THE ROLE OF OFFER RATES IN CONTROLLING SHARING BY YOUNG CHILDREN¹

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The effects of different reinforcement contingencies on the rates of offers to share and their corresponding rates of acceptance by two small groups of preschool children were investigated in two experiments. In the first experiment, food and praise were given after a 5-min play period to any subject who had made one or more offers to share during the play period. This procedure increased the rate of share-offers by all subjects. However, as share-offers increased, the percentage of offers accepted decreased. In the second experiment, reinforcement was made contingent on a subject reducing offers to share to only one or two per 5-min period. This led to a higher percentage of the offers being accepted. The results suggest that by controlling the rate of a social behavior, the manner in which other persons in the environment respond to the behavior may also be influenced.

DESCRIPTORS: sharing, offers to share, response rate, reinforcement, preschool children

Sharing, as a unique prosocial behavior, has received considerable attention from experimental child psychologists. Several researchers (Handlon and Gross, 1959; Larsen and Kellogg, 1974; Ugurel and Semin, 1965), influenced initially by Piaget (1932), have investigated age and sex variables affecting sharing under various natural conditions. Some studies have considered the effects of adult models on rate and probability of children's sharing (Elliot and Vasta, 1970; Harris, 1970; Midlarsky and Bryan, 1967; Rosenhan and White, 1966). Others have examined the effects of a "need of approval" and adult presence on sharing (Atwood and Sengstacken, 1951; Staub and Strek, 1970).

However, few studies have used extrinsic reinforcement to teach children to share. In one such study, Fischer (1963) found that the sharing of marbles with an unknown peer was facilitated when the subject received reinforcement for it. More recently, Rogers-Warren and Baer (1976) taught sharing and praising to preschool children by reinforcing the subjects' accurate self-reports of having performed these behaviors. Several experiments concerned with abnormal social behaviors have reinforced sharing as a part of a general class of prosocial behaviors (Allen, Hart, Buell, Harris, and Wolf, 1964; Buell, Stoddard, Harris, and Baer, 1968; Kirby and Toler, 1970; Pinkston, Reese, LeBlanc, and Baer, 1973; Sajwaj, Twardosz, and Burke, 1972).

In the present study, a first experiment taught members of two small groups of preschool children to share with one another, by reinforcing their offers to share. In a second experiment, the subjects' rates of offers to share were experimentally manipulated, to examine the effects of various offer-rates on the corresponding rates of offer-acceptance.

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The second experiment was conducted on the premise that the most appropriate sharing is that which has the best probability of acceptance. Thus, if a large percentage of share-offers is being rejected, then these offers are functionally inappropriate to the children receiving them. Conversely, a high rate of acceptances shows that their recipients consider the offers appropriate. No doubt, appropriate sharing, defined by its probability of acceptance, depends on the form of share-offers. Also, it may depend on the rate of offers to share. The second experiment examined whether the rate of offer-acceptances was controlled by different rates of offers to share.

GENERAL METHOD

Subjects

Two groups of preschool children served as subjects for both Experiment I and II. Group A consisted of five subjects who ranged in age from 3 to 7 yr. Of the five (two males, three females), the two oldest were mildly retarded; the other three were not. Group B consisted of four, two males and two females, ranging in age from 3 to 5 yr, all of whom were considered normal. With one exception, all subjects but one had good verbal skills. Group A subjects were in a University Affiliated Facility classroom at the University of Kansas. Group B subjects were in a Headstart classroom located near the university.

Setting

Both groups met each weekday with the experimenter for a 10-min play period in small experimental rooms located near their respective classrooms. During the sessions, the subjects were seated around a plywood board measuring approximately 0.6 by 0.8 m and had access to materials furnished by the experimenter. The 10-min play period was divided into two successive 5-min segments. During each segment, the groups were provided with one of four possible materials: plastic nuts and bolts, Lego

blocks, magic markers, or crayons. The nuts and bolts were alternated daily with the Lego in one 5-min segment, and the markers were alternated daily with the crayons in the other 5-min segment. After the first 5-min segment, the material was removed and replaced by a second material for the second 5-min segment. During reinforcement conditions, the time between the first and second interval (usually about 1 min) was used to deliver reinforcement to subjects who had made one or more share-offers during the 5-min segment. Share-offers during the second 5-min segment were reinforced at the conclusion of that segment.

