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WHAT'S WRONG WITH PUNISHMENT?*

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The two authors have been working closely together for two years and have published several reports of their research concerned with the effects of punishment on animal behavior. The present paper was adapted from a talk given by Dr. Appel at the joint meetings of ASC and AAAS in Cleveland, December, 1963.—Editor.

It is possible to distinguish at least three ways in which punishment or the threat of punishment is used in our complex society. (1) To re-assert or to advertise legal, ethical, and moral principles. It is wrong to commit a premeditated murder; the murderer must therefore be punished. (2) To deter others from committing an offense. If we impose a severe sentence for burglary, the frequency of this crime should be reduced. (3) To suppress an individual's disposition to behave in a certain manner. If we slap Johny's hand when he puts it into the cookie jar, we will reduce his tendency to reach for a second cookie.

In the first two examples, punishment is used to promote the welfare of the *punishing* agency; no benefit to the punished individual need be either implied or intended. The third use of punishment is of particular psychological interest and the exclusive concern of this paper; it presupposes that such treatment can modify the behavior of the individual who is being punished, hopefully in such a way as to make him a more socially desirable person. We maintain, however, that while punishment may indeed suppress behavior, it can, by itself, have no such therapeutic or beneficial consequences because its effects are usually transient and depend on continuous and repeated applications.

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The use of punishment, in spite of, or perhaps because of, recent modifications in techniques of education and of psychotherapy, seems to have increased in popularity during the last few years. This can be seen in the growing number of experimental and clinical studies involving aversive control of one kind or another[1] or in what has been called "aversion therapy."[2] As just one example of the "therapeutic" use of punishment in the clinic, a recent report from a hospital in England can be cited.[3]

A single male transvestite was placed in a room the floor of which was an electrifiable grid. Every time he was instructed to put on his favorite female garments, a shock was given through this floor. Disrobing terminated the shock. This unfortunate individual's sysmptoms were reported to have been eliminated for six months, presumably as a result of his treatment.

While we may wonder both about the generality of this finding and whether the abnormal behavior was in fact eliminated or was emitted discreetly at home, it is not our purpose to further discuss data of this kind but to present some results of experiments on punishment from controlled and restricted environments. These laboratory studies have been replicated several times and seem therefore much less subject to scientific objections. They are, by their very nature, however, far removed from clinical situations and, to generalize from

[1] For example, Appel, *Analysis of Aversively Motivated Behavior*, 10 ARCHIVES GEN. PSYCHIAT. 71 (1964).

[2] Rachman, *Introduction to Behavior Therapy*, 1 BEHAV. RES. THERAP. 3 (1963).

[3] Blakemore, Thorpe, Barker, Conway, and Lavin, *The Application of Faradic Aversion Conditioning in a Case of Transvestism*, 1 BEHAV. RES. THERAP. 29 (1963).

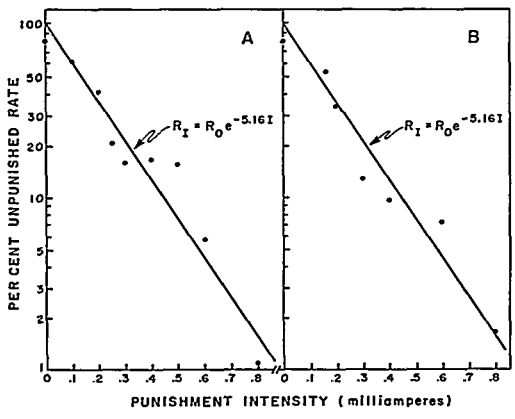

Figure 1

The functional relationship between response suppression and punishment intensity in rats. See text for further explanation.

experiments with pigeons, rats and monkeys to complex human social situations is always a great risk. Nevertheless, the results might be of some general interest.

In the experiments we wish to discuss, hungry animals are trained to work for food rewards by pressing a lever mounted on one wall of a sound and light attenuated experimental chamber or by pecking at an illuminated plastic disc or key. The subjects are given many weeks of daily 1 or 1–1½ hour experimental sessions in the apparatus. During these sessions, every bar-press or key-peck is initially followed by food but later, only some of these responses are rewarded. On the average, food is given once a minute. Such a schedule is called variable-interval (VI 1). Each response is recorded and rate of bar-pressing or key-pecking is of primary interest.

After the food-motivated performance stabilizes, an attempt is made to evaluate the effects of punishment by adding such a contingency to the on-going or base line conditions. In the experiments to be discussed, brief electric shocks of various intensities were administered immediately following each (intermittently rewarded) response. Thus, at this stage of the experimentation, whenever a simple pattern of motor behavior resulting in the depression of the lever or key occurs, it is followed occasionally by food and regularly by shock. The shocks were given to rats through the response lever and the floor of the chamber; birds were punished through surgically implanted shock electrodes.[4] In spite of these radical differences both in species and in method of punishment administration, virtually identical results were obtained in all of the experiments.

