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ABSTRACT

Two experiments are reported: one with autistic children in a day-care treatment program. the other with "hopeless" rating behavior in a grade six school setting. Although the samples were small (seven in the autistic group, 43 in the sixth grade group), the results indicated conclusively the increased rate of cooperative responses and decrease of uncooperative responses under reinforcing conditions in the first experiment and the benefits of utilizing behavior modification in the school setting. Eight experimental conditions were arranged in the day-care setting in which two variables were manipulated: apparatus and differential reinforcement. The effects of positive reinforcement upon cooperative behavior appeared to be greater without apparatus than with it. In the second study, over a two month period, a point system was used to rate pupils' cooperativeness: however, this was rejected as unnecessary since the initial extrinsic motivation of a field trip evolved to an intrinsic motivation in cooperating for the sake of cooperating. (SBP)

Establishing and Maintaining Cooperative Behaviour Among Autistic Children and Among Normal Children - Both Groups Having Been Classified as "Hopeless"

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The failure of a programme designed to change the behaviour of subjects in either regular school systems or more specialized settings is frequently a function of the staff too readily classifying subjects as "hopeless cases" rather than a function of an inflexible programme. This paper presents findings which demonstrate the effectiveness of a behaviour modification approach to establishing cooperative behaviour among "hopeless" children in two different settings, viz., (1) autistic children in a psychiatric hospital and (2) "unmanagable" grade 6 children in a regular elementary school class.

Experiment 1 - Autistic Children

Social inadequacy and lack of social cooperation is one of the defining characteristics of mental deficiency (Heber, 1959; Sarason & Galdwin, 1958; Spradlin et al., 1967). It is therefore surprising to find that in spite of this widespread acknowledgement there have been comparatively few investigations into how such children respond to each other. Of equal significance is the finding that among the reported studies investigating social cooperation between retarded, mentally deficient, or even normal children, there commonly is involved apparatus

which might in itself have a significant influence upon the cooperative behavior of the subjects. For example, Mithaug and Burgess (1967, 1968), in concluding that individual reinforcement was both necessary and sufficient for establishing cooperative behavior between children, used apparatus which consisted of three, 14-key piano keyboard instruments wired to a counting device on the experimenter's desk. Each of the three children (five to twelve years old), simultaneously pressing a predesignated key, activated a light for reinforcement. The influence of the novel apparatus on the cooperative behavior obtained is unknown.

Findings that cooperative responses gradually increase in frequency when reinforced and gradually decrease in frequency during extinction appear to be more marked in experiments which involved the use of novel apparatus (e.g. Azrin and Lindsley, 1965; Hintgen et al., 1965; Hollis, 1966) rather than in similar studies which have not involved apparatus (e.g. Carlin and Armstrong, 1968). It was therefore hypothesized that use of novel apparatus would significantly enhance the effects of reinforcement of cooperative behavior between autistic children.

METHOD

Subjects were drawn from a population of seven autistic children in a day-care treatment programme at the Clarke Institute of Toronto.

Alex was a six year old boy who had developed some funtional speech, but he was markedly withdrawn and rarely attempted to interact socially with the other children. Danny was a five year old boy who displayed a somewhat more developed use of language (approximately that of an average three year old). He exhibited high distractibility and occasional

aggressive behavior toward the other children.

Procedure. The subjects participated together in sessions which lasted ten minutes and occurred twice a day, once in the morning and once in the afternoon. The experimenter sat beside the subjects at a table in a sound-proof room, which had a one-way observation mirror and an intercom system. A piece of paper and crayon were placed between the subjects and the task called for the children to draw a picture together. Both subjects had developed sufficient fine motor skills to enable them to draw a simple figure, such as a face or a house. Brief instructions were given to both subjects prior to beginning each session, the duration of which was measured by the use of a stop-watch. The experimenter then recorded the frequency of occurrence of cooperative and uncooperative responses. Cooperative behavior was defined as inviting (either verbally or gesturally) the other child to have a turn, or attending to what the other child was doing for two or more seconds. Uncooperative behavior, or that which was incompatible with participation in the goal-directed activity, was defined as physically disturbing the other child (e.g., grabbing the crayon, hitting) or rejecting the other child (e.g., refusing to share the crayon at request, refusing to participate).

To assess reliability of measurement, periodic observational checks were made by staff not directly involved in the experiment. These data indicated an agreement of above 90% on observed responses.

Conditions. The subjects were involved in eight experimental conditions in which the two variables, apparatus and differential reinforcement, were manipulated.

