DOCUMENT RESUME

ED 077 554 PS 006 475

AUTHOR Oliver, Steven D.; And Others
TITLE Some Effects on Human Behavior of Aversive Events.
INSTITUTION Utah Univ., Salt Lake City. Bureau of Educational Research.
PUB DATE 72
NOTE 24p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Adults; *Aggression; Anti Social Behavior; Children; *Conditioned Response; *Electrical Stimuli; Operant Conditioning; Reinforcement; *Stimulus Behavior; Technical Reports; *Timeout

ABSTRACT

Two studies were done to examine aggressive behavior in humans. In Experiment One, adults working on a plunger pulling task could receive a 3.5 ma shock at 75% probability every two minutes. The shock was unrelated to their plunger pulling behavior. Subjects could press a toggle switch to deliver electric shock to the experimenter, who was in the room with the subjects as an alleged observer. Three sessions in which no shock was delivered alternated with two sessions in which shock was delivered. In shock sessions subjects pressed the toggle switch and shocked the observer at an average rate more than nine times higher than in the non-shock sessions. In Experiment Two, baselines of aggressive behavior were collected for three consecutive 120- or 90-minute segments daily. The subjects were two children, and a single-subject repeated measures multiple baseline design was used. After approximately two weeks of baseline, a brief time-out was made contingent upon aggressive behavior which occurred in the first segment each day, and non-contingent time-outs roughly yoked to the time-outs in the first segment were delivered in the third segment each day. Other conditions were also included. Non-contingent time-out seemed to control an above baseline rate of aggressive behavior in the segments in which it was programmed, and in adjacent segments. Results were interpreted as replicating the animal laboratory findings relating non-contingent aversive stimulation to aggressive behavior. (Author/KM)

SOME EFFECTS ON HUMAN BEHAVIOR

OF AVERSIVE EVENTS

Steven D. Oliver, Robert West

and

Howard N. Sloane, Jr.[1]

University of Utah

ABSTRACT

Two studies were done to examine aggressive behavior in humans. In Experiment One, adults working on a plunger pulling task could receive a 3.5 ma shock at 75% probability every two minutes. The shock was unrelated to their plunger pulling behavior. Subjects could press a toggle switch to deliver electric shock to the experimenter, who was in the room with the subjects as an alleged observer. Three sessions in which no shock was delivered alternated with two sessions in which shock was delivered. In shock sessions subjects pressed the toggle switch and shocked the observer at an average rate more than nine times higher than in the non-shock sessions.

In Experiment Two, baselines of aggressive behavior were collected for three consecutive 120 or 90 minute segments daily. The subjects were two children, and a single-subject repeated measures multiple baseline design was used. After approximately two weeks of baseline, a brief time-out was made contingent upon aggressive behavior which occurred in the first segment each day, and non-contingent time-outs roughly yoked to the time-outs in the first segment were delivered in the third segment each day. Other conditions included a return to baseline in all three time segments, response-contingent time-out in the first segment with baseline conditions in the other two segments, response-contingent time-out in the first segment and the first hour of the second segment, with non-contingent time-out in the second hour of the second segment and in the third segment, and response-contingent time-out in all three segments. Non-contingent time-out seemed to control an above baseline rate of aggressive behavior in the segments in which it was programmed, as well as in the segment adjacent to that in which it was programmed, and in which time-out was not programmed at all.

Results were interpreted as replicating the animal laboratory findings relating non-contingent aversive stimulation to aggressive behavior. The specific controlling relationship in the latter case needs further analysis to be interpretable.

PUNISHMENT ELICITED AGGRESSIVE BEHAVIOR IN HUMANS

Elicited aggressive behavior as a function of punishment has been demonstrated in a large number of non-human species (Ulrich and Azrin, 1962; Azrin, Hutchinson and Hake, 1963; Ulrich, Wolf and Azrin, 1964; Azrin, Hake and Hutchinson, 1965; Scott, 1966; and Ulrich, 1967). In addition, a wide range of allegedly aversive conditions have been used to elicit animal aggressive behavior, including shock-pain (Ulrich, 1966), a preheated floor (Ulrich and Azrin, 1962), tail-pinch (Azrin, Hake and Hutchinson, 1965), and various extinction or reduced reinforcement density procedures (Azrin, Hutchinson and Hake, 1966; Hutchinson, Azrin and Hunt, 1968; Gentry, 1968; and Knutson, 1970).

