than directly weakening the response that is punished.

Similar conclusions were subsequently reached in the experimentation of Skinner (1938) and Estes (1944). Skinner punished rats for

pressing a lever by having the lever quickly snap upward thereby slapping the rats' paws. To measure the effects of punishment, Skinner obtained extinction curves for four rats following training with a fixed-interval schedule of reinforcement. Two rats were slapped at the beginning of the extinction period, and two were not. The result was that the rats slapped at the beginning of extinction showed a much lower rate of responding during extinction. As a matter of fact, the punishment seemed to suppress the response entirely for a period of time. However, the interesting point is that by the time extinction was complete, the slapped rats' total number of responses emitted was equal to those of the rats which were not slapped.

Skinner interpreted the data to mean that punishment has only a temporary effect upon behavior. Punishment did not affect the total number of responses that the animal would eventually emit during extinction, but it only affected the rate at which the total would be emitted. Early in extinction the punished animals showed a lower rate of responding; their response rate was suppressed. Eventually, however, the suppression disappeared and the rates accelerated, so that in the end the punished animals gave just as many responses altogether as the unpunished animals.

In a widely cited monograph, Estes (1944) reported a variety of experiments on punishment. He used lever-pressing in the rat as the response of interest but substituted an electric shock for Skinner's slap. The shock was delivered through the lever so that rats accustomed to receiving food as a result of lever-pressing sometimes received the

shock instead. Estes reported findings that were similar to Skinner's conclusions about punishment. He stated that the effect of punishment is primarily upon the rate of responding rather than upon the total overall tendency to emit a particular response.

Estes found that if punishment was intense enough or lasted long enough, there was a slight permanent decrease in the total number of responses the animal would emit. Nevertheless, punishment was never able to eliminate responding during extinction completely. Rats always returned to responding after punishment even though they were never again reinforced. Under conditions in which Estes punished the rates intermittently instead of for every response, the decrease of the rate of responding was not nearly so great, but it was longer before responding resumed. The results of partial punishment are thus consistent with the findings on partial reinforcement (Azrin, Holy, & Hake, 1963; Boe, 1971). In addition to the variables mentioned thus far, Skinner and Estes varied the intensity of the shock, the schedule of presentation, and the manner of presentation. Noncontingent punishment was demonstrated to be as effective as contingent punishment, and thus the view that punishment establishes an generalized internal emotional state became popular.

Somewhat earlier, Meunzinger (1934) had demonstrated that the formulation of a simultaneous two-choice discrimination in a discrete-trial T-maze situation is facilitated when either the correct response alternative, the incorrect response alternative or both alternatives are punished. This finding by Meunzinger served as the impetus for

an information or discrimination theoretical approach to punishment.

Since the time of these early studies, and in contrast to the views of Skinner and Estes, a great deal of more recent research evidence has demonstrated that a punisher can be a highly effective modifier of behavior when made contingent upon a response (e.g., Brady, 1955; Azrin, 1956; Church, 1963, 1969; Azrin & Holz, 1966; Camp, Raymond, & Church, 1967). As stated by Fantino (1973), "Although Skinner has made an impressive case against the effectiveness of aversive control, his position has not been borne out by empirical data" (p. 243).

Learning researchers (Azrin, 1953; Hunt & Brady, 1955; Azrin et al., 1963; Church, Wooten, & Matthews, 1970; Boe, 1971; Meyer, 1971) have demonstrated without a doubt that response-contingent punishment does a more direct and effective job of suppressing a particular response than noncontingent punishment for a particular response using the conditional emotional response procedure. The basic and undeniable conclusion from these studies is that contingent punishment is capable of totally suppressing behavior.

Church et al. (1970) hypothesized that contingent punishment tends to have its effects upon a more restricted segment of an organism's behavior, namely that segment that is being punished. In contrast, the noncontingent punishment procedure tends to affect a large part of all behavior that occurs in the aversive situation. In the former procedure it is clear what is being punished, while in

the latter process it is never completely clear to the person being punished.

Definition of Punishment

In contemporary operant research, the most commonly accepted definition of punishment is that of Azrin and Holz (1966): "... punishment is a reduction of the future probability of a specific response as a result of the immediate delivery of a stimulus for that response. The stimulus is designated as a punishing stimulus; the entire process is designated as punishment" (p. 381). This definition not only includes reference to the organism's behavior, but it also specifies the behavioral effect of the stimulus. Punishment cannot facilitate or increase behavior, and it cannot be noncontingent. With this definition the noncontingent punishment phenomenon is either refuted or explained in terms of classical conditioning. It is a functional definition that defines itself by the result that it produces and conversely states that if the future probability of the response does not decrease, then one does not have a punishing stimulus and consequently no punishment procedure exists.

The argument for defining punishment by its outcome rather than as a procedure (i.e., in terms of behavioral outcome rather than as the presentation of aversive stimuli contingent upon a response) is that the latter refers to "subjective" states. To operant researchers, this is considered a theoretical inference about behavior that presents

great difficulty in measurement. Contrary to this opinion, however, the "subjective" definitions have had a firm empirical base. Thorndike was able to operationally define the "discomfort" of punishment as a condition which the organism would avoid or abandon.

The human being, of course, can verbally indicate whether a stimulus is aversive or not, and the extent to which it is aversive. Thus, for the purpose of this study, punishment is defined procedurally rather than functionally, that is, as aversive stimuli made contingent upon a response. The participants in the study themselves determine whether or not a stimulus is aversive.

