

INTERDEPENDENT, DEPENDENT, AND INDEPENDENT GROUP CONTINGENCIES FOR CONTROLLING DISRUPTIVE BEHAVIOR

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Three group-oriented contingency systems (interdependent, dependent, and independent) were compared in a modified reversal design to evaluate each system's effectiveness in controlling the disruptive behavior of a self-contained classroom of educable mentally retarded children. Interdependent and dependent group-contingency systems were more effective than independent contingencies in controlling dis-

ruptive behavior. Sequential ordering of contingency phases did not allow one to completely rule out carry-over effects; however, it was unlikely that the independent contingency phases were rendered ineffective due to their positioning in the treatment sequences. The roles of group cooperation, peer reinforcement, and informational feedback in the success of group-oriented contingency systems are discussed.

Group-oriented contingency systems have enjoyed increased use in public school classrooms in recent years. This increased use has come about primarily because of economic and practical considerations as well as demonstrated effectiveness of the peer group in controlling classroom behavior (Litow & Pumroy, 1975). Modifying the behavior of an entire class using a single contingency for all group members has several advantages. First, the teacher saves time in administering a group-contingency program because separate records on everyone's contingency are not necessary. Second, a group-contingency system is relatively more efficient in terms of modification of group behavior than are individual contingency systems. Third, group-contingency systems have been more effective in modifying group behavior than have individual contingency systems (Hayes, 1976; Litow & Pumroy, 1975; O'Leary & O'Leary, 1976).

Group-oriented contingency systems are not new to education, although they are a relatively recent innovation in American schools. Bronfenbrenner (1970) reports that Soviet methods of education have traditionally stressed group rather than individual achievement. In Russian schools, individual and group members are expected to discipline each other (Hayes, 1976). Consistent use of group rewards should exert more control over individual behavior in a group, and establish peers as an important source of influence over behavior in the classroom.

Litow and Pumroy (1975) have classified group-oriented contingency systems into three types: (a) interdependent, (b) dependent, and (c) independent. Interdependent contingency systems are established when the same response requirements are in effect for the entire group and reinforcement is made contingent upon a level of group performance. Barrish, Saunders, and Wolf's (1969) study is the prototypical example of an interdependent group contingency. In this study, a class was divided into two teams. The teacher announced that the class was going to play the "Good Behavior Game," in which the team with the fewest marks for disruptive behavior would receive reinforcement at the end of the day. Reinforcement consisted of stars on chart, wearing victory tags, free time, and so forth. This interdependent group contingency was effective in reducing the disruptive behavior of the entire class. Dependent group-contingency systems are established when reinforcement for the group is made contingent upon performances of selected group members. Walker and Buckley (1972) used a dependent group-contingency system whereby reinforcement for the group was made contingent upon the appropriate academic and social behavior of a single child. Independent group-contingency systems are established when reinforcement is made contingent upon each group member's performance, but access to reinforcement does not depend (i.e., is independent of) upon the behavior of other class members. Independent group-contingency systems have frequently been applied in special education settings to decrease disruptive behavior (Ayllon & Roberts, 1974; Drabman, 1973; O'Leary & Becker, 1967).

Several comparisons have been made to determine the relative effectiveness of interdependent, dependent, and independent group contingencies in controlling disruptive classroom behavior. Litow and Pumroy (1975) cited 14 studies in which interdependent versus independent group contingencies were compared. Most studies have shown no differences in the amount of behavioral control exerted by the two group-contingency systems (Axelrod, 1973; Drabman, Spitalnik, & Spitalnik, 1974; Grandy, Madsen, & DeMersseman, 1973; Herman & Tramontona, 1971; Levin, 1971; Page & Edwards, 1978; Prentice, Note 1; Turknett, Note 2). No studies have assessed the amount of *group* behavior control exerted by dependent group-contingency systems, nor have dependent group contingencies been compared with interdependent or independent systems to determine the relative effectiveness of each in controlling classroom behavior.