Only a few studies have demonstrated anything even suggesting increased aggressive behavior as a function of aversive stimulation in humans, and these reports are difficult to interpret. Ulrich and Favell (1970) gave child subjects the task of stacking bottle stoppers into piles, and were told that there was another (hypothetical) subject performing the same task in another room. This alleged other subject was said to have a button he could press, vibrating the actual subject's table and knocking over his stacks of stoppers. The actual subject also had a button, which he was told would vibrate the other (non-existent) subject's table. Results showed an increased number of button presses from all four subjects following vibration of their table by the hypothetical subject. However, most children have been reinforced for attack behavior towards other children by the termination of similar behavior directed towards them, and this history may have controlled the button presses, which could thus be called "operant" rather than "elicited." Sajwaj, Twardosz and Burke (1972) reported an increase in disruptive behaviors of preschool children as a function of teachers "ignoring" other behavior which had previously been reinforced. The study was done to examine phenomena other than aggressive behavior, and thus the definition of "disruptive behaviors" included topographies usually considered aggressive, (such as fighting and poking) as well as behaviors usually not called aggressive (such as whispering or leaving the area). These behavioral categories make an intepretation in terms of elicited aggressive behavior difficult.

However, although the possible aggression increasing effects of aversive conditions has not been really investigated with humans, a number of treatment-oriented studies have reported on the use of response-contingent aversive events to weaken undesirable behaviors. Many of these have used a time out from positive reinforcement, such as Risley and Wolf (1966), Sloane, Johnston and Bijou (1967), Zeilberger, Sampen and Sloane (1968), Bostow and Bailey (1969), Willoughby (1969), Patterson, Cobb and Ray (1970) and White, Nielsen and Johnson (1972). In addition, treatment studies using shock punishment with humans are also in the literature (Risley, 1968; Lovaas and Simmons, 1969).

The current studies examined increased aggressive behavior in humans as a function of electric shock and as a function of a time-out from positive reinforcement.

EXPERIMENT ONE[2]

Method

Subjects. Ten volunteer subjects who were male veterans from the alcoholic ward of the Salt Lake City Veterans' Administration Hospital were used. They ranged in age from 37-52 years. All understood that they could discontinue participation at any time. None were taking medication that might affect their sensitivity to the shock stimulus, and all smoked cigaretts and were short of funds. All were adjudged competent by their ward physician.

Procedure. Subjects were seated in a small room containing a plunger manipulandum, a receptacle which received poker chips from a dispenser, and a spring loaded toggle switch which when pressed delivered shock through arm-band electrodes to one experimenter, who was described as an observer. In addition, a second set of forearm electrodes delivered shock to the subject. The experimenter sat on a chair next to the subject.

Plunger pulling was established and maintained on a VI 3 schedule of reinforcement for five 30 minute sessions. Poker chips obtained were exchangeable at the end of each session for cash or cigarettes.

During shock sessions the subject had a 75% probability of receiving a 300 volt ac 3.5 ma shock for 0.5 seconds during each two minute period. Previous research (Rand et. al., 1971) had established this shock level as close to the maximal level with which regular attendance could be maintained with voluntary subjects and with the reinforcement contingencies used. Shock delivery was initiated by a timer and probability counter, and was independent of all subject behavior, including plunger pulling.

The subject could press the toggle switch delivering shock to the experimenter at any time during any session. When he did, the experimenter received a 180 volt dc 0.5 second shock at 3.5 ma. The subject could "test" the delivery of shock to the subject on request.

During the first, third, and fifth experimental session the subjects did not receive shocks. During the second and fourth sessions shocks were delivered to the subjects.

Recording and Programming. All recording and programming was done by automated electro-mechanical equipment. Plunger pulls, tokens delivered, shocks delivered to the subject, and shocks delivered to the experimenter were recorded each session.

Results

Seven of the subjects delivered more shocks to the experimenter during the period in which they received shock than during the periods in which they did not receive shock (Table 1), although the increase was small for three subjects. The remaining three subjects never shocked the experimenter. Using the Wilcoxon Matched-Pairs Signed-Ranks Test, a significantly different number of shocks were delivered to E under the two conditions ($p \leq .01$ with $T=0$ and $N=7$, one-tailed). As a whole, the group delivered 16 shocks per session to the experimenter in sessions in which they received shock, and 1.7 shocks per session in sessions in which they did not receive shock (Figure 1).

Table 1

SHCCKS TO E DURING SHOCK AND NO-SHOCK CONDITIONS

Subject	Shocks delivered during periods II and IV (shock to S)	Shocks delivered during periods I, III and V (no shock to S)
1	0	0
2	1	0
3	0	0
4	0	0
5	1	0
6	3	0
7	2	1
8	5	1
9	8	3
10	12	0

