

## EFFECTIVENESS OF SEVERAL SUPPRESSION PROCEDURES IN ELIMINATING A HIGH-PROBABILITY RESPONSE IN A SEVERELY BRAIN-DAMAGED CHILD

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**ABSTRACT.** The three different punishment procedures of time-out, electric shock and slaps were used to eliminate the highly undesirable behavior of the placing of non-edibles in the mouth by a severely retarded girl. All three punishment procedures were found effective in suppressing this response. However, in all three procedures it was found that the punishment situations were highly discriminated from those conditions of non-punishment, a finding that suggests some limitations in the use of punishment. It was also found upon a discontinuation of one of the punishers (electric shock) that the undesired response returned in strength above that level observed prior to the introduction of the shock.

**RESUMEN.** Se utilizaron tres diferentes procedimientos de castigo, choque eléctrico, manazos y tiempo fuera, para eliminar la conducta altamente indeseable de colocarse objetos no comestibles en la boca mostrada por una niña severamente retardada. Se encontró que los tres procedimientos de castigo fueron efectivos para suprimir esta respuesta. Sin embargo, en los tres procedimientos se encontró que se discriminó con gran precisión a las situaciones punitivas de las no punitivas, hallazgo que sugiere algunas limitaciones en el uso del castigo. Se encontró también que al discontinuar uno de los estímulos punitivos (choque eléctrico), la respuesta indeseable recuperó y superó su fuerza previa al nivel observado antes de introducir el choque.

Punishment has proved to be an efficient procedure for reducing response frequency (Azrin and Holz, 1966; Church, 1969). Recently, punishment has been used to eliminate behavioral problems that interfere with more productive behaviors or to eliminate behaviors that are self-injurious or dangerous to others (Wolf, Risley and Mees, 1964; Risley, 1968; Birnbrauer, 1968; Bucher and Lovaas, 1967). However, at the present time, the use of punishers for applied behavioral problems is not completely understood. The purpose of this study was to compare the effects of several different punishers and more specifically to assess those conditions under which their effects generalize. In this study the three different punishers of time-out, electric shock and slaps were used to eliminate the undesirable behavior of the placing of nonedibles in the mouth by a young retarded girl. Each punishment procedure was evaluated in terms of its ability to suppress the behavior, the lasting effects of the punishment, and whether the punishment procedures would result in suppressing the re-

sponse in new situations.

The subject, named G., a fourteen-year-old girl, had been diagnosed as having an extended and deep brain lesion. Seizures appeared when the girl was six months old and in spite of medication convulsions still occur regularly. Behaviorally, G. had a very limited repertoire. She exhibited no verbal behavior and spent a large percentage of time expectorating on the floor and playing with the saliva. She also engaged in a great deal of self-stimulatory behavior, such as head-rocking, waving her hands and running wildly about. The child also lacked self-care behaviors. G. spent a considerable amount of her time placing nonedibles in her mouth. Since the girl did not chew at that time, keeping food or any object within the mouth had previously led, on several occasions, almost to asphyxiation. Due to the fatal possibilities of engaging in this behavior, it was decided to eliminate it as rapidly as possible.

#### BASE-LINE OBSERVATION

Initial observations indicated that G. placed in her mouth nonedibles such as leaves, flowers, paper, insects, etc., and occasionally, she did place edibles in her mouth, but these were such things as scraps of food, and non-prepared items for cooking. Since approximately 80 or 90% of the objects placed in the mouth were of the nonedible variety, it was decided to eliminate the placing of all objects into the mouth. Subsequently a discrimination was attempted, in which edibles were only those objects which were presented by social agents to the girl. In order to obtain initial data on the frequency of this behavior, the girl was observed in her home one hour per day for fourteen consecutive days. The observations were taken at one o'clock in the afternoon each day, since the parents had reported that this behavior was most likely to occur at this time. Both the frequency of placing objects in the mouth and the duration of these individual responses was measured. The response was highly distinctive and presented no judgment problem at all. Figure 1 shows both the frequency of placing objects into the mouth and the percentage of each one-hour observation period in which objects were kept in the mouth. The duration measure exhibits much more stability than the frequency measure, as on occasions an object would already be in her mouth before the one-hour recording period began. Thus, duration of the response was a more satisfactory measure of the behavior. Figure 1 shows that the frequency varied between 0 and 22 responses per hour, and the duration between 45 and one hundred per cent of the total time of observation.

