

# The effects of an experimental game on the classroom cooperative play of a preschool isolate<sup>1</sup>

*Los efectos de un juego experimental sobre el juego  
cooperativo en el salón de clase de un niño preescolar aislado*

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## ABSTRACT

This study examined the effects of a laboratory game on the classroom cooperative play of a four-year-old preschool isolate. In a multiple baseline design across groups, this preschool child was taken from the classroom daily to play an experimental game with a representative of each group. The results indicate that the cooperative play of the target subject increased with each group, while teacher attention for cooperative play remained constant. It was concluded that the laboratory game (or its components) could be used to increase cooperative play of a preschool child.

DESCRIPTORS: experimental game, cooperative play, classroom, child.

## RESUMEN

*Este estudio examinó los efectos de un juego de laboratorio sobre el juego cooperativo en el salón de clase de un niño aislado preescolar de cuatro años de edad. En un diseño de línea base múltiple a través de los grupos, este niño preescolar fue retirado diariamente del salón de clase para jugar un juego experimental con un representante de cada grupo. Los resultados indican que el juego cooperativo del sujeto aumentó con cada grupo, mientras que se mantuvo constante la atención del maestro por el juego cooperativo. Se concluyó que el juego de laboratorio (o sus componentes) podrían ser utilizados para aumentar el juego cooperativo de un niño preescolar.*

DESCRIPTORES: juego experimental, juego cooperativo, salón de clase, niño.

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Cooperation between individuals is a prerequisite for progress in some situations. In others, individual work is more productive. Many past efforts to modify cooperative interactions have concentrated primarily on social skills in natural environments, and academic and motor skills in laboratory contrived situations. Rarely have behavior modification procedures been applied in a laboratory setting to an uncooperative target subject and a classmate and then the target individual's cooperative behavior generalized to others in the classroom.

Cooperative responses have been variously described as a synchronous motor response (Weingold & Webster, 1964), as an alteration of responses between individuals (Mithaug & Burgess, 1968) or as a combination of these in a social setting (Hart, Reynolds, Baer, Brawley, & Harris, 1968). In laboratory settings, the development of cooperative responses has been studied using reinforcement (Mithaug & Burgess, 1968) and reinforcement and punishment (Weingold & Webster, 1964). An experimental game involving motor responses has been used in the laboratory to establish cooperative behavior between normal children using edibles as a reinforcer (Azrin & Lindsley, 1956); using social reinforcement, modeling, rule conformity and an explanation of cooperation (Nelson & Madsen, 1968); using instructions for the use of the game (Lounsbury & Bell, 1976); and between retardates using music as a reinforcer (Johnson, 1968). This same type of mechanical cooperative game has been used to establish responses between a single subject and several different persons paired with that subject in dyads (Cohen, 1962). In these latter studies, both the experimental manipulation and the measurement of cooperative responses were conducted in the laboratory setting. On the other hand, there are several studies in which the cooperative behaviors of children have been manipulated and measured in classroom settings (Hart et al., 1968; Wishon, 1979). Two studies have examined cooperative responses in both the laboratory and the natural setting. In the first study (Levison 1971), children who dispensed social rewards at a relatively high rate were paired with those children (isolates) who received and dispensed rewards at a low rate for 15 minute dyad dramatic play situations in a research room. Cooperative play of the isolates increased during the experimental sessions and later generalized to the classroom with others. In the second study (Altman, 1971) dyads matched on age and sex learned cooperative responses on an experimental game. Cooperative play between these dyads was measured before and after the game with the result of increased cooperative play after the game.

The present study sought to demonstrate that the cooperative play established on a laboratory task between an uncooperative target subject and two key members of two social groups in a class would generalize to the social groups themselves in the classroom. Attempts were made to hold teacher attention for cooperative play constant, in order to assess the effects of the laboratory cooperative game on daily measures of cooperation within the classroom.

## METHOD

### *Subject and Setting*

The subject (Jill) was a four-year-old Spanish speaking girl with a functional English vocabulary. She was enrolled in the Edna A. Hill Child Development Laboratory Preschools in the Department of Human Development and Family Life at the University of Kansas. Jill attended afternoon sessions held four days a week. There were sixteen children enrolled and four teachers in these sessions. Jill seldom played with any of the children in the room, and spent most of her time watching the other children interact or engaging in isolated play. The teachers agreed that Jill's isolate behaviors were probably detrimental to her well-rounded preschool experiences. Thus a program designed to increase cooperative interaction was instituted.