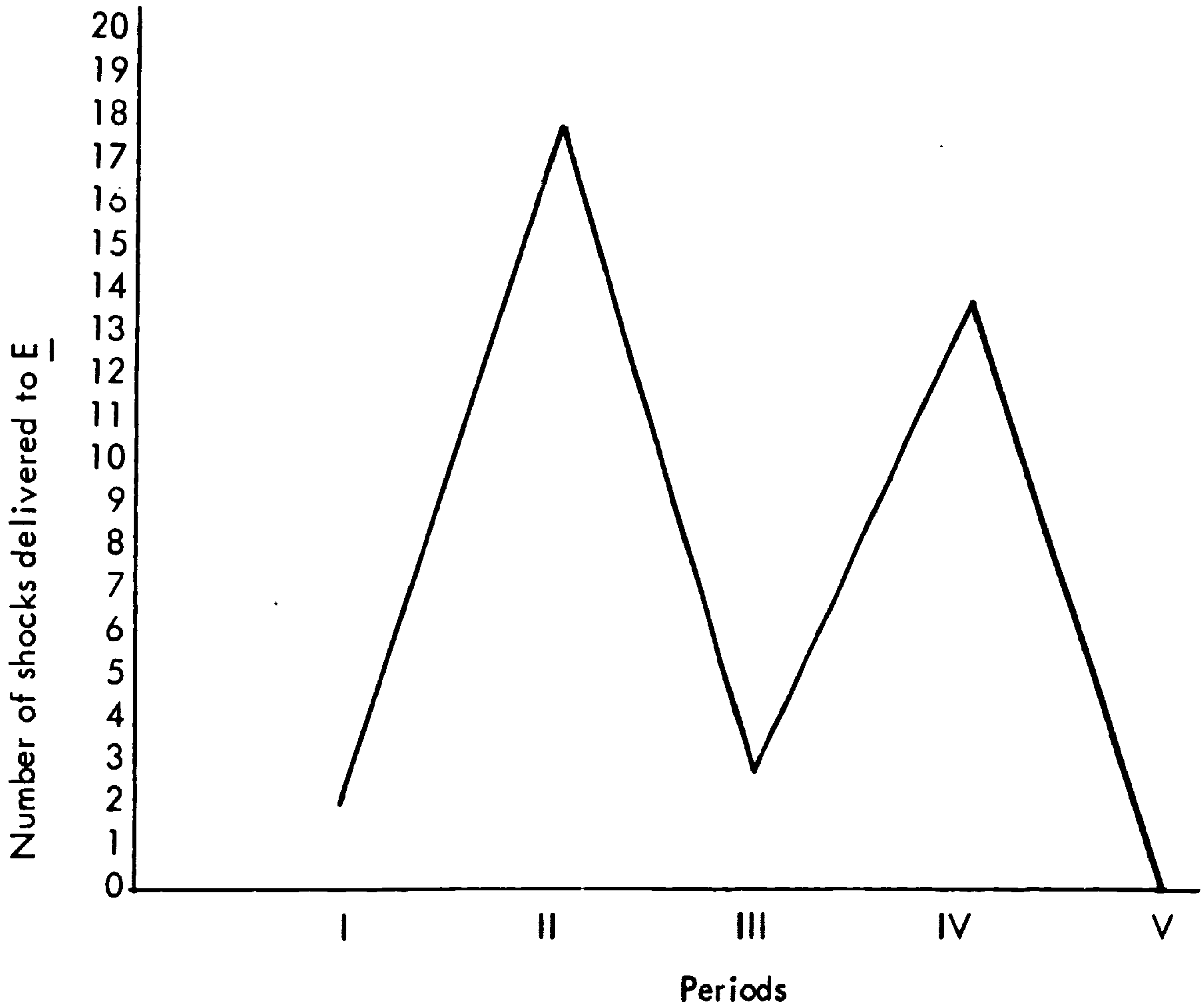

FIGURE 1

SHOCKS DELIVERED TO E DURING
EACH PERIOD BY ALL Ss

EXPERIMENT TWO[3]

Method

Subjects. The subjects were two elementary school age children referred to the Behavior Modification Training Center in Salt Lake City because of excessive aggressive behavior at home and school. One was seven years old, the other was eight. Both were male. Both had normal I.Q. scores. Parental and teacher permissions were obtained in advance of any experimental procedures.

Setting. The entire experiment took place in a special elementary token economy class room for distrubed, psychotic and retarded children. Throughout the day both group and individual tutoring activities were scheduled. All children in the classroom had programs to modify behavior problems and/or academic behaviors. Other than the conditions imposed during the study, the only staff reactions made to aggressive behavior emitted by the subjects were to physically prevent injury. Neither subject had any other program involving a time-out contingency. The entire experiment was completed with one subject before it was started with the second.

Time-Out Procedures. The classroom contained a four foot square by six foot high time-out booth located near the rear corner. The booth was sound attenuated but not sound proof. When required by experimental conditions, subjects were placed in the time-out booth without any comment. The children were firmly but gently led to the room if necessary. Both Ss had observed other children being placed in the time-out booth prior to this study. Each time-out was three mins in length, sometimes extended by the requirement that the final min be free of tantrum behavior. At the termination of the time-out Ss were returned to the ongoing class activity without comment.

Design. A multiple baseline design was used. Aggressive behaviors of subjects were recorded during three time segments each school day. One segment was for aggressive behaviors which occurred between 9:00 and 11:00 a.m. each day, the second was for aggressive behaviors occurring between 11:00 a.m. and 1:00 p.m. each day, and the third was for aggressive behaviors observed between 1:00 and 2:30 p.m. each day. All data were converted to frequency per 120 minutes for each time segment.