The initial attempt to suppress this behavior was by making a period of time-out contingent on the response.

#### PUNISHMENT BY TIME-OUT OF POSITIVE REINFORCEMENT

The studies were carried out at the Behavior Clinic of the University of Veracruz. Two adjacent booths separated by a one-way mirror were used. The booth in which the girl was placed contained only a chair and a table. On this table were placed edible and nonedible objects. The child was allowed free access to these objects and when she selected an object the experimenters shouted *No!*, the object was withdrawn from her hand or mouth, and she was taken to the adjacent darkened room, where she was kept for one minute. When it was impossible to take the objects from her mouth, G. was placed in the time-out room for two minutes. Temper tantrums on the part of G., during the time-out period, continued the time-out until the temper tantrum subsided. In this part of the study, the taking of both edibles and nonedibles was punished by time-out. The sessions were initially fifteen minutes long, and each time a session terminated without a response occurring, the next session length was doubled. This continued until G. did not make a single response in a two-hour session. Figure 1 shows that the initial rate of responding was 0.4 responses per minute in the first 15-minute session and it required seven 15-minute sessions to bring down the rate to zero. It can be seen that subsequent doublings of the session length always resulted in some responding, but subsequently the frequency was again reduced to zero. The average rate of responding always decreased in every subsequent block of sessions with different duration, as well as the number of sessions required to get the complete suppression effect.

After the final sessions of two-hour duration, five more sessions were conducted during which time-out was discontinued. However during these sessions, the experimenters continued to shout *No!* following the taking of an object. These sessions were conducted to assess the functional control of these stimuli, previously paired with time-out, over response suppression. Figure 1 shows that G. emitted only one response during these five one-hour sessions. Two additional sessions of 155 minutes each were conducted during which the girl was left alone, and the experimenters observed her through the one-way mirror. The withdrawal of the social stimuli paired with time-out produced an increase in the previously suppressed behavior, indicating that the effect was specific to those conditions in which time-out was applied or to stimuli associated with time-out were presented. Therefore, no generalization of the suppression was obtained

in other conditions different to those of the training situation. As an informal observation, it can be said, that after ending the training situation, G. did take objects when she was with people other than the experimenters who had been putting her on time-out.

### PUNISHMENT BY ELECTRIC SHOCK WITH AN ALTERNATIVE REINFORCED RESPONSE

The previous procedure had shown that the suppression was restricted to particular social agents. As the purpose of the investigation was to reduce the frequency of placing nonedibles in the mouth in the natural setting (the girl being alone), it was decided to use a punisher that did not require social agents for its delivery. The punisher selected was that of electric shock. Previous studies have shown that if an alternative reinforced response is available in addition to the punished response, the suppression is facilitated (Herman and Azrin, 1964). The punishment procedure implemented was as follows. The child was seated before the table which was divided into two sections, one of which was black and the other white. Edible objects such as pieces of banana, cookies, etc., were placed on the white side. Nonedibles such as banana peels, leaves, paper, and flowers were placed on the black side. As social agents were to be withdrawn from the punishment situation, a discrimination between edibles and nonedibles was now attempted.

A trials procedure was used as follows: (1) G. was required to make eye-contact with the experimenter each time she was prompted to do so; (2) when eye-contact was accomplished, she was presented with edibles and nonedibles (edibles on the white side, nonedibles on the black side); (3) if G. selected an edible, she was allowed to eat it, but if she took a non-edible, a brief electric shock was administered through electrodes connected to the right ankle. The intensity of the shock was approximately 1 ma. and the duration half a second. Within three shock deliveries the girl no longer selected nonedibles. At this time, the electrodes were disconnected and over the next 90 sessions, the subject never selected the non-edible in presence of the experimenter (15 trials per session). The sessions were used for generalized imitation training and to facilitate the discrimination of edibles from nonedibles in a free-operant situation.