The purpose of the present investigation was to compare the relative effectiveness of interdependent, dependent, and independent group-contingency systems in controlling the disruptive classroom behaviors of educably mentally retarded (EMR) children in a self-contained classroom.

METHOD

Subjects

Subjects were 12 EMR children enrolled in a self-contained classroom located in a middle-class, suburban elementary school. Children's ages ranged from 6

to 10 years, with a mean class age of 8.2 years. Their IQs, as measured by individual intelligence tests, ranged from 45 to 68, with an average class IQ of 57. Ten of the 12 students had been in the class for at least 1 full year prior to the study. The class was staffed by a master's-level teacher, a teacher's aide, and a student teacher for the duration of the study. A token economy system had been established in the class at least 18 months prior to the present investigation but was discontinued for the duration of the study.

Behavioral definition and observational procedures. Disruptive behavior was defined as any occurrence of talking out without permission; out of seat; laughing inappropriately; verbal or physical aggression (shoving; pulling hair; imperatives such as "Shut up!", "Drop dead!"); and/or throwing objects in the classroom such as pencils, paper wads, erasers. Coding sheets were constructed by the experimenters with these five behavior categories typed horizontally across the page and children's names typed vertically down the page. Although five categories of disruptive behavior were listed, the total frequency of disruptive behavior was used for calculation of interobserver agreement estimates and for plotting the dependent measure (total class frequency of disruptive behavior). The teacher's aide and a student teacher served as observers. The observers were trained for a period of 5 days (30 minutes each day) by the experimenters on the use of the observation code and behavioral definitions. Training consisted of instruction in the five categories of disruptive behavior. Operational definitions of each category of disruptive behavior were typed on sheets of paper. Several examples of what constituted disruptive behavior were provided under each operational definition via written vignettes. Some examples of operational definitions used in this study were as follows: *Talking Out Inappropriately* — "Any audible verbalization made by a student without the teacher calling upon him/her specifically or asking a question to the group in general"; *Laughing Inappropriately* — "Any audible sound (not verbalization) made by the student whenever students were supposed to be engaged in on-task behavior, or an audible sound (nonverbalization) made in response to another student's reprimand from the teacher." Live modeling of all disruptive behaviors by both experimenters was used to enhance the operational definitions. (A complete listing of all operational definitions and training examples may be obtained from the authors.)

Observations were collected during noninstructional class periods (e.g., seat work, warm-up periods, group discussion, and free time) for 30 minutes in the morning and 30 minutes in the afternoon and at the same time each day. Resulting rates of disruptive behavior were based upon 1 hour's observation each day. Reliability checks were conducted twice during each phase of the study for a total of 16 reliability checks. Since event or frequency recording was used (i.e., the total number of discrete occurrences of disruptive behavior), interobserver agreement was calculated by tabulating each observer's recorded frequency of disruptive behavior and dividing the smaller recorded frequency by the larger recorded frequency and multiplying by 100. This is the most frequently used method for calculating interobserver agreement estimates for frequency or event data (Favell, 1977; Kazdin, 1980; Kent & Foster, 1977).

Agreement estimates ranged from .85 to .95, with an average interobserver agreement of .91.

Experimental design

An ABCDABCD reversal design was used to evaluate the efficacy of the three group-contingency systems in controlling disruptive behavior. This design is a variation of an extended reversal design described by Hersen and Barlow (1976). Although a functional analysis is possible with this design, a drawback is that sequential ordering effects of treatment cannot be ruled out completely. Since the authors wished to evaluate the different contingency systems and, at the same time, make administration of the various systems as simple as possible for the teacher, this design was employed. Hersen and Barlow (1976) and Kratochwill (1978) offer excellent technical discussion of the advantages and disadvantages of these designs.

Procedures

The effects of group-oriented contingency systems were evaluated under eight experimental conditions: baseline 1 & 2, interdependent 1 & 2, dependent 1 & 2, and independent 1 & 2. These eight conditions consisted of 5-day blocks for each condition for a total experiment duration of 40 days (8 school weeks). There were only four school absences during the 40 days of the study. Prior to collection of baseline data, the teachers selected an equal number of children to be assigned to two teams. This was done for administration of the interdependent and dependent contingency systems, which are described later.