### *Behavior Definitions*

Jill was observed for initiations, responses to initiations, cooperative play and parallel play. All other children in the room were observed for initiations to Jill, and her responses to these initiations were recorded. Teachers were observed for their attention to Jill.

Initiations included both verbal and nonverbal behaviors. A verbal initiation from Jill was defined as a vocalization directed to a peer, adult or group (two or more persons). Nonverbal initiations to peers and adults were defined as handing a peer or adult an object or touching them.

Responses to initiations were defined as a vocalization or any physical movement which followed an initiation by another person within ten seconds. Jill was scored in cooperative play if she was in an activity with another child or group of children which involved a common object, or if she was exchanging objects with another child, operating equipment that required two or more persons, engaged in verbal conversation, or involved in a unified or organized activity that included imitative gestures or vocalizations. Fighting was not considered cooperative play.

Parallel play was defined as manipulating materials by herself when those materials were within three feet of another child in the area.

Teacher attention to Jill included verbal and nonverbal behaviors. Teacher attention was scored if the teacher talked to Jill (indicated by their facing each other or use of names) or if the teacher touched Jill or handed her an object.

### *Observation*

Jill was observed during inside free play, an activity which lasted one hour, Monday through Thursday. Observations were taken the first half

of free play on Monday and Wednesday, and the second half on Tuesday and Thursday.

The data, recorded in 10-second intervals, were tabulated in the form of percent of time each behavior occurred during each session. Teacher attention was considered contingent on cooperative or parallel play if it occurred in the same 10-second interval or the interval immediately following an occasion of cooperative or parallel play.

Reliability was determined by having a second, independent observer record behavior simultaneously with the main observer. Records of the two observers were compared and intervals of agreement for each category of behavior marked. Reliability was taken on ten occasions throughout the study, at least once during each condition.<sup>2</sup> The average reliability scores were: peer initiations, 73 %; subject initiations, 82 %; peer responses, 59 %; subject responses, 85%; cooperative play, 93%; parallel play, 80%; and teacher attention, 91%. Total reliability ranged from 98% to 75% and averaged 90%.

### *Apparatus*

The cooperative game was a discrete-trial task that required the responding of two children. When their responses on any one trial met the definition of a cooperative response, they received a single marble for that trial, and the apparatus advanced to the next trial.

The apparatus for the game viewed from the side, was a triangular box, 6 inches high, 21 inches wide and 18 inches deep. Viewed from the front, facing Side A, there were four circular, three inch diameter holes cut in the wood, with translucent plexiglass set behind them. These plexiglass windows could be easily pressed to operate a microswitch. On each window, a circle of colored tissue paper (one each of four different colors) was superimposed. Side B was constructed identically; each window was covered with tissue paper of the same color as the Side A window that was programmed to match it. Thus, one window on Side A and the correct matching window on Side B were marked the same color. Each of the four correct matches was color cued in this manner.

The marble dispenser was built into a clown face that was on a stand three feet tall and supported by a painted wood base shaped as feet. On the clownface, the marbles rolled through a tube that represented his mouth. A red light bulb representing his nose lighted when marbles were dispensed.

This apparatus was programmed by use of electromechanical relay circuitry to illuminate one of the windows on Side A. If a correct response was made or three seconds passed (whichever occurred first), that window

<sup>2</sup> Occurrence reliability was calculated as: Number of agreements of occurrence divided by the total number of intervals either or both observers recorded in occurrence.

went dark. Another window on the same side (predetermined by a table of random numbers) simultaneously illuminated, beginning a new trial. A correct response was defined as pressing the lighted window on Side A and the matching window on Side B within three seconds of light onset. All other responses were considered noncooperative responses. When a cooperative response occurred, the clown's nose lit up and a marble fell into the container midway between the two children.

Responses were tallied on magnetic counters that operated each time a switch was closed. Responses on each of the eight windows, cooperative responses, and trials were counted.

The game, clown marble dispenser, and chairs and tables were located in an experimental room. An adjoining observation booth housed the control equipment.

### *Procedure*

A multiple baseline design across groups was used for this study; one group served as a control while the two other groups were subjected to experimental manipulation. These groups were formed by dividing Jill's fifteen classroom peers into three groups of five children; one group with which she had a near zero rate of interaction (Group 1), one group with which she had an intermediate rate of interaction (Group 2), and one group with which she had the highest rate of interaction (Group 3).