In order to assess whether or not the taking of nonedibles would occur in the absence of the experimenter, the subject was left alone in the room. Electrodes were left attached to her ankle, and nonedibles were placed on a black linen. For three ten-minute sessions, she was shocked every time she took a nonedible. Shock was discontinued for two days. In these two



days, the taking of nonedibles increased over the previous level before shock, so shock was reintroduced for seven additional sessions. During these seven sessions, a DRO procedure of positive reinforcement was introduced. Each one minute that the subject refrained from taking a non-edible resulted in a positive reinforcer (piece of food) delivered by the experimenter. Following these seven sessions the shock was taken out, and the DRO procedure maintained during four more sessions. Figure 2 shows the results of these procedures.

It can be seen that in the initial three sessions, in which electric shock was delivered contingent on taking a nonedible, the frequency of this response decreased from the initial high frequency of four responses in ten minutes (0.4 per minute) to one response in ten minutes (0.1 per minute) during the third session. Discontinuation of the shock (sessions four and five) resulted in an immediate increase in the taking of nonedibles. This increase slightly exceeded the level previous to shock punishment. Reintroducing shock punishment plus the DRO procedure resulted in an immediate cessation of the response. During the seven sessions in which this procedure was in effect, only a single response was emitted by the subject.

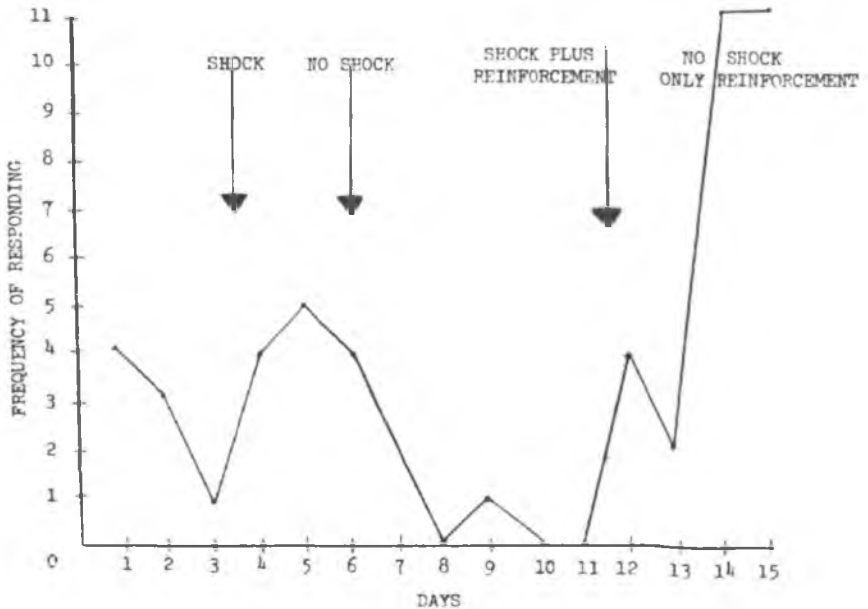


Figure 2. The use of electric shock and reinforcement to suppress the behavior of placing objects in the mouth.

Finally, when the shock punishment was discontinued leaving only the DRO procedure (sessions eleven to fifteen) there was a dramatic increase in the frequency of taking nonedibles. By the final sessions under this condition, the frequency of taking these nonedibles greatly exceeded that observed initially. These results indicated that shock punishment was effective in suppressing the desired response but that discontinuation of the shock procedure resulted in elevating the frequency of the response. In this procedure, the use of shock punishment did not produce the desired outcome. That is, there was no generalized suppression. On the contrary, the suppression was completely limited to those specific conditions under which shock was administered.

Since the shock punisher did not have the desired effect, a new procedure was implemented, i.e., the use of a punisher delivered by a social agent under conditions in which the social agent was not present during the emission of the response of taking nonedibles. A social agent was used in this procedure as an attempt to produce generalization of response suppression found in the Clinic to the home situation.