Theories of Punishment

Three early theories of punishment have been mentioned in the historical background which has been presented. The first was Thorndike's original theory that stated that the response itself was weakened if punished. The second theory was Thorndike's later formulation which discounted punishment as effective in the same way that reward is effective. According to this view punishment acted indirectly by making the subject engage in other behaviors; the behavior that appeared weakened was actually the result of the organism performing other responses. Estes proposed that contingent and noncontingent punishment are essentially equal in suppressing behavior, and that aversive stimuli produce a conditioned emotional response in organisms that results in withdrawal. This emotional state is aroused by the discriminative stimuli in the situation and this fear state disrupts the behavior. Therefore what is of paramount importance is the stimuli-

shock relationship as opposed to the response-shock relationship.

Estes' position did not specify the exact nature or cause for the disruption of behavior other than to say that fear itself is disruptive. The first theory suggesting further principles of punishment was the competing-response theory proposed by Guthrie (1934), which stated that aversive stimuli elicit unconditioned skeletal responses which are physically incompatible with ongoing behavior. Electric shock, for example, would elicit responses that cannot be performed without disrupting other forms of behavior like lever-pressing. Guthrie's theory has merit in the sense that aversive stimuli do elicit unconditioned responses which compete with learned behavior.

The most popular punishment theories in recent years have been the so-called two-factor theories (Bolles, 1967), which rely in part on the concept of conditioned punishment. Two-factor theories generally maintain that punishment involves two processes: (1) the association of stimuli preceding punishment (conditioned punishers) with the punishment itself, generally through classical conditioning; and (2) the association of a response with the removal of these conditioned punishers, generally through operant conditioning. The punishing stimuli elicit an emotional response (for example, fear) which is conditioned to environmental stimuli. The result is avoidance learning. The avoidance response can be any response that terminates the presence of the stimuli eliciting the emotional response or enables the organism to escape from them. The avoidance or escape response is

in direct competition with the punished response and, as a result, suppression of the punished response takes place.

It is generally felt that the primary advantage of the two-factor punishment theories are that they account for response suppression by using both respondent and instrumental learning principles. There are many variations of two-process or two-factor theories (Mowrer, 1947, 1960; Dinsmoor, 1954, 1955; Rescorla & Solomon, 1967; Rachlin & Herrnstein, 1969), each of which has its own merits and limitation. Generally most of these theories of punishment are limited conceptualizations that are not appropriate for all types of punished responses or for all types of punishment situations.

Some learning researchers in recent years take the theoretical stance that punishment and reinforcement are different sides of the same coin, which ironically is the position Thorndike took in 1913. They reject the notion, however, that learning is simply a matter of the forming and undoing of hypothetical stimulus-response associations. Fantino (1973), for example, notes that although punishment has not been studied as extensively as reinforcement, the research evidence indicates that the principles which apply to reinforcement apply to punishment as well. In his view, there is remarkable symmetry between the effects of reinforcement and punishment.

Parameters of Punishment

Today, learning theorists have passed from an era of the grand, broad theory into the era of the microtheory. Because of the enormous

complexity of behavior, it is impossible to develop a general theory of punishment. Instead, modern theorists examine a specific bit of behavior, collect large amounts of data, tease it apart, and then attempt to put it together into some limited theoretical structure or microtheory. Unfortunately there is still no simple answer to the question of punishment and its application to human learning.

As indicated previously, punishment suppresses behavior when contingently applied, and its effects can be lasting, depending upon the conditions. A variety of other parameters of punishment, however, determines if a punishment procedure will be effective and to what extent. These variables which determine the degree and extent of punishment's effects include the intensity of punishment, duration of punishment, schedule of presentation, contingency, delay of presentation, prior stimulation, and the nature of the punishing agent. It is not within the scope of this paper to examine all these conditions but rather to discuss those variables which are relevant for the present study.

The effects of punishment are determined to a great extent by the original intensity and schedule of application of the punishing stimulus. Only very intense punishers are likely to lead to complete and permanent response suppression; mild to moderate punishers are almost always followed by recovery.

Speed of recovery is contingent upon the original schedule of application of punishment. Continuous punishment is associated with rapid recovery; intermittent punishment leads to gradual recovery.

Degree of recovery following mild continuous punishment usually exceeds the original baseline level of responding, although it must be remembered that the studies leading to these conclusions were almost completely done with animals using electric shock as the punisher (Fantino, 1973).

Although schedules of reinforcement are widely studied, the same has not been true with schedules of punishment. The most commonly used schedule of punishment is continuous punishment, and generally the conclusion drawn is that the more frequent the punishment, the greater the degree of response suppression (Azrin, Holz, & Hake, 1963). Using human participants, Zimmer and Baydan (1963) and Crider, Schwartz and Shapiro (1970) have demonstrated that continuous punishment is more effective than intermittent punishment in suppressing a response.

As with reinforcement, a crucial variable determining the effectiveness of a punisher is the immediacy of the presentation of the punisher following the response to be punished. The effectiveness of reinforcement can be drastically reduced if the period of delay intervenes between execution of the response and punishment (Neuringer, 1969; Mackintosh, 1974). So it is also with punishment. If the suppressive effects of punishment on responding are to be maximal and enduring, punishment should be applied immediately (Cohen, 1968).

Azrin and Holz (1966), in summarizing the conditions under which punishment is the most effective in suppressing behavior, mention several of these same points. (1) Punishment should be as intense as