Experimental conditions

Baseline 1. No contingencies were operative for disruptive behavior during the 5-day baseline. Frequency of the group's (entire class) disruptive behavior was recorded by observers and two reliability checks were conducted.

Interdependent contingency 1. During this phase, the class was divided into two teams (Tigers and Elephants). The teacher assigned children to each team and stated that the team with the fewest marks for disruptive behavior would earn themselves reinforcement for the day (e.g., party, pencils, free time). Reinforcer preferences were determined by the teacher via reinforcement menus administered before the study began. The reinforcer menus were similar to the ones presented by Blackham and Silberman (1980). The team with the most marks had to work while the other team engaged in the reinforcers. If either team had more than five disruptive behaviors during the two observation periods (30 minutes, morning + 30 minutes, afternoon), reinforcement could not be earned. The teacher wrote the name of each team on the chalkboard and recorded marks under the appropriate team name each time a disruptive behavior occurred. This visual recording was used primarily as a feedback technique to children so they would know whenever a team member was disruptive. In the case of ties, each team received reinforcement if the team total was five or less disruptive behaviors. This phase lasted 5 days.

Dependent contingency 1. In this condition, team captains (the two most

disruptive children during baseline) were assigned to each of the above teams. Reinforcement for each team was made contingent upon each team captain's frequency of disruptive behavior. The team captain with the fewest number of disruptive behaviors earned teammates reinforcement for the day (same reinforcers mentioned in the interdependent contingency). No team captain could emit more than five disruptive behaviors to earn team reinforcement. Recording of the entire class's frequency of disruptive behavior continued as in the interdependent contingency system, and this number was recorded as the dependent measure for this phase (as in the previous phase). Thus, although team captains earned reinforcement for their group, the effect of the dependent contingency on total group disruption was the critical variable being investigated. This phase lasted 5 days.

Independent contingency 1. During this 5-day condition, each child was competing against every other child for reinforcement. Reinforcement was independent of group performance; to be considered as a potential winner of the reinforcement for that day, each child had to have five or fewer disruptive behaviors. Thus, eligible children were those who had five or fewer disruptive behaviors, and the eventual winner was determined by the child with the fewest number of disruptive behaviors for that day. In case of ties, all children with the same lowest number of disruptive behaviors received reinforcement. Again, the frequency of the entire group's disruptive behavior was recorded (as in previous phases).

Baseline, interdependent, dependent, and independent 2. The same four phases were repeated for verification. Each respective phase was conducted exactly as in prior phases and lasted 5 days.

RESULTS

Figure 1 depicts the total class frequency of disruptive behavior as a function of experimental phases. Graphed data represent the combined class frequencies of disruptive behavior without regard to team data. Since the purpose of the study was to investigate the effects of three group-contingency systems on group disruptive behavior, data are presented graphically in this way. As can be seen from Figure 1, lower rates of disruptive behavior occurred under the interdependent and dependent group-contingency systems.

A somewhat more detailed picture of the data emerges in Table 1. Table 1 shows the frequency of disruptive behavior for each team as a function of phase. Each team's data are shown in the baseline and independent phases for comparison purposes, although team identity was eliminated during these phases in the classroom. As can be seen in Table 1, reinforcement was obtained by one or the other team 8 out of 10 days during the interdependent contingency phases. During the dependent contingency phases, reinforcement was obtained by one or another on 7 of 10 days. Thus, for both the interdependent and dependent contingency phases, reinforcement was obtained 75% of the time during the 20 days these contingency systems were operative. During the independent contingency phases, reinforcement was earned 6 out of 10 days. However, only three individuals were ever reinforced during this 10-day