#### PUNISHMENT PRIMING AND THE USE OF SLAPS

In this procedure punishment was again used in an attempt to eliminate the behavior of taking nonedibles. The experimenter randomly selected both edibles and nonedibles and placed them against the child's mouth. If the object was an edible, the child was allowed to eat it. If the object was a nonedible, the child was slapped on the side of the face at that moment when the nonedible made contact. Thus punishment was paired with the stimulus of a nonedible against the mouth. This procedure was implemented for fifteen sessions, and each session was composed of ten punishment trials. Following these fifteen sessions, the child was placed alone in the room where she could be observed through a one-way mirror. Nonedibles were placed in the room on the same black surface that had been used previously. If the child was observed to select one of the nonedibles, an experimenter immediately entered the room, shouted *No!* and slapped the child. As previously, an alternate more appropriate response was reinforced. This response consisted of the child picking up an edible (banana pieces) out of a cup which was on the opposite side of the room from where the nonedibles were kept. These edibles were placed in the cup by one of the experimenters from outside the room. The placing of these edibles in the cup was noncontingent upon a specific response. The frequency with which these edibles were placed in the cup was gradually decreased over sessions from one edible every thirty seconds to the final

value in the seventeenth session of one every forty minutes. The seventeen sessions that were conducted using this procedure were of increasing length. The first session was of ten minutes duration and this gradually increased to two hours by the seventeenth session. Until reaching one-hour length, sessions were increased by five minutes. The last four sessions were increased by fifteen minutes each. Following the seventeenth session there were three additional sessions during which the presentation of edibles was discontinued and punishment was no longer administered.

Figure 3 shows the results of this procedure on the rate of grasping of nonedibles and the rate of placing nonedibles in the mouth. The initial rate of taking nonedibles was about 0.13 responses per minute. Over sessions which became progressively longer, this rate decreased, and during the final two sessions (16 and 17) which were 105 and 120 minutes respectively, not a single response was emitted. The rate of placing objects in the mouth was negligible and no changes occurred. During sessions 17 to 20, when punishment and food reinforcement were discontinued, the rate of both touching and placing nonedibles in the mouth remained at zero. During these sessions the subject was observed to spend an increasing percentage of time sitting facing the cup in which reinforcement was deposited. At this time training procedures were discontinued at the Clinic.

### GENERALIZATION TO HOME

In an attempt to eliminate the response of taking nonedibles in the home, a punishment procedure was implemented using the subject's parents, brothers and the maids as the administrators of the punishment. The instructions given to the above individuals were to punish the child by slapping her when (1) the child attempted to enter the kitchen, where she had previously taken many nonedibles; (2) the child took nonedibles inside or outside of the house; and (3) intermittent inspection revealed the child had nonedibles in her mouth.

Because of the adults' failures to follow these instructions, the authors decided to demonstrate the proper procedures. For fifteen minutes daily for seven consecutive days, the experimenters implemented the desired contingencies. During this period, every time the child entered the kitchen or took a nonedible from the floor *No!* was shouted and she was punished by slapping when she did not obey the verbal command. On the first such day this procedure was implemented, the child was punished a total of twelve times. By the seventh day only a single punishment was administered and the subject was obeying 85% of the verbal commands. It was also observed that the subject began to expel any nonedible objects from her mouth just