Jill's social interactions with all children were observed for a 16-day baseline. Beginning on the 17th day of the study, Jill and Lynn (selected from Group 1 on the basis of her developed cooperative play skills) were taken from the classroom daily to engage in the experimental cooperative game. On the 30th day, the treatment was extended to Group 2, while being continued in Group 1. During this condition, Jill and Lynn played the game one day while Jill and Mark (from Group 2, also selected on the basis of his play skills) played it the next two days. This schedule was continued throughout this treatment. During both treatments, Jill's partner from each group was constant. Following the 39th day of the study, the treatment condition was reversed simultaneously for Groups 1 and 2, and baseline conditions were reinstated for the remainder of the study.

During the treatment condition, Jill and her peer were taken from the preschool classroom to an experimental room. There the two children were seated opposite each other at the apparatus such that each of them was facing a set of windows and were facing each other. They were given the following instructions:

"This is a game for both of you to play. Here's how it works. Jill, a light will come on in one of these windows in front of you. (The teacher pointed to each of them.) When the light comes on, you should tell Lynn what color it is. Tell her "Lynn, press red." Then, Jill, you

push the red window. Now, Lynn, when Jill tells you what color to push, you find it and push it. If both of you press the right window Bozo here will tell you, "That was right!" by blinking his nose and putting a marble here for both of you to share. If you earn enough marbles, you may trade them for two red tokens."

During the familiarization with the apparatus, each child was requested to name the color in each window as the teacher pointed to it. The teacher then said, "Let's try it a few times," and started the game.

The teacher remained in the room for three trials, prompting responses if necessary. On all remaining sessions, she told the pair, "I'll be back for you in ten minutes." She then left the room to watch from the adjoining observation and program control booth. The pair played the game for ten minutes, then the teacher reentered the room and praised them for their participation. She helped them count the marbles they had earned and traded them for two red tokens each. The red tokens were exchangeable in the classroom for snacks, trips, games, etc. The teacher then returned the two children to the classroom at which time the observer began the daily observation.

## RESULTS

The results of this study are presented in terms of the percent of time that Jill engaged in cooperative play, the percent with which Jill played from each group.

The results for the three groups of peers are shown in Figure 1. In this figure, each point represents the total number of intervals in which Jill was observed in cooperative play with the five children in each group respectively, divided by the total number of intervals observed, multiplied by the number of children in the group present that day ( $\#$  of intervals the Subject engaged in cooperative play/ $\#$  of intervals observed, times  $\#$  of children present in that group). Each point then, represents the percent of available child-intervals that Jill interacted, rather than the percent of observed intervals. In this way, if all five children of Group 1 were present and Jill played all the observed time with a single child from Group 1, she would have interacted 20 % of the available child-intervals for Group 1.

During the baseline conditions for Group 1, Jill played with those children an average of 0.36% of the available child-intervals and tended to spend more time with this group during the last days of baseline. However, she still spent well under 25% of her time in cooperative play. After the instatement of the experimental game, there were eight days that Jill's percent of cooperative play was within baseline range. Nevertheless, the average percent of play for this condition was 4.5%. At the arrow on Day 30, Jill and Lynn no longer played the experimental game every day; instead