Experimental Periods. There were six experimental periods.

Baseline. For approximately two school weeks (see Figures) aggressive behaviors were merely recorded during each time segment. No procedures were applied.

Period I. Following the baseline sessions, aggressive behaviors emitted during the first time segment each day produced a three minute response-contingent time-out from reinforcement (seclusion in the TO room). Aggressive behaviors emitted during the second segment each day were merely recorded, and had no programmed contingencies. During the third segment each day, the subject was placed in the time-out room non-contingently. An approximate "yoking" procedure was used, in that these non-contingent time-outs occurred with about the same temporal distribution and frequency as the response-contingent time-outs had during the first period of the day, with adjustments for the slightly shorter length of this third period. When no time-outs had occurred during the first period, two time-outs were programmed during period three at arbitrary times. These three procedures were labeled RC (response-contingent time-out), N (no time-out) and NC (non-contingent time-out). These sessions lasted seven days for one subject and five days for the other.

Period II. These conditions were continued for three additional days for one subject and for two additional days for the other, with one modification. During the first hour of segment two, a time-out from reinforcement was programmed contingent upon aggressive behaviors, and during the second hour of segment two, non-contingent time-out was programmed yoked to the first hour.

Period III. Following this, the initial experimental conditions which followed baseline (Period I) were reinstated, for four sessions with one subject and for two sessions with the other.

Period IV. During the next seven sessions for one subject, and five for the other, response-contingent time-out was programmed during the first segment each day. During the remaining two segments each day, aggressive behavior was recorded, but no contingencies were programmed for it, and there were no time-outs.

Treatment. In the final condition, time-out contingencies were in effect for aggressive behavior during all three segments. This lasted seven days for one subject and 18 days for the other.

Conditions are summarized in Table 2.

Recording, Response Definitions, and Reliability. Standard definitions of aggressive behavior (physical assault) reported in the literature (Sloane, et. al. 1967, Zeilberger, et. al., 1968) were used by observers: hitting, kicking, biting, shoving, striking with an object, or throwing an object at another individual. One or more checks on observer reliability were made on each baseline (time segment) each time the experimental manipulations changed, by having a second observer record for the entire session. Observers never disagreed by more than one aggressive behavior for a time segment (two hours or one and one-half hours). Aggressive behaviors ranged from zero to approximately 30 per 120 minutes.

Results

Tables 3 and 4 present the data for each S in terms of mean frequency of aggressive behavior in each condition within their respective time segments. The day by day variations for each S are presented in Figures 2 and 3, which give session by session rates for each time segment.

The Effects of Response-Contingent Time-Out. Time Segment One started with a baseline condition. In all other conditions during this segment time-out was contingent upon aggressive behavior. A relatively stable baseline was obtained from S^1 in which the rate of aggressive behavior was higher than in any other experimental period, declining to an approximately zero rate during the final conditions. For S^2 aggressive rates were also much higher during baseline than at other times, but were also declining during baseline, making interpretation more difficult. For S^2 aggressive behavior approximated a median zero rate starting with the first experimental condition after baseline.

Both Ss showed a relatively stable rate of aggressive behavior during baseline in Time Segments Two and Three, and with both Ss the rate declined to approximately zero in the final period when time-out was contingent upon aggressive behavior. Neither S had aggressive rates approaching zero in this Time Segment under any other experimental conditions, and both had significantly higher rates of aggressive behaviors in the no time-out periods which preceeded this final response-contingent condition. However, depending upon the interpretation of 1-2 data points, S^1's rates in both Time Segments may have been declining prior to the institution of the response-contingent time-out condition. Such was clearly not the case with S^2.

In Period II of Time Segment Two, both Ss had a half session of response-contingent time-out, and a half session of non-contingent time-out. For both Ss, aggressive behavior during the response-contingent portion of this condition was lower than it [illegible] at any other time in the Time Segment, and was only a fraction of the rate which existed during the non-contingent portion of this period. In Period I of this Time Segment a separate record was not kept of the rate during the first and second half of the Time Segment. However, observation of the means for Periods I and II for Time Segment Two (Tables 3 and 4) indicates that the rates could not have been as low in the first half of the Segment during Period I, when no contingencies existed for aggressive behavior, as they were during the corresponding times of Period II.

The Effects of Non-Contingent Time-Out in Its Time Segment. In Time Segment Three, non-contingent time-out was programmed following baseline for Periods I, II and III. For both Ss the rates under this condition were higher than during any other period in that Time Segment, which included baseline periods and a period of response-contingent time-out. S^2, however, showed a temporary initial depression in responding for reasons unknown.

In Time Segment Two, both Ss were exposed to non-contingent time-out for half of each session during Period II, and to response-contingent time-out for the other half of each of these sessions. With S^2 this produced the highest aggressive rates observed in the entire study. With S^1 this produced rates well above baseline rates or rates during response-contingent time-out, but not appreciably higher rates than during certain periods when no time-out was programmed.