The apparatus consisted of a crayon tied to each end of a length

of string which ran through an eyelet fixed to the top of the table. The length of the string was such that only one child could draw at a time, because as soon as one child brought his crayon to where the paper was placed, the other crayon moved beyond the edge of the sheet. Co-operation was therefore needed for both children to contribute to the drawing.

In reinforcement conditions, the experimenter reinforced cooperative responses with a small piece of food which had demonstrated reinforcing value for the child in previous training situations, together with verbal praise for the behavior ("Good helping", or "Good watching"). Uncooperative responses were punished with a "time-out" procedure, viz. removing the child a short distance from the table for a duration of one minute.

In Condition I, a base period, cooperative and uncooperative behaviors were observed without the introduction of apparatus or reinforcement. In order to assess the effects of reinforcement alone, differential reinforcement was introduced in Condition II, and withdrawn in Condition III which was a reversal to the baseline condition. Then, in order to assess the effects of apparatus with and without reinforcement, the apparatus was introduced alone in Condition IV, reinforcement was added in Condition V, and then reinforcement was withdrawn in Condition VI. In a seventh condition, apparatus was combined with a fixed ratio 2:1 schedule of reinforcement. The final condition (eighth) involved a thinning out of the reinforcement schedule up to a 1:8 ratio. Table 1 outlines this series of conditions and presents the design employed to evaluate whether the novel apparatus influenced cooperative behavior, and also whether reinforcement (with and without apparatus) significantly affected cooperative behavior between the two subjects.

Insert Table 1 about here

RESULTS

Figure 1 presents the two subjects' cooperative and uncooperative responses over the eight experimental conditions.

Insert Figure 1 about here

The mean cooperative and uncooperative scores and their standard deviations are presented in Figure 2.

Insert Figure 2 about here

The introduction of reinforcement without apparatus in Condition II (following the establishment of a baseline in Condition I) significantly increased cooperative behavior and decreased uncooperative behavior. Extinction during Condition III demonstrated the effectiveness of reinforcement, as cooperative behavior decreased rapidly and uncooperative behavior increased slightly. The introduction of the apparatus without reinforcement during Condition IV made no significant difference to the subject's cooperative behavior, and even markedly decreased Danny's uncooperative responses.

A marked return to cooperative behavior occurred during Condition V when reinforcement was reintroduced with the apparatus. Condition VI

(when only the use of the apparatus was continued) resulted in essentially the same pattern as presented within Condition IV, viz., a significant decrease in cooperative behavior and a marked increase in Danny's uncooperative responses. When the reinforcement was reintroduced on a fixed ratio schedule of every other response, and the use of the apparatus was continued (Condition VII), cooperative behavior of both subjects increased very significantly and uncooperative behavior decreased.

During Condition VIII (no apparatus), the reinforcement ratios were varied considerably, and the cooperative responses varied accordingly. When the fixed ratio was increased from 1:2 to 1:4, both subjects' cooperative responses increased significantly (and the uncooperative responses decreased), but beyond this ratio (i.e., 1:5 to 1:8) cooperation declined significantly; and Danny's uncooperative responses again showed an increase.

Both subjects' scores were combined to give a mean cooperative and uncooperative response under each condition. t tests were then used to investigate the statistical significance of between-condition differences. These data are presented in Table 2.

Insert Table 2 about here

DISCUSSION

The increased rate of cooperative responses and decrease of uncooperative responses under reinforcing conditions clearly support the findings of previous studies such as those reported by Mithaug and Burgess

(1967, 1968), Cohen (1962), Azrin and Lindsley (1956), Jorgenson and Parnell (1970), and Vogler (1970).

It is also clear that the apparatus not only failed significantly to increase cooperative behavior, but contributed to an increase in uncooperative responses even during reinforcement conditions. Thus the effects of positive reinforcement upon cooperative behavior appear to be greater without apparatus in the present study.

Experiment 2 - Normal Children

Subjects comprised a class of 43 grade 6 students who had a school reputation for violently disruptive behavior and who the staff regarded as "hopeless".

Procedure Five staff members who shared responsibilities for teaching the class were asked to rate each pupil's cooperativeness on a 7 point scale (7 = high cooperativeness). Ratings included both cooperation with other students and cooperation with the teacher.

After these baseline data were gathered, the class was invited to raise funds for a three-day social studies trip contingent upon their gaining a minimum number of points at the end of each of the subsequent 14 days. Each child was given a card displaying "cooperative behavior" and "uncooperative behavior". The teacher was given a pocket-sized hole punching device to record individual students' cooperative and/or uncooperative behaviors. The class points for each day were calculated by subtracting the total number of uncooperative responses from the total number of cooperative responses.