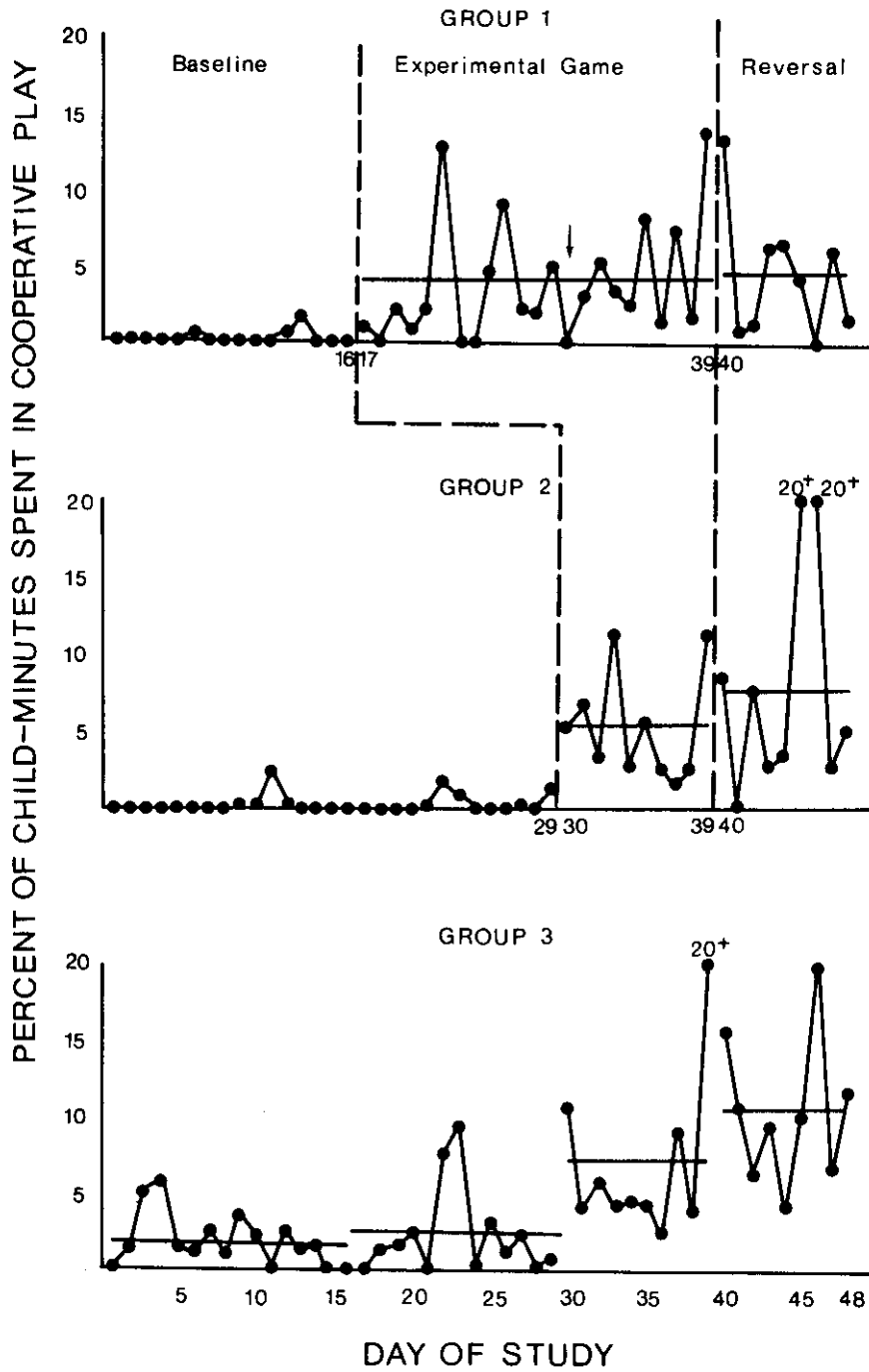


Fig. 1. Percent of child-minutes spent in cooperative play with each group.

Jill and Mark played it every two days or three. However, Jill still played the game each day. On the 39th day, the experimental game was discontinued. However, Jill's average percent of time spent in cooperative play again increased (to 4.51%) in spite of occasional low interaction days on the 41st and 46th days of the study.

Baseline with Group 2 lasted 29 days, of which the last 13 were concurrent with the experimental game played with Group 1. Jill's interaction with this group averaged 7.8% including exceptionally high days when her play included many children from this group.

Group 3 was never included in the experimental game because of the acceptable rate of interaction with this group. However, they were observed throughout the study to see if Jill's increased play with other peers would have an effect on her already established interactions with members of Group 3. During days 1 to 26 (baseline for Groups 1 and 2) Jill's play with Group 3 averaged 1.19%. During days 17 to 29, (experimental game for Group 1) Jill played an average of 2.62% of the time available with Group 3. While the experimental game was in effect for both Groups 1 and 2 (days 30 to 39), Jill played an average of 7.12% of available time with Group 3, and an average of 10.4% when the game was not in effect for either of the other groups.