TABLE 2

Sequence of Experimental Manipulations Within
Each Time Segment with Respect to Each Period

EXPERIMENTAL PERIODS	TIME SEGMENT 1	2	3
Baseline	N	N	N
I	RC	N	NC
II	RC	RC ¦ NC	NC
III	RC	N	NC
IV	RC	N	N
Treatment	RC	RC	RC

N - no TO
NC - non-contingent TO
RC - response-contingent TO

Rates in Segment Two with No Time-Out. Segment Two contained several periods in which there were no time-outs programmed at all. These were similar exactly to the baseline periods, except that other experimental conditions were concurrently programmed in other Time Segments, which was not true during baseline. For both subjects, aggressive rates higher than either baseline rates or rates during the final response-contingent condition were produced during these no time-out periods if non-contingent time-out was concurrently programmed in another time-segment (Periods I and III). The accelerating effect was quite variable and did not appear immediately, making a functional interpretation difficult. Rates during the non-time-out period declined to approximately baseline levels when non-contingent time-out was not being concurrently programmed in another Segment of the multiple schedule (Period IV).

In summary, the results for each S were the same. Response-contingent TO decreased the frequency of aggressive behavior on which it was contingent. Non-contingent TO increased the frequency of aggressive behaviors during those time segments in which it was programmed. When non-contingent TO was programmed in one time segment, extremely high rates of aggressive behavior were obtained in the adjacent time segment in which there was no TO, contingent or non-contingent. This effect did not develop until a day or so of exposure (see Figures). That this high rate was controlled by the adjacent non-contingent TO is suggested by the fact that in Period IV, when the NC condition was dropped, the rates in the N period declined. This decline took a day to develop, and is most clear from the figures.

TABLE 3

Mean Frequencies of Aggressive Behaviors for $\underline{S}_1$

EXPERIMENTAL PERIODS	TIME SEGMENT 1	TIME SEGMENT 2	TIME SEGMENT 3
Baseline	5.3 N	6.4 N	7.6 N
I	3.4 RC	18.1 N	12.8 NC
II	1.20 RC	3.0 RC ¦ 18.0 NC	10.0 NC
III	0.6 RC	15.0 N	10.0 NC
IV	0.9 RC	10.1 N	6.5 N
Treatment	0.1 RC	0.6 RC	0.1 RC

N - no TO
NC - non-contingent TO
RC - response-contingent TO

TABLE 4

Mean Frequencies of Aggressive Behaviors for $\underline{S}_2$

EXPERIMENTAL PERIODS	TIME SEGMENT 1	TIME SEGMENT 2	TIME SEGMENT 3
Baseline	8.3 N	10.8 N	8.3 N
I	0.5 RC	14.7 N	12.8 NC
II	0.7 RC	0.7 RC ¦ 22.0 NC	14.0 NC
III	0.5 RC	15.8 N	15.1 NC
IV	1.4 RC	12.8 N	8.3 N
Treatment	0.0 RC	1.3 RC	0.2 RC