Two months after the experiment began the same teachers rated each student on the same scale as described above.

RESULTS

The pre- and post-test ratings of cooperativeness are presented in Table 3.

Insert Table 3 about here

The dramatic increases in cooperativeness both with teachers and peers was so marked that no statistical analyses were performed on the data. The pre- and post-test differences were obviously statistically significant.

DISCUSSION

The behavior modification programme was extremely effective not only for the two month period when the data were collected, but the teachers involved all reported that the class became a delightful group of students to work with for the remainder of the year. The "home" teacher, responsible for the major proportion of the students' in-class hours, reported the following extra "lessons" learned from the experiment:

(1) That the point system no longer became relevant after 3 weeks, i.e. the initial extrinsic motivation of a field trip evolved to an intrinsic motivation in cooperating for the sake of cooperating.

(2) That the class maintained its cooperative behavior after the

field trip. This again suggests the strength of the intrinsic motivation aroused.

(3) The programme allowed for individual student reinforcement schedules, i.e. the teacher was able to give points to reinforce specific behaviors which were appropriate for that particular student.

CONCLUSION

The results of both experiments imply additional evidence of the effectiveness of a behavior modification approach to increasing cooperative behavior between children in both clinical and regular school settings. Of special significance, however, is the suggestion that this approach can be successful even with subjects that have been thought of as "hopeless cases".

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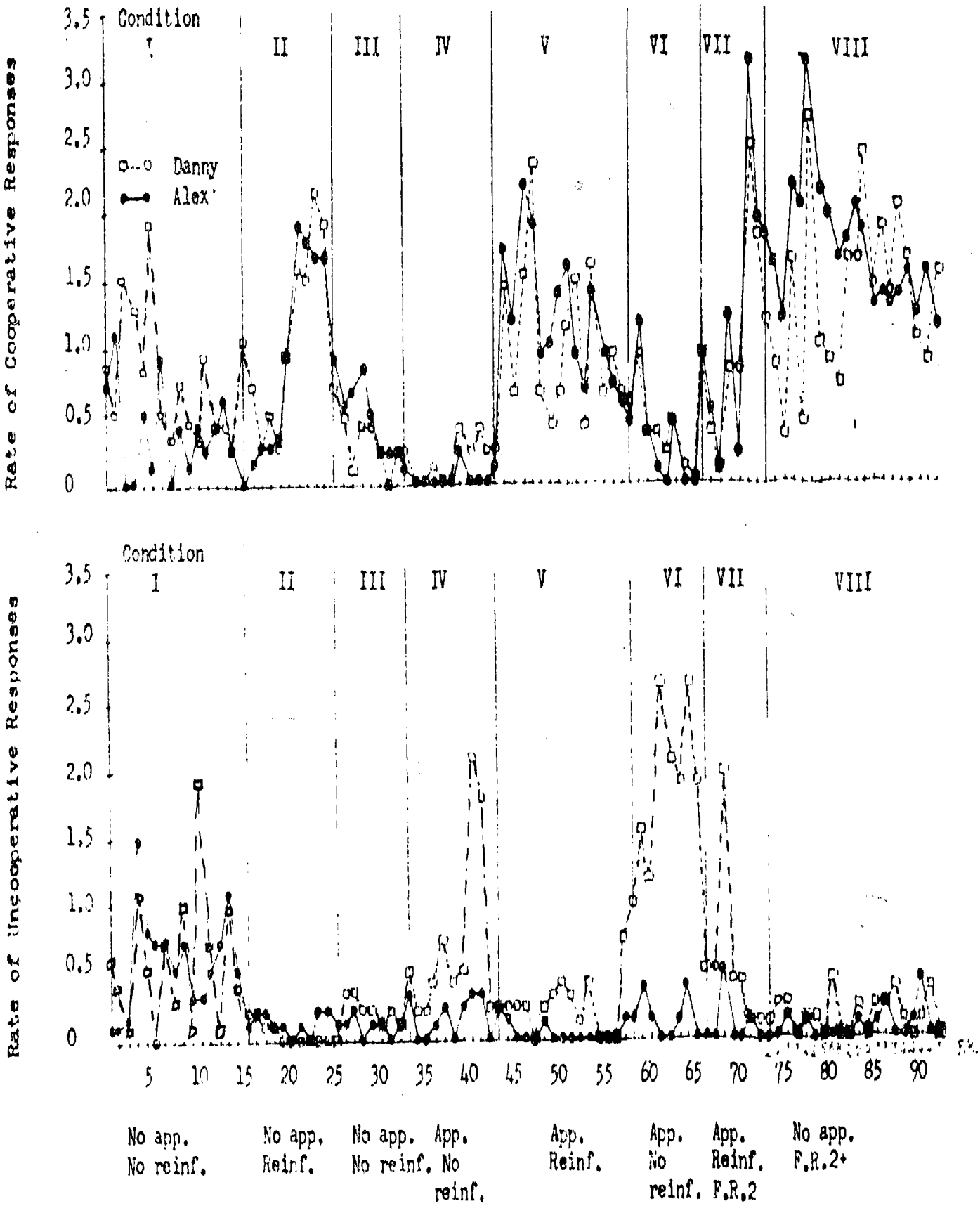

