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EFFECT OF CONTINGENT AND NON-CONTINGENT SOCIAL REINFORCEMENT ON THE COOPERATIVE PLAY OF A PRESCHOOL CHILD[1]

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The effect of adult social reinforcement on the cooperative play of a five-year old girl in a preschool setting was assessed under two conditions: (1) presented randomly throughout the school day, and (2) presented contingent on cooperative play. Only in the latter condition was a significant change in cooperative play observed.

A series of recent studies has shown that adult social stimulation, presented as a consequence of various behaviors of preschool children, successfully increased those behaviors (Allen *et al.*, 1964, 1967; Harris, Johnston, Kelley, and Wolf, 1964; Baer and Wolf, 1968). In each case, the child's behavior was modified by making this teacher reinforcement both frequent and contingent upon the behavior, whereas previously reinforcement had been intermittent and non-contingent. In this study, a simple comparison was made of the separate roles of frequent reinforcement and contingent reinforcement in developing the cooperative play of a preschool child.

METHOD

Subject

Martha, aged 5 yr 4 months, was enrolled in a group of 15 normal children in a university preschool. The group attended school five afternoons per week for approximately 2.5 hr each day. Most of Martha's time at school was spent in non-social tricycle-riding, sand play, swinging, "cooking", and playing with animal toys. Her contacts with other children, though frequent, tended to be brief and non-cooperative. Her refusals to play when invited, her taunts and competitive statements ("I can do that better than you"), and her foul language and rambling accounts of violent accidents perhaps made her aversive to other children. These behaviors, her frequent upsetting of materials, and her typical delay in fulfilling routines seemed to have a similar effect on teachers.

Procedures

General procedures. The general plan of study was built upon a "reversal" design incorporating two different contingencies of reinforcement. The baseline consisted of normal preschool practices, composed essentially of intermittent attention to Martha, in no particular contingency. The first type of reinforcement consisted of greatly increased and carefully non-contingent[3] social reinforcement from teachers. There then followed a period of decreased reinforcement presented contingent upon cooperative play or approximations to it. Following clear evidence of behavioral change, this condition was discontinued and a return to the prior condition, frequent non-contingent reinforcement, was instituted. This was done to demonstrate experimental control of the behavioral change, thus validating the functional nature of the contingent reinforcement used to bring it about, and again demonstrating the previously noted lack of function in frequent but non-contingent reinforcement. As soon as this was clear, decreased but contingent reinforcement was again instituted, and a more intermittent schedule was approached.

Approximations to cooperative play were reinforced when necessary in the first stages

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[3]In this report, the term "non-contingent reinforcement" means reinforcement presenting according to random intervals of time, without regard for what behavior might be occurring at those times. It is to be distinguished from the term DRO (differential reinforcement of other than cooperative behavior).

of shaping the behavior. These approximations were typically verbal responses to children who had been prompted by the teachers to approach Martha with an idea for play. Verbal response was a minor component of cooperative play (as defined below), but was judged a good behavioral route to the cooperative behaviors ultimately sought.

The major behavior observed and treated experimentally was cooperation between Martha and any other children. In addition, a second class of behavior, Martha's proximity to other children, was observed and recorded. Proximity was studied in part because it is often taken as evidence of a social orientation in a child, and in part because it existed at a considerable rate in Martha from the outset, and could easily be mistaken for a cooperative social orientation when in fact it need not be.

Specific procedures. For 10 days, Martha's teachers maintained their ongoing pattern of responding to her intermittently and without regard for her immediately preceding behavior. Objective records were taken of Martha's rates of cooperative play and of maintaining simple proximity to other children. This constituted the baseline period of the study.

Cooperative play was defined specifically as any of the following activities: pulling a child or being pulled by a child in a wagon; handing an object to a child, or pouring into his hands or into a container held by him; helping a child by supporting him physically, or bringing, putting away, or building something verbalized as expressly for him; sharing something with a child by digging in the same hole, carrying the same object, painting on the same paper or from the same paint pot, or adding to the same structure or construction (such as a chain of manipulative toys, or a block house).

Proximity was defined as being within 3 ft of another child, indoors, and within 6 ft outdoors.

For the next seven days, the teachers displayed attention and approval in close proximity to Martha at random intervals throughout the school session, so that approximately 80% of each session involved such interaction. This constituted the first period of non-contingent reinforcement.

Teacher reinforcement consisted of remaining near Martha and attending closely to her activities, sometimes supplying her with equipment or materials, and sometimes smiling, laughing, conversing, and admiring her.

Subsequently, for a period of 12 days, Martha received the same teacher reinforcement only as a consequence of cooperative play or behavior conducive to cooperative play. This constituted the first reinforcement of cooperative play.

Since Martha emitted cooperative play at a very low rate initially, it was necessary to use priming and shaping procedures. Priming meant that other children were prompted to speak to Martha or initiate potentially cooperative situations with her. (No such promptings were ever given to Martha herself.) Shaping meant that Martha was initially reinforced for all responsive verbalizations in proximity to children, subsequently only for such verbalization in potentially cooperative situations, and finally (by the seventh day of this 12-day period) only for full-blown cooperative play.