Observation Code

Three behaviors were recorded for each subject during both experiments: (1) offers to share, (2) acceptance of others' offers to share, (3) refusals of others' share-offers. Share-offers were defined both verbally and nonverbally. A verbal share-offer was defined as any verbalization by a child to one or more peers in which the child (1) invited the peer(s) to join in a particular task or activity, (2) offered to share materials directly with the peer(s), or (3) offered to trade materials with the peer(s). However, if a child made a verbal share-offer that a peer verbally accepted, but the materials did not change hands, the event was not counted as a share-offer or as an acceptance. (This recording rule ensured that the behaviors being defined and measured as share-offers and acceptances were functional agreements and not irrelevant verbal behaviors). A nonverbal share-offer was defined in two ways: (1) a child successfully handed material to one or more peers without a verbal offer, or (2) a child and peer(s) used the same material simultaneously without a verbal offer. The purpose of this definition was to measure share-offers made through gestures, such as holding a material out to a peer, in the absence of a verbal offer. Verbal and nonverbal offers to share were scored identically. The acceptance of a share-offer was scored when a child physically took in hand, within 5 sec, material offered

by one or more peers. A refusal of a share-offer was scored when a child either did not acknowledge a share-offer, or verbally and/or physically rejected the offer. (Trading, defined as sharing involving a promise to reciprocate—"I'll give you this if you give me that"—was scored as sharing, but occurred only rarely).

A 10-sec interval-recording method was used in the study. All occurrences of the coded behaviors were recorded in the interval during which they occurred. For example, a share-offer might occur and be scored in one 10-sec interval while the acceptance or rejection of that offer occurred and was scored in the subsequent 10-sec interval. Two observers with stopwatches, clipboards, and data sheets recorded the children's behaviors in each setting. They sat within 0.9 m of the group, one on each side. Each observer recorded occurrences of all three coded behaviors for two or three children.

Reliability

Interobserver agreement was calculated by having a third observer make simultaneous, but independent, observations. Reliability observations were taken at least once in each experimental condition in both experiments. Agreement was measured by comparing the two observation records for agreement on the occurrence of coded behaviors, interval by interval. The percentage of agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100.

EXPERIMENT I

Experiment I examined a reinforcement procedure used to increase the rates of share-offers by children in both groups. Following baseline, food and praise were given after each 5-min segment to any subject who had made one or more offers to share during the segment. When play began, subjects were told that those who shared might receive "something". These procedures increased the rate of share-offers in all

Fig. 1. The relationship between the mean rates of share-offers per 5-min segment and their corresponding mean percentages of acceptance.

subjects. However, as share-offer rates increased, the percentage of offers accepted decreased. Figure 1 shows that the highest percentage of acceptance corresponded with the lowest rate of offers made. Specifically, the highest rate of acceptance (75%) occurred when subjects offered to share an average of once per 5-min segment. When the children averaged five, six, or seven offers per segment, only about 28% of those offers were accepted.

EXPERIMENT II

Experiment II attempted to produce appropriate rates of sharing, defined as that rate of share-offers that has the highest probability of acceptance. The analysis of the share-offer and acceptance rates in Experiment I indicated that appropriate sharing might be maintained simply by controlling the rate of offers to share made within a given session. A reversal design was employed to examine this possibility with both groups.

Procedures

The final nine sessions of Experiment I served as the baseline for Group A in Experiment II;

the final six sessions of Experiment I served as the baseline for Group B. During this time, children were instructed that "if you share, you might get something". Contingent reinforcement was made available after each 5-min segment for those who met the contingency during that session segment.

Training package to reduce share-offer rates. Following baseline, a two-part training program to reduce the rates of share-offers was applied to both groups. The first part of the program consisted of a shaping procedure that had two components. First, before each session, the experimenter told the children that he would explain the proper ways to share, that it was best to offer only things that they themselves had already used, and to ask people if they wanted to share. Second, the experimenter gave short, descriptive verbal reinforcement for appropriate sharing once or twice per 5-min segment.

The second part of the shaping program made reinforcement contingent on a child making six or fewer share-offers per session segment. Direct shaping was discontinued. Before each 5-min segment, the experimenter instructed the children that "if you make less than six share-offers but at least one, then you might get something". After these two components of the shaping program, a sequence of contingencies on the rate of share-offers was applied, as follows.

"Two or less" contingency. Reinforcement followed one or two share-offers during a given 5-min segment. The children were instructed that "if you make just one or two share-offers, you might get something". All children who met the contingency received a piece of cereal, or an M&M, plus verbal praise at the end of each 5-min segment.

The "six or more" contingency. Following the "two or less" condition, a reversal condition was applied in both groups in which reinforcers were contingent on a child making at least six share-offers per 5-min segment. Before each segment, the children were instructed that "if you make at least six share-offers during the play period, you might get something". At the end of each

5-min segment, all children who met the contingency received a piece of cereal, or an M&M, plus verbal praise.

Resumption of the "two or less" contingency. Following the "six or more" reversal condition, reinforcers were again contingent on a child making only one or two share-offers per 5-min segment.

RESULTS

The mean reliability of all child behaviors for Groups A and B was 87%. The mean number of share-offers and the mean percentage of offers accepted, per condition, for Groups A and B, are shown in Table 1. The groups' percentages of change in both offer and acceptance rates by condition are also presented. Block analyses of the percentage of offers accepted for Groups A and B are shown in Figures 2 and 3. In addition, the mean share-offer rates per subject for the first and second half of each condition are shown in the figures.