N - no TO
NC - non-contingent TO
RC - response-contingent TO

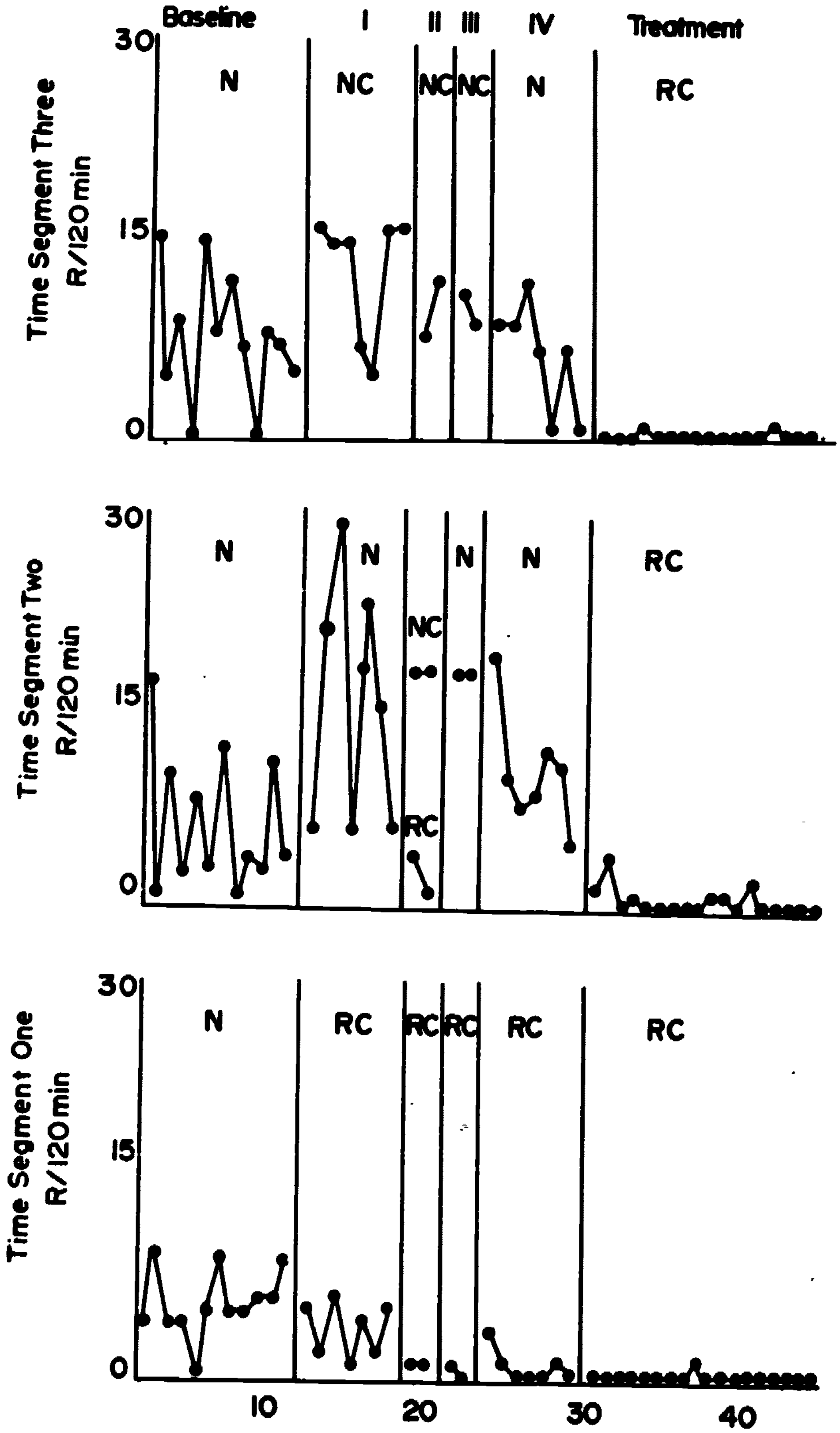

FIGURE 2. AGGRESSIVE BEHAVIOR FOR S1

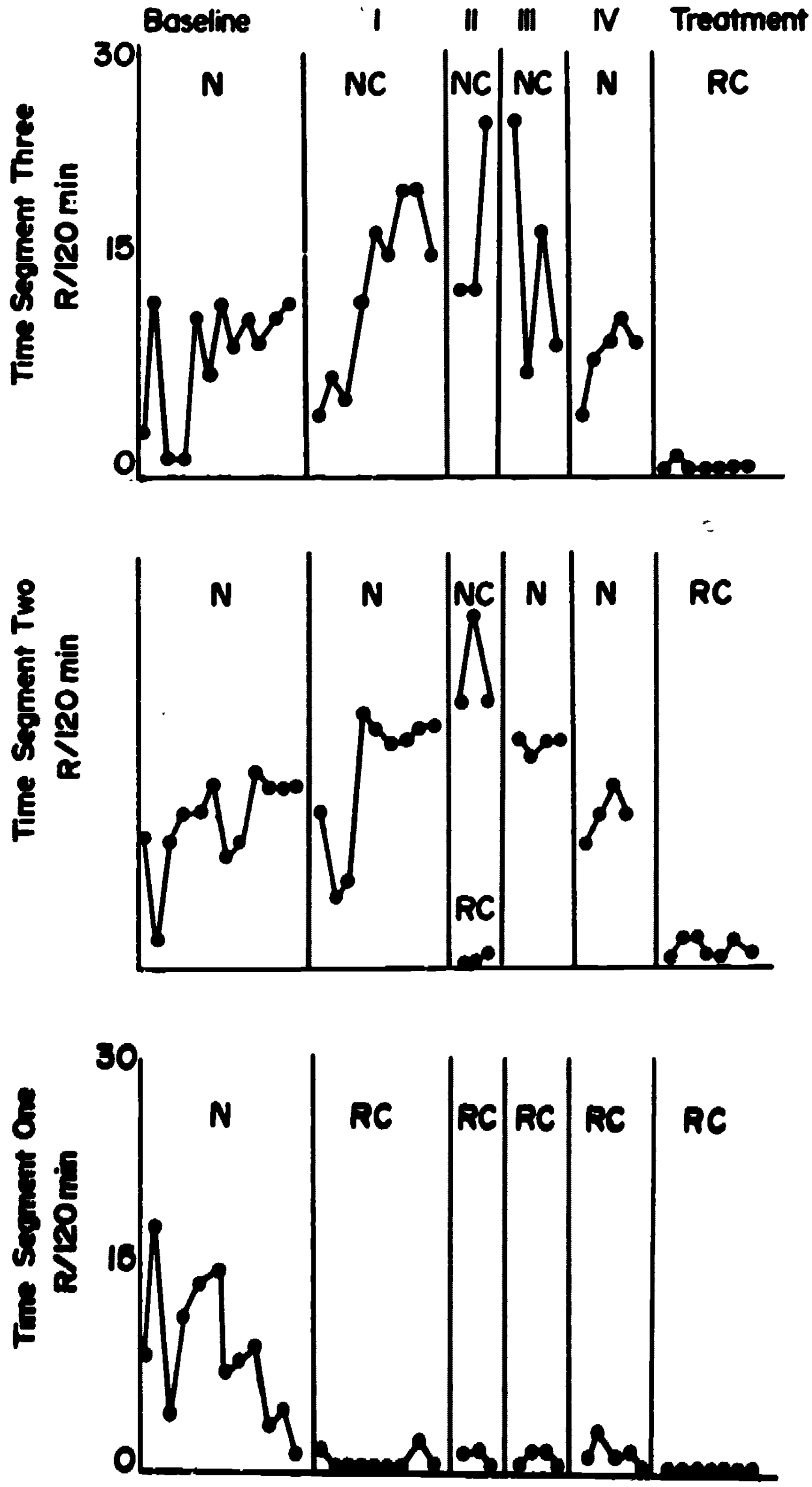

FIGURE 3. AGGRESSIVE BEHAVIOR FOR S2

DISCUSSION

These two experiments strongly suggest that aggressive behavior in humans is elicited by non-contingent punishment in much the same manner as has been demonstrated in animals. In Experiment One, in which electric shock was used, elicited aggression was not obtained from all subjects. This may be a function of the complex history relating to punishment and aggressive behaviors likely with adult human subjects, and it may also be a function of shock intensity. Ulrich and Azrin (1962) found that fighting among rats occurred as a non-monotonic function of shock intensity, with most fighting at middle levels of shock. Without parametric studies using humans it is impossible to assess whether or not the shock intensities used were close to maximally effective, or close to minimally effective, or neither. Similarly, in Experiment Two, greater results might have been obtained with different TO parameters, or with more powerful aversive stimuli.

A most interesting and unexpected finding was the increase in aggressive behavior in time segments adjacent to those in which non-contingent TO was programmed (Experiment Two). As was indicated in the Results section, data from Period IV suggest that this is mainly a function of the non-contingent TO, although some lesser effect due to the response-contingent TO is not excluded. The exact controlling relationship is not clear; for instance, the N segment always followed the RC and preceded the NC segments. The possibility of serial effects, contrast effects, and effects due to discriminative control of aggressive behavior by time out interacting with these factors cannot be excluded.

There are numerous ethical, social and technical problems in studying aversive control in humans, particularly in using non-contingent aversive stimuli. This is particularly true when child subjects are used, who cannot be assumed to have given informed consent or to remain subjects on a voluntary basis. Adults usually have the option of leaving. In studying conditioned suppression in humans, for instance, it was found that adult subjects may not return to or stay in sessions when electric shock intensities approach those used with animals (Rand, Dobson and Sloane, 1972). Children usually do not have this option. In