After these 12 days, non-contingent stimulation was resumed for four days, the second non-contingent reinforcement period. Again, teachers interacted with Martha for approximately 80% of each school session.

Finally, over an eight-day period (the last eight days of the school year), the teachers again resumed contingent reinforcement of cooperative play, constituting the second reinforcement of cooperative play. During the last four days of this period, the teachers steadily decreased their rate of reinforcing cooperative play and correspondingly increased their attention to desirable behaviors other than cooperative play, to regain a more typical reinforcement schedule for the girl, and to see if the rate of cooperative play would be maintained nevertheless.

Recording. Data on Martha's behavior were recorded daily in consecutive 10-sec intervals by an observer. Observation was continuous during the school-day session, except for a teacher-structured group-activity period of 20 to 30 min daily. In recording Martha's behavior, the observer used the categories of proximity, cooperative play, and teacher reinforcement. The child's scores for any day were the percentages of the 10-sec intervals marked as involving proximity or cooperative play.

Observer reliability was checked on five separate days by having a second observer re-

cord Martha's behavior in the same fashion as the first. Comparison of total incidences of proximity, cooperative play, and teacher reinforcement yielded 92% or better agreement on each of the five days.

RESULTS AND DISCUSSIONS

The percentage of each session involving proximity and cooperative play is graphed in Fig. 1. It can be seen that during the baseline period Martha was in proximity to children roughly 50% of the day; at the same time, her rate of cooperative play was 5% or less of the day, and on five of the 10 days, 0%. Teacher reinforcement averaged about 20% of the school day.

When Martha was then given continual, non-contingent teacher reinforcement for about 80% of each session (Days 11 through 17 in Fig. 1), her rate of proximity to children varied sporadically between about 40% and 90% of the day, the average rising to about 65%. Probably this was due in part to the attraction of other children to a situation in which a teacher was giving close and continual attention. The decline in the rate of proximity to children after Day 15 might indicate the adaptation of the other children to a teacher always being somewhere near Martha. Except for Day 14 (when Martha's favorite companion returned from four days of hospitalization and she spent some time pulling him in a wagon), there was no overall change in Martha's rate of cooperative play, which still averaged less than 5% of the day.

After the eighteenth day, when teacher reinforcement of Martha was made contingent on cooperative play or approximations to it, the rate of teacher reinforcement dropped to its baseline level, and frequently amounted to less than 20% of the day; yet at the same time Martha's rate of cooperative play increased from 4% of the day to almost 40%. In the course of developing this increase, teachers found that their verbalizations to Martha frequently drew her out of cooperative play with a child and into interaction with them; therefore, reinforcement was given with increasing frequency to the entire cooperating group rather than to Martha as an individual.

Figure 1 shows that during the period of reinforcement of cooperative play, Martha's