During baseline, Group A maintained an average of 3.9 share-offers per subject per 5-min segment, only 32% of which were accepted by a peer. Group B averaged 2.9 share-offers per session-segment during baseline, of which only 36% were accepted.

During training, Group A failed to respond to the training program until mid-way through the second part (reinforcement contingent on six offers or less per 5-min segment). However, Group B responded positively during the initial sessions of the first part of the program (topography shaping).

During the "two or less" condition, Group A averaged 2.0 offers to share per 5-min segment, a 49% decrease from their rate during the baseline condition. Correspondingly, their rate of offers accepted averaged 56%, an increase of 75% (24 percentile points) over their baseline average. Group B averaged 2.4 offers to share per segment during this condition, a decline of 16% from their baseline average. However, they accepted an average of 69% of the

Table 1

The mean number of share-offers and the mean percentage of offers accepted, per condition, for Groups A and B. Also, the groups' percentages of change in both offer and acceptance rates from condition to condition.

	Baseline	Reinforcement Contingencies		
		2 or More	6 or Less	2 or More
GROUP A				
Mean number of offers to share	3.9	2.0	4.1	1.7
% Change from previous condition	—	−49%	+110%	−58%
Mean % accepted	32%	56%	37%	53%
% Change from previous condition	—	+75%	−34%	+27%
GROUP B				
Mean number of offers to share	2.9	2.4	3.0	1.1
% Change from previous condition	—	−16%	+25%	−65%
Mean % accepted	36%	69%	26%	60%
% Change from previous condition	—	+91%	−67%	+131%

GROUP B: EXPERIMENT II

Fig. 2. A block analysis of the percentage of share-offers accepted in every 15 offers made by Group A in Experiment II, and the mean share-offer rates, per child, for the first and second half of each condition.

GROUP A: EXPERIMENT II

Fig. 3. A block analysis of the percentage of share-offers accepted in every 15 offers made by Group B in Experiment II, and the mean share-offer rates, per child, for the first and second half of each condition.

share-offers made, a gain of 91% (55 percentile points) over the baseline rate.

Across the "six or more" reversal condition, Group A's rate of share-offers increased 110% to a mean of 4.1 offers per subject, per session segment. Correspondingly, their rate of offers accepted dropped 34% from the preceding condition to an average of 37%. Group B averaged 3.0 share-offers per segment, a 25% increase in their rate over the "two or less" condition. Their acceptance rate during the same period averaged 26%, a 62% decline from the preceding condition.

During the final "two or less" condition, Group A averaged 1.7 share-offers per 5-min segment. This reflected a decrease of 58% from their average rate during the reversal ("six or more") condition. Concurrently, their average rate of acceptance increased 43% from the reversal condition to an average of 53% accepted. For this condition, Group B's rate of share-offers dropped 65% from the reversal condition to an average of 1.1 offers per subject per sessions segment. Their corresponding acceptance rate in-

creased to 60% accepted, a gain of 130% over their rate during the preceding reversal condition. Throughout all experimental conditions, the average number of offers accepted per child per 5-min segment ranged from 0.9 to 1.5.

Examination of individual share-offer rates indicated that four of the five subjects in Group A successfully reversed their offer rates in the "six or more" condition, and then reversed to lower rates in the final "two or less" condition. Only two of the four subjects in Group B reversed their share-offer rates during the "six or more" condition, accounting for the relatively small reversal effect in Group B's overall offer rate.

DISCUSSION

Experiment II showed a strong inverse relationship between the children's rates of offers to share and the percentages of those offers accepted: high rates of offers to share resulted in correspondingly low percentages of offers being accepted. If appropriate sharing is defined

as that rate of share-offers that has the highest probability of acceptance, then Experiment II produced more appropriate sharing in both Groups A and B during the "two or less" conditions.

Experiment II also showed that, for sharing, the appropriateness or inappropriateness of the behavior (at least for the share-offer recipients) was related to the rate of share-offers. This finding raises an important question concerning modifications to increase behavior in other settings. If the rate of a specific behavior determines whether other individuals in the setting respond positively or negatively, then should not the target rate be chosen according to that social reaction? Much of the sharing in Experiment I was inappropriate for the peer recipients, judging by the low percentage of the offers to share that were accepted. But in Experiment II, the deliberately lowered rates of offers produced in the "two or less" conditions apparently were more appropriate for the peer-recipients, as indexed by the much higher percentages of these offers accepted.

The results of Experiment II suggest that controlling a social behavior's rate sometimes may significantly alter the manner in which other persons in the environment respond to the behavior. Further research into the functional relationships of different behavior rates and their consequences may provide behavior analysts with important information relative to the successful, durable programming of complex social behaviors in the natural environment.

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