Figure 1: Cooperative and Uncooperative Response Rates

ALEX

CONDITION	COOPERATIVE		UNCOOPERATIVE	
	MEAN	STD. DEV.	MEAN	STD. DEV.
I	0.37	0.34	0.58	.38
II	0.88	0.81	0.12	0.08
III	0.51	0.29	0.09	0.06
IV	0.03	0.07	0.14	0.13
V	1.15	0.56	0.03	0.06
VI	0.3	0.4	0.11	0.12
VII	1.13	1.07	0.09	0.19
VIII	1.68	0.46	0.05	0.1

DANNY

CONDITION	COOPERATIVE		UNCOOPERATIVE	
	MEAN	STD. DEV.	MEAN	STD. DEV.
I	0.73	0.49	0.59	0.5
II	1.1	0.67	0.06	0.08
III	0.34	0.22	0.17	0.1
IV	0.13	0.13	0.68	0.7
V	0.96	0.59	0.21	0.19
VI	0.32	0.25	1.89	0.62
VII	1.0	0.8	0.57	0.65
VIII	1.32	0.61	0.12	0.12

Figure 2: Mean Cooperative and Uncooperative Responses and Their Standard Deviations for Each Condition

TABLE 1

EXPERIMENTAL DESIGN TO EVALUATE EFFECTS OF REINFORCEMENT--WITH AND WITHOUT APP --FOR COOPERATIVE DRAWING BEHAVIOR

CONDITION	STIMULUS	CONTINGENCY
1 (a)	no apparatus	no reinforcement
2 (b)	no apparatus	reinforcement
3 (a)	no apparatus	no reinforcement
4 (c)	apparatus	no reinforcement
5 (d)	apparatus	reinforcement
6 (c)	apparatus	no reinforcement
7 (d)	apparatus	reinforcement (thin contingency)
8 (b)	no apparatus	reinforcement (thin contingency)

TABLE 2

t SCORES FOR BETWEEN-CONDITIONS COMPARISONS

COOPERATIVE RESPONSES

CONDITION 1	2	3	4	5	6	7	8
I	-3.06**	.4NS	3.88**	-4.29**	1.33NS	-2.84**	-8.26**
II		2.91*	3.51**	-0.32NS	3.46**	.24NS	-3.05**
III			5.45**	-4.11**	1.16NS	-2.65**	-7.37**
IV				-7.49**	-2.0NS	-4.79**	-11.26**
V					4.78**	-0.04NS	-3.37**
VI						-3.09**	-8.03**
VII							-2.17NS
VIII							

UNCOOPERATIVE RESPONSES

CONDITION 1	2	3	4	5	6	7	8
I	5.[illegible]**	2.11*	1.26NS	5.49**	-1.92NS	1.[illegible]	6.86**
II		-1.41NS	-2.52*	-0.77NS	-4.02**	-[illegible].95NS	0.0NS
III			-1.97NS	0.23NS	-3.43**	-1.44NS	1.2NS
IV				2.68**	-2.22NS	0.47NS	3.48**
V					-4.7**	-1.94NS	0.89NS
VI						[illegible].26*	5.67**
VII							2.64*

Underlined scores indicate two-tailed tests

TABLE 3

THE PRE- AND POST-TEST RATINGS OF COOPERATIVENESS (IN PERCENTAGES)

	Pre-T			Post-Test			Improvements		
	Coop. with Teacher	Coop with Students	Av.	Coop with Teacher	Coop with Students	Av.	Coop with Teacher	Coop with Students	Av.
Boys	10.3	40	25.1	84.3	87.3	85.8	74	47.1	60.5
Girls	14.5	44.4	29.4	86	87.3	86.6	72	43	57.5
Total	12.4	42.1	27.3	86.4	86.2	86.3	74.2	45	59.6