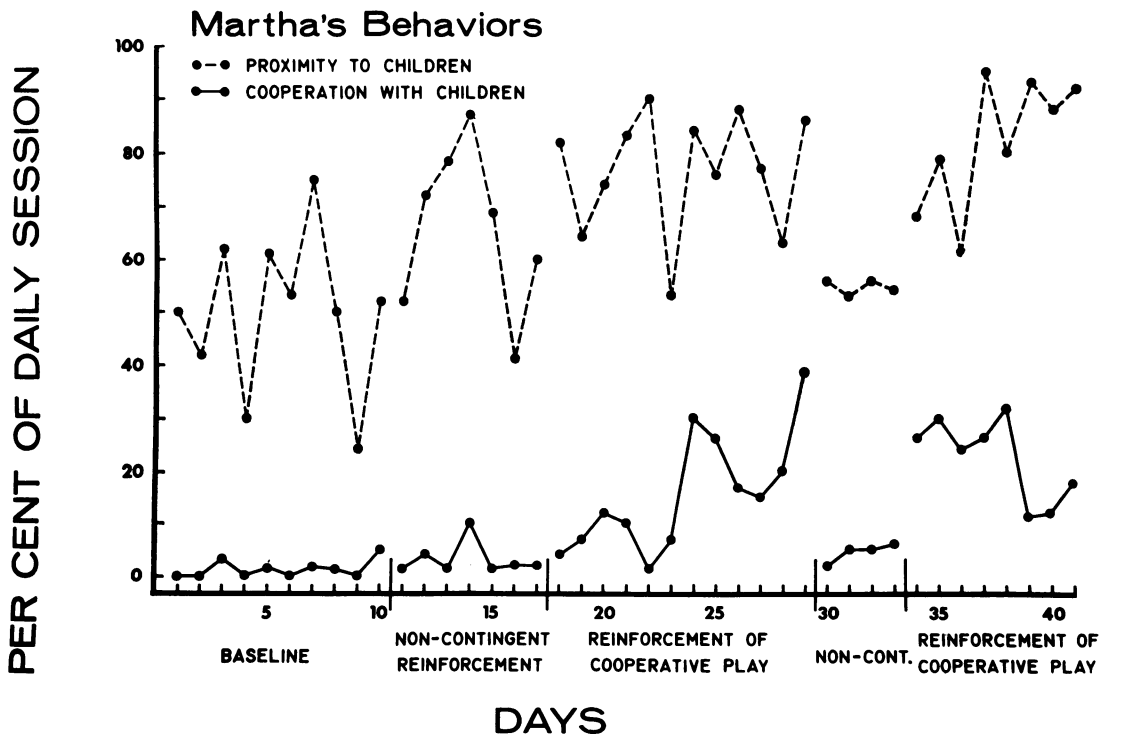

Fig. 1. Daily percentages of proximity and cooperative play over sequential experimental conditions.

proximity to children increased to about 75% of the day and was maintained at approximately that level. When Martha was again given almost continual non-contingent teacher reinforcement for any and all behavior (beginning on Day 30), both proximity to children and cooperative play dropped almost to their baseline levels. Martha again spent about 55% of the school day in proximity with children and only 5% in cooperation with them; yet teacher reinforcement had increased from near 20% of the day to about 80%. During this time cooperative play was not ignored; like any of the rest of Martha's behaviors, it might be reinforced if it occurred while a teacher was present. However, teachers during this period went to Martha immediately upon her arrival at school rather than waiting for a cooperative behavior to occur, and thus tended to reinforce behaviors sometimes incompatible with cooperative play at the start of each school day.

When teacher reinforcement was again made contingent upon cooperative play, a high rate of the behavior was immediately recovered, and was maintained for four days (Days 34 to 37) at 25% or more of the day. In this process, teacher reinforcement again decreased to about 20% of the day. Martha's proximity to children (not reinforced as such) rose again to a 75% average.

When teachers began on Day 38 to generalize reinforcement from specifically cooperative behaviors to broader categories of play, there were only four days of school remaining. As can be seen in Fig. 1, teacher reinforcement of cooperative behaviors was decreased too quickly during the first three days, and Martha's rate of cooperative play declined, though not to its baseline level. During this time, however, Martha was spending approximately 90% of the day in proximity to children. Her interactions with them appeared to be not only of much longer duration, but of a more positive nature than had characterized baseline interactions. Teachers judged that Martha had changed from an "obnoxious" girl to one who was "sometimes unpleasant". A high rate of "obnoxious" behavior could hardly co-exist with a high rate of cooperative play, of course, but many preschool children are capable of alternating between the two repertoires.

It can be seen in Fig. 1 that non-contingent reinforcement, whether continual or intermittent, did not appreciably develop cooperative play. Only when reinforcement was made contingent upon the behavior did any reliable change in rate appear. Hence, the data indicate that the behavior change was less a function of teacher attention (whether "a lot" or a "little") than it was a function of teacher attention made contingent on the behavior. Yet it is frequently assumed that children display hostile or angry (non-cooperative) behaviors as a result of too little positive attention from the adults in their environment. In this case, at least, abundant positive attention from all involved adults had no power to develop a cooperative replacement for Martha's unpleasant behaviors as long as it was presented as a non-contingent gift. Yet a much smaller amount of reinforcement could drastically alter her behavior, so long as it occurred in contingency with that behavior. Furthermore, it is to be noted that abundant but non-contingent attention could not maintain Martha's newly shaped cooperative repertoire, when contingent reinforcement was discontinued early in that development. It would seem, then, that to whatever extent Martha's behavior can serve as a guide, deliberate behavior modification is likely to proceed more effectively when it is based upon contingent, rather than abundant, stimulation.

REFERENCES

Allen, K. Eileen; Hart, Betty M., Buell, Joan S., Harris, Florence R., and Wolf, M. M. Effects of social reinforcement on isolate behavior of a nursery school child. *Child Development*, 1964, **35**, 511-518.

Allen, K. Eileen; Henke, Lydia B., Harris, Florence R., Baer, D. M., and Reynolds, Nancy J. Control of hyperactivity by social reinforcement of attending behavior. *Journal of Educational Psychology*, 1967, **58**, 231-237.

Baer, D. M. and Wolf, M. M. The reinforcement contingency in preschool and remedial education. In R. D. Hess and Roberta M. Bear (Eds.) *Early Education: current theory, research, and practice*. Chicago: Aldine, 1968.

Harris, Florence R., Johnston, Margaret K., Kelley, C. Susan, and Wolf, M. M. Effects of positive social reinforcement on regressed crawling of a nursery school child. *Journal of Educational Psychology*, 1964, **55**, 35-41.

Hart, Betty M., Allen K. Eileen; Buell, Joan S., Harris, Florence R., and Wolf, M. M. Effects of social reinforcement on operant crying. *Journal of Experimental Child Psychology*, 1964, **1**, 145-153.