It is important to understand that in the procedure we have described only one sequence or chain of behavior can ultimately be followed by food and it is this highly motivated behavior and only this behavior which is concurrently punished. If other, alternative sequences are allowed to produce the same or greater rewards, the administration of presumably punishing stimuli has very different effects[5]; i.e., such stimuli serve to "remind" the animal to emit the non-punished response. That is, very mild, response-contingent shocks function as discriminative stimuli, feedback cues, or secondary reinforcers by providing information which enables the organism to structure its environment.[6] Supposedly punished behavior is, in such a case, not suppressed. It simply becomes less preferred than the alternative rewarded behavior. Thus, when more than one route to reward is clearly provided, many kinds of very mild "punishments" such as gentle reprimands or discipline might have constructive value not by giving pain but by giving information.

To return to the case when a stimulus has only one function, to punish, i.e., when painful or aversive events are applied immediately after the emission of a response, Fig. 1 shows the quantitative relationship between shock intensity and response rate. The average percent of the unpunished rate of bar-pressing for four rats is shown on a logarithmic scale on the ordinate of Box A of the figure and shock intensity is indicated on the abscissa. The equation describes the line which best fits the actual data points.[7] As the intensity of shock increases, the rate decreases; in other words, the more severe the punishment, the greater is the amount of suppression of the punished response.

The mathematical relationship seems to have some generality. It was fitted to the average data on the first day of punishment in an experiment with rats in our laboratory and was found to predict the performance during the 10th through the 15th day of exposure to various intensities of punishment in another group of rats in another experiment and, in Fig. 2, the behavior of pigeons

[4] Azrin, *A Technique for Delivering Shock to Pigeons*, 2 J. Exp. Anal. Behav. 161 (1959).

[5] For example, see Muenzinger, *Motivation in Learning: I. Electric Shock for the Correct Response in a Visual Discrimination Habit*, 17 J. Comp. Psychol. 267 (1934).

[6] Holz, and Azrin, *Discriminative Properties of Punishment*, 4 J. Exp. Anal. Behav. 225 (1961).

[7] These data were first published in Appel, *Punishment and Shock Intensity*, 141 Science 528 (1963).

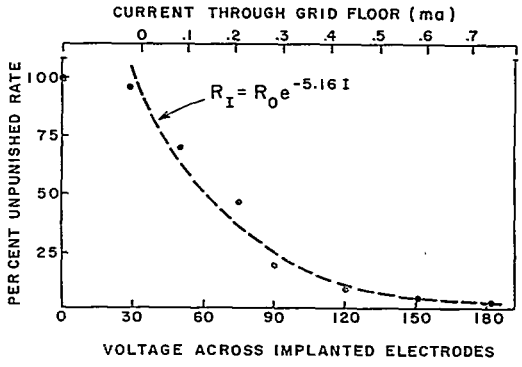

FIGURE 2

A comparison of response suppresion as a function of punishment intensity in birds and in rats. The data points are from a pigeon experiment by Azrin & Holz[8] and the equation is the same as that shown in Fig. 1.

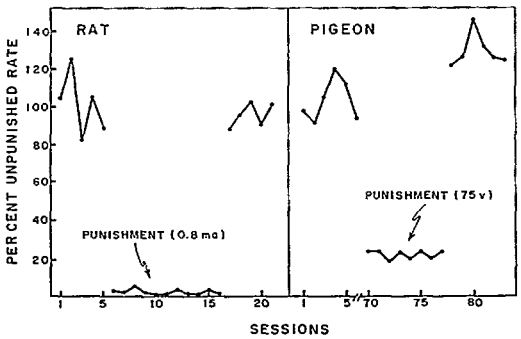

FIGURE 3

Average performances before, during, and after relatively severe punishment for rat and for pigeon. The pigeon data are from Azrin & Holz[8] and the rat data are unpublished.

punished with a different shock system in another laboratory.[8] There is no reason to expect that these findings would not apply to human beings and to all other organisms.

If then, punishment can suppress a simple, highly motivated pattern of behavior in an orderly manner, why do we argue that it is an ineffective therapeutic agent? Only three of many reasons will be discussed.

(1) At most intensities, suppressed behavior returns to normal, i.e., pre-punishment levels, as soon as shock is withdrawn.

Figure 3 shows data from two experiments in two different laboratories. Punishment at the intensities

[8] From Azrin, and Holz, *Punishment During Fixed Interval Reinforcement*, 4 J. EXP. ANAL. BEHAV. 343 (1961). We thank N. H. Azrin for allowing us to re-plot his data.