Experiment Two, a relatively mild aversive stimulus was used. The authors, the classroom staffs, and the children's parents were all familiar with time-out procedures, and the usual reactions of children to the procedures. In spite of this, all involved had much concern over the use of non-contingent time-out, and frequent consulations were held on the reactions of the children to the procedure, on the possibility of other behavioral changes, and on the necessity for continuing the periods which used non-contingent time-out. The only effects noticed, other than those reported as data, were a temporary lack of fondness on the part of the children towards the staff who placed them in time-out non-contingently. We have not observed this when response-contingent time-out has been used.

In Experiment Two, subjects were selected who had excessively high rates of aggressive behavior, and for whom a time-out program to reduce these rates was judged beneficial by the treatment staff. As part of the study, treatment procedures were included as the final condition. Experiment One used voluntary informed adult subjects.

As indicated, prior studies (see Ulrich, 1967) have suggested that some aggressive behavior is elicited, that is, mainly under the control of antecedent conditions, while other aggressive behavior is maintained by its consequences, and thus properly called operant. Although the status of operant aggressive behavior seems clear, the status of elicited aggressive behavior is confused both experimentally and conceptually. Are aversive events unconditioned or conditioned stimuli which may sometimes elicit aggressive responses as with respondents? Is "pain" a setting event which changes the reinforcing function of attack behaviors or has some other accelerating effect upon aggressive behaviors? Although these functional relationships are not clear, the literature on "elicited" aggressive behavior does suggest that in some manner aversive events may increase that rate of aggressive behavior, other than through a negative reinforcement paradigm. If this should prove to be true in humans, as in animals, it would suggest that many of the procedures typically used to deal with undesired aggressive behaviors are, at best, not maximally effective, and that many procedures used in education and in social interactions or social institutions may be functional in producing aggressive behavior. The current studies provide an initial suggestion that this may be the case.