Figure 2 illustrates teacher attention contingent on cooperative play. Each point of this graph represents the percent of Jill's day spent interacting,

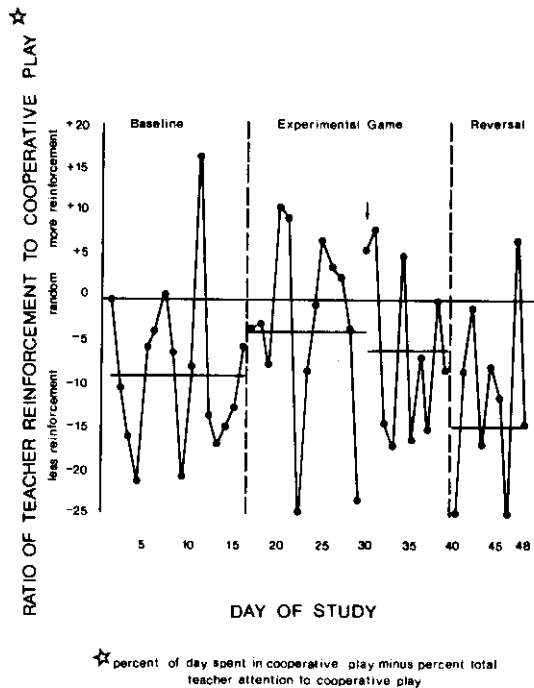


Fig. 2. Ratio of teacher reinforcement to cooperative play.



minus the percent of the total teachers' attention to Jill for cooperative play as opposed to parallel play or unoccupied time (Jill's percent of day spent in cooperative play minus percent of all teacher attention to Jill for cooperative play). Using this formula, if the proportion of Jill's day spent in cooperative play is equal to the proportion of the teachers' attention to Jill contingent on cooperative play, then the teachers should be randomly reinforcing cooperative play. That is, she is as likely to receive attention for parallel play as she is for cooperative play. For example, if Jill spent 30 % of her day playing and if 30 % of all the teachers' attention to her is contingent on cooperative play, then the result (0) would indicate that the teachers were neither systematically reinforcing or extinguishing cooperative play. In this hypothetical instance, Jill would have spent the other 70 % of her time not interacting, and the teachers would have attended to those behaviors 70 % of their time spent with Jill. However, if Jill spent 8 % of her time in cooperative play interactions (as she did on Day 5) and the teachers attended only 2% of their time to cooperative play, the result (-6) represents systematic extinction. On the other hand, positive numbers represent systematic reinforcement.

As Figure 2 indicates, the percent of teachers' attention for cooperative play was usually less than Jill's percent cooperative play. During baseline teachers' attention in relation to Jill's cooperative play averaged -9 and during the experimental game with Groups 1 and 2, it averaged -4 and -6 respectively. During the reversal, with the exception of two high points (only one of them positive) teachers' attention to cooperative play averaged -15.

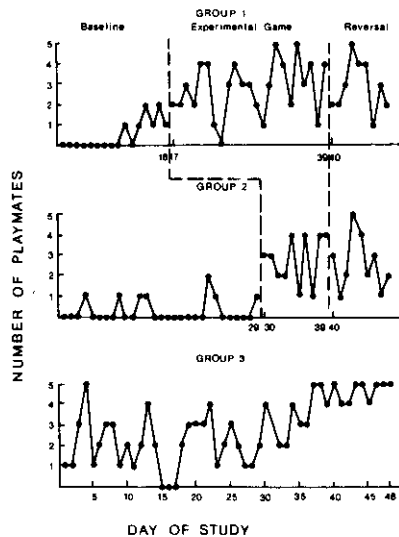


Fig. 3. Number of different playmates from each group involved in cooperative play for more than one minute.

The number of children with whom Jill played from each group was also monitored, and is presented in Figure 3. Jill played with a maximum of two members of Group 1 during baseline. During the experimental game, however, she extended her circle of playmates to include all five members on two occasions, and played with two or more children every day with only four exceptions. Jill initially played with only one or two children from Group 2, but during the experimental game she played with four children on four days and averaged three playmates from this group. Jill played with all five members of Group 3 on one occasion early in the study, but averaged three playmates with this group. During the last five days of the study, Jill played with four or five of the children in this group.