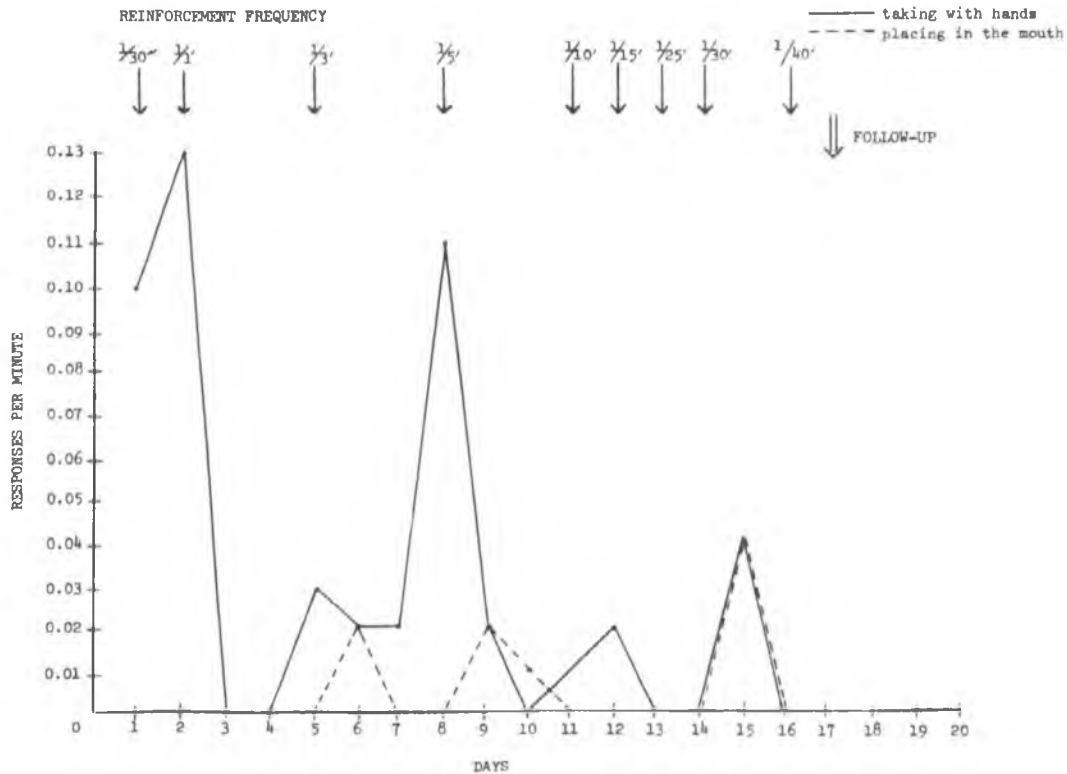


Figure 3. Punishing with slaps after a punishment priming procedure.

prior to the daily inspection before sessions began.

## DISCUSSION

This study showed that the three different punishers of time-out, electric shock, and slaps, were effective in reducing the frequency of the undesirable response of placing objects in the mouth. However, none of these procedures had the desired effect of generalizing to conditions other than those in which they were administered.

Time-out has been shown in previous studies to be effective in reducing the frequency of responses (Wolf, Risley and Mees, 1964), as it did in this case. However, in this study it was found that the effects of time-out are restricted to the presence of the social agents that implemented the time-out procedure. When a different individual was present or when the experimenters were absent, the girl immediately began taking nonedibles again. Thus the girl easily discriminated those conditions under which time-out was applied, which greatly limited its effectiveness.

Electric shock also proved to be an effective punisher of the response of placing nonedibles in the mouth. The response was suppressed quickly and remained suppressed for the entire period of shock administration. However, as with the use of time-out in this study, those conditions under which shock was administered were sharply discriminated by the subject. The discriminated punishment trials procedure, where the taking of nonedibles was always punished and the taking of edibles allowed, did not generalize to the situation where the subject was allowed to move freely about the room which contained nonedibles only. In this situation, when shock was discontinued, the response returned. A consistent finding in this study was that when the electric shock was discontinued the response frequency increased over those levels observed prior to the introduction of shock. This phenomenon has been labeled the punishment contrast effect and has been observed in experimental studies with animals (Azrin and Holz, 1966). This finding has not been reported previously in other applied studies that have employed electric shock but that also have found that electric shock effects are restricted to the conditions in which it is administered (Birnbrauer, 1968).

The third punishment procedure used in this study, that of slapping the child, also was effective in suppressing the response of taking nonedibles. In fact, the slaps as punishers produced their suppressive effect as quickly as electric shock. This result may reflect the initial conditions on this procedure where the slaps were paired with putting a nonedible against the subject's mouth (punishment priming). This procedure of pairing an

aversive event with a stimulus has been widely used in experimental studies of conditioned suppression with animals (Blackman, 1968). Observations did not indicate any emotional disruption during this pairing process; on the contrary, it seemed to facilitate the reinforcement of the response of the subject approaching and staying near that part of the room where the edibles were being delivered.

In conclusion, the study showed the effectiveness of three different punishers. However, all three procedures resulted in the subject discriminating those specific conditions under which the punishment was administered. That is, as previous studies have shown, the punishment was effective only in the specific conditions where it was administered. No generalization of the response suppression was observed. It seems that if punishment is to be effective it must be administered in every set of stimulus conditions where response suppression is desired.

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## FOOTNOTES

1. Now at the National University of Mexico at Mexico City.
2. The authors are greatly indebted to Dr. J. R. Powell for his invaluable assistance in rewriting the final version of this manuscript.