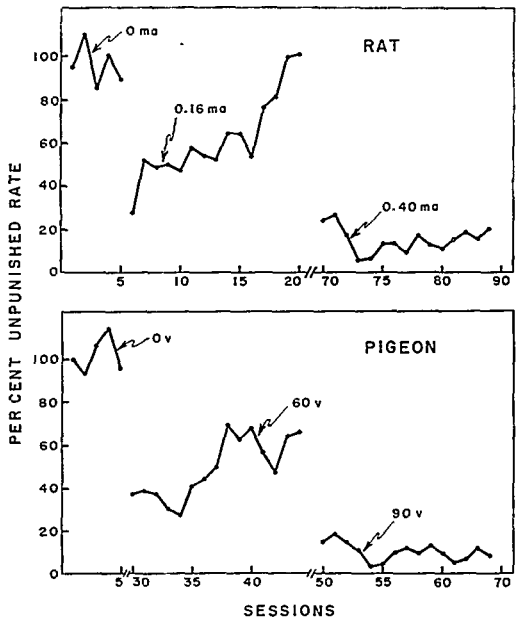

FIGURE 4

Between-session recovery as a function of shock intensity and number of sessions of punishment in rat and pigeon. The rat data (upper graph) are unpublished and the pigeon data (lower graph) are from Azrin & Holz.[8]

indicated was administered to either rats or birds for several daily experimental sessions (shown on the abscissa). As soon as shock is withdrawn, the response rate increases at least to its initial value. It can, therefore, be concluded that punishment suppresses concurrently rewarded behavior only as long as it continues to follow each response. This is clearly an inefficient if not an impossible procedure in daily life. When shock follows responding only intermittently, considerably less suppression is obtained.[9]

When sudden or very severe shock is used, punishment is an unfortunate choice as a therapeutic agent for another reason. In such a case, behavior can be inhibited to such an extent that the organism might well perish or be (permanently) damaged as a result of its "therapeutic" experience. As one example of this *traumatic* suppression, monkeys were given intense, punishing shocks and then exposed to the experimental situation for several hundred hours after the aversive contingency was removed.[10] These animals rarely

[9] Azrin, Holz, and Hake, *Fixed-Ratio Punishment*, 6 J. EXP. ANAL. BEHAV. 141 (1963).

[10] Appel, *Punishment in the Squirrel Monkey Saimiri Sciurea*, 133 SCIENCE 36 (1961).

responded again under any experimental conditions. Neither increasing the probability of obtaining food reinforcements nor the level of deprivation (i.e., their hunger) had any effect. The monkeys looked unusually frightened and they would have starved to death had the investigation not been terminated. This kind of treatment has obvious limitations and cannot ordinarily be said to modify the behavior of the punished organism in a constructive manner.

(2) It therefore seems that it is necessary to continue to punish a response to maintain a given amount of suppression unless such severe shock is used that there is a danger of seriously injuring the organism whose behavior we wish to modify. There is, however, evidence that at mild and sometimes at moderate intensities, responding does not long remain suppressed even when punishment is continuously applied.

Figure 4 shows data from studies of rats and pigeons exposed to at least 15 daily sessions first of mild and then of moderately intense punishing shocks. It is clear that the average response rate increases and gradually returns to normal in the presence of mild punishment. Longer exposure to the moderate punishment often has the same effect. Therefore, it is not at all certain that continued and repeated punishment will suppress a response for any length of time.

(3) In all of the experiments discussed so far, the effects of punishment have been examined on behavior which is concurrently reinforced with food. Logically, punishment might be expected to be more effective when it is used to try to eliminate a habit which once was effective but is no longer of any consequence, i.e., during experimental extinction. It is known, however, that although punishment can suppress a response during extinction in much the same way it does during concurrent positive reinforcement, it is no more effective in eliminating a habit that is simply withholding reinforcement.[11] In an experiment conducted by Skinner,[12] for example, hungry rats were trained to press a bar for food and then were exposed to several sessions during which no food was given. During this extinction period, one group of four animals was punished for 10-minutes and another group was not. Although the punished rats emitted lower rates during the punishment period, the total number of responses over the two extinction days was the same for both groups. Thus, even when a response is no longer of any value, in that it has no environmental or at least reinforcing consequences, its elimination is not facilitated by punishment.

In summary, evidence has been presented from animal experiments which seems to indicate that, although punishment can and does suppress a response, it is by itself (i.e., when it does not have other properties), essentially an ineffective way to control or to eliminate the behavior of the punished organism.

[11] For example, see Estes, *An Experimental Study of Punishment*, 57 No. 3 PSYCHOL. MONOGR. Whole No. 263 (1944).

[12] SKINNER, THE BEHAVIOR OF ORGANISMS 158 (1938).