Further explication of aggressive behavior in humans will surely raise questions about child rearing and educational practices, and general forms of social control. At present, the need for a more thoroughgoing *experimental* analysis of human aggressive behavior seems strongly indicated.

1. Reprints may be obtained by writing to Howard N. Sloane, Bureau of Educational Research, 308 Milton Bennion Hall, University of Utah,

2. Experiment One was done by Robert C. West as a Master's thesis.

3. Experiment Two was done by Steven D. Oliver as a Master's thesis.

REFERENCES

Azrin, N. H., Hake, D. F. and Hutchinson, R. R. Elicitation of aggression by a physical blow. Journal of the Experimental Analysis of Behavior, 1965, 8, 55-57

Azrin, N. H., Hutchinson, R. R., and Hake, D. F. Pain-induced fighting in the squirrel monkey. Journal of the Experimental Analysis of Behavior, 1963, 6, 620.

Azrin, N. H., Hutchinson, R. R. and Hake, D. F. Extinction induced aggression. Journal of the Experimental Analysis of Behavior, 1966, 9, 191-204.

Bostow, D. E. and Bailey, J. B. Modification of severe disruptive and aggressive behavior using brief time-out and reinforcement procedures. Journal of Applied Behavior Analysis, 1969, 2, 31-37.

Gentry, W. D. Fixed-ratio schedule-induced aggression. Journal of the Experimental Analysis of Behavior, 1968, 11, 813-817.

Hutchinson, R. R., Azrin, N. H. and Hunt, G. M. Attack produced by intermittent reinforcement of a concurrent operant response. Journal of the Experimental Analysis of Behavior, 1968, 11, 489-495.

Hutchinson, R. R., Azrin, N. H. and Renfrew, J. W. Effects of shock intensity and duration on the frequency of biting attack by squirrel monkeys. Journal of the Experimental Analysis of Behavior, 1968, 11, 83-88.

Knutson, J. F. Aggression during the fixed-ratio and extinction components of a multiple schedule of reinforcement. Journal of the Experimental Analysis of Behavior, 1970, 13, 221-231.

Lovaas, O. I. and Simmons, J. Q. Manipulation of self-destruction in three retarded children. Journal of Applied Behavior Analysis, 1969, 2, 142-158.

Patterson, G. R., Cobb, J. A., and Ray, R. S. A social engineering technology for retraining aggressive boys. In H. Adams and L. Unikel (Eds.), Georgia symposium in experimental clinical psychology, Vol. 2, New York: Pergamon, 1970.

Rand, G. V., Sloane, H. N. and Dobson, W. R. Some variables affecting conditioned suppression in humans. Behavior Therapy, 1971, 2, 554-559.

Risley, T. R. The effects and side effects of punishing the autistic behaviors of a deviant child. Journal of Applied Behavior Analysis, 1968, 1, 21-34.

Risley, T. and Wolf, M. Experimental manipulation of autistic behaviors and generalization into the home. In R. Ulrich, T. Stachnik, and J. Mabry (Eds.), Control of human behavior, Glenview, Illinois: Scott, Foresman, 1966.

Sajwaj, T., Twardosz, S. and Burke, M. Side effects of extinction procedures in a remedial preschool. Journal of Applied Behavior Analysis, 1972, 5, 163-175.

Scott, J. P. Agonistic behavior of mice and rats. American Zoologist, 1966, 6, 683-701.

Sloane, H. N., Johnston, M. K., and Bijou, S. W. Successive modification of aggressive behavior and aggressive fantasy play by management of contingencies. Journal of Child Psychology and Psychiatry and Allied Disciplines, 1967, 8, 217-226.

Ulrich, R. E. Pain as a cause of aggression. American Zoologist, 1966, 6, 643-662.

Ulrich, R. E. Pain-aggression. In G. A. Kimble (Ed.), Foundations of conditioning and learning. New York: Appleton-Century-Crofts, 1967, pp. 600-622.

Ulrich, R. E. and Favell, J. E. Human aggression. In Neuringer, C. and Michael, J. L. Behavior modification in Clinicai Psychology, New York: Appleton-Century-Crofts, 1970.

Ulrich, R. E., Wolff, P. C. and Azrin, N. H. Shock as an elicitor of intra- and inter-species fighting behavior. Animal Behavior, 1964, 12, 14-15.

White, G. D., Nielsen, G. and Johnson, S. M. Time-out duration and the suppression of deviant behavior in children. Journal of Applied Behavior Analysis, 1972, 5, 111-120.

Willoughby, R. H. The effects of time-out from positive reinforcement on the operant behavior of preschool children. Journal of Experimental Child Psychology, 1969, 7, 299-313.

Zeilberger, J., Sampen, S. E., and Sloane, H. N. Modification of a child's problem behaviors in the home with the mother as therapist. Journal of Applied Behavior Analysis, 1968, 1, 47-53.