### DISCUSSION

The present experiment investigated the effect of a cooperative game played in a laboratory setting on a preschool girl's cooperative play in the classroom. As a result of the cooperative game, she spent a larger percent of time engaged in cooperative play while the game was in effect than she had during baseline. Furthermore, her play increased only with the group of children she was introduced to through the game. That is, she played more with Group 1 after one of their members was involved with Jill in the game, and her play with Group 2 increased only after playing the game with a member in this group. This multiple baseline design indicates that the game was responsible for initiating Jill's play with these children. On the other hand, the increased play with Group 3 may indicate that Jill's refined cooperative play skills were generalizing as a result of increased play with other children. Because teacher attention to Jill's cooperative play was relatively constant throughout the study, most of the increase in cooperative play can be attributed to the introduction of the experimental cooperative game. Thus, the results of this study indicate that the cooperative game played in a laboratory situation did increase cooperative interactions in the classroom for this preschool child.

This study also examined the effects the cooperative game between the subject and one child from a group produced on the other four children in this group. After the game was instated with Group 1, Jill included more of the children in this group in her play than she had previously during baseline; Group 2 showed similar results. The cooperative game did increase the number of Jill's playmates from each group.

When the game was not in effect for either group, Jill's cooperative play did not decrease; in fact it increased in all groups. An explanation for this failure to reverse might be Baer's "behavioral trap" (Baer, Rowbury, & Goetz, 1976). Jill had acquired the entry response to the reinforcement mechanisms. The teacher or the environment no longer controlled her play as her peers were now reinforcing her cooperative play. Therefore as she learned skills

to play cooperatively, her play was increased and maintained regardless of the state of experimental manipulation because her peers had become a stronger reinforcer for her than the activities her teachers had planned for her.

It is possible that Jill began and continued playing with this group of children because of their reinforcing value, or she may have added playmates to her circle of friends at random. This explanation is unlikely because she began playing with two groups simultaneously with the instatement of the game for that group.

It is also possible that the activities or the children became more inviting to Jill to engage in cooperative play; casual observation indicated that this is unlikely, as most of the activities were presented both during baseline and treatment, and the same children were present throughout the study.

In considering the function of the experimental game in establishing Jill's cooperative play, it is possible that it established the peer or cooperation itself (or both) as a secondary reinforcer, or the peer as a discriminative stimulus for cooperation. The secondary reinforcing function may have come about by pairing the reinforcer (the marble) with the peer and task completion (requiring cooperation). The peer also may have become a discriminative stimulus for cooperative behavior, since it was in his or her presence, and only then, that a cooperative response was possible, and therefore represented the availability of the reinforcer. These possibilities would help explain the generalization of Jill's cooperative behavior from the laboratory to the classroom.

The generalization of Jill's cooperative behavior with one peer in the group (trained) to all five children in the group may have been a function of the composition of each group. Group 1 was composed of the less active children and were subjectively observed to often play in the same activities together. Group 2 was composed of all males, who were more active and also were casually observed to play together often. Therefore, once Jill began playing with one child in the group, she was automatically introduced to, and included in a group of new friends.

That cooperative responses can be established in the laboratory setting has been demonstrated often. But the usefulness to the isolate child of these laboratory cooperative responses has not been examined thoroughly. Though Altman (1971) found that dyads engaged in more cooperative play after a cooperative experimental game, his subjects were not identified as isolate children. And though Levison (1971) reported dramatic-play with a peer in a laboratory generalized to "others" during free-play in the classroom, those others were not identified. The present study clarified aspects of the generalization of cooperative behavior from laboratory to classroom for the isolate child. Generalization occurred to the social group of the partner participating in the experimental game. Therefore, to promote cooperative behavior of an isolate to *all* children in the natural setting of a classroom one would be well-advised to pair the isolate in a cooperative game with key members of the various social groups within that classroom.

If the out-of-the-classroom experience does increase cooperative play in the classroom as was observed in this study, then the teacher has another tool to use in changing the behavior of an isolate. For a relatively small response cost, the teacher can take that child and a peer from the room for a short period of time, teach them cooperative responding in a laboratory situation, and expect it to generalize to the classroom situation. Or alternatively, activities could be arranged within the classroom in which naturally occurring reinforcers are systematically made contingent on cooperative responses. For example, games such as Chinese checkers or dominoes, etc. which require little teacher time, could be used to increase cooperative play. The use of such games would depend on the teacher arranging environmental consequences, in addition to herself, for cooperative play. Possibly a teacher could instruct an isolate child and another child to first play a game in the corner of the room before participating in the free-play activities. If this course were taken, teachers would be left free in the classroom to attend to other teaching duties, rather than shaping and consistently reinforcing cooperative behavior.

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