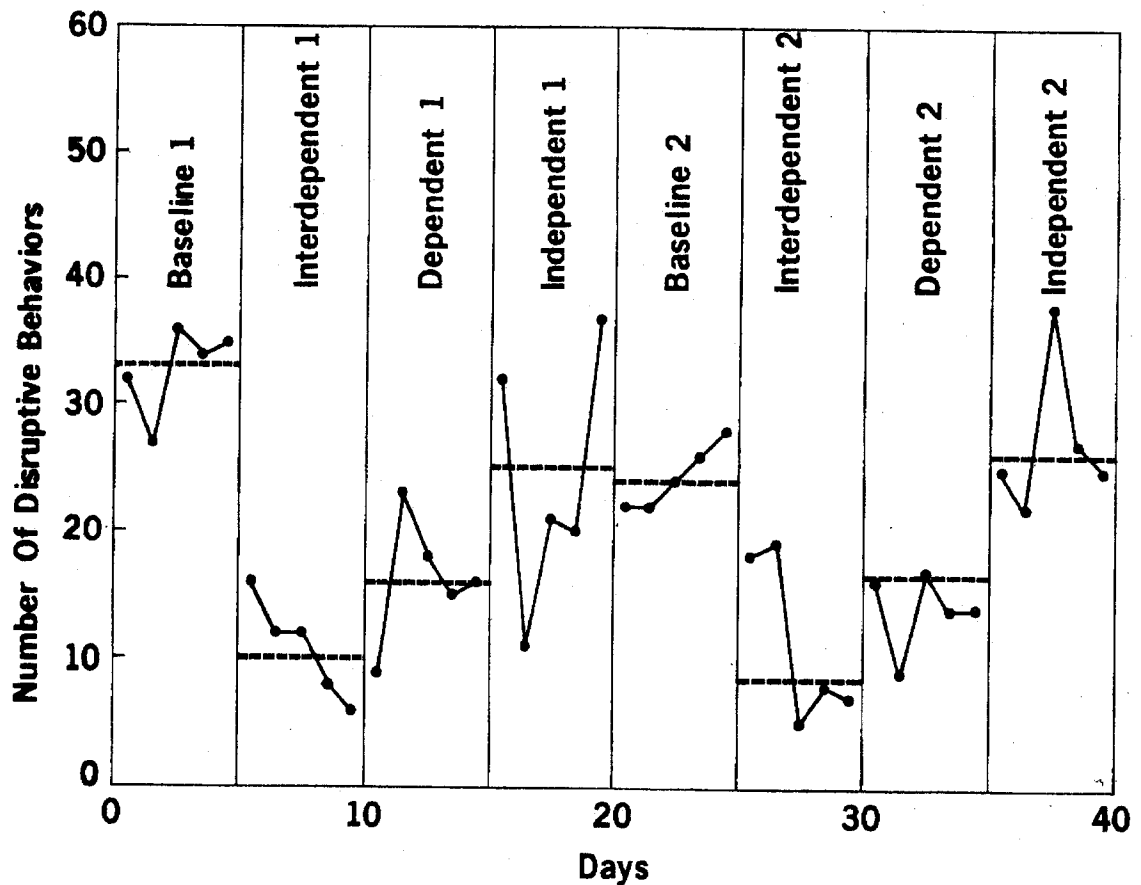


Figure 1. Total class rates of disruptive behavior as a function of contingency phase.

period, and one child had the lowest rates of disruptive behavior on 3 of the 6 days, accounting for half of the reinforcement days. What this amounted to was a relatively thinner reinforcement schedule for the rest of the class, as only a few children ever received reinforcement. It was possible for children to have five or fewer occurrences of disruptive behavior and still not receive reinforcement. This, in fact, happened to five children during these phases.

Comparison of mean and median frequencies of disruptive behavior is facilitated by Table 2. As can be seen in Table 2, median frequencies of disruptive behavior were lower during the interdependent ($Md = 10$) and dependent ($Md = 15.5$) contingency phases than under the independent phases ($Md = 25$). In fact, the independent phases were not greatly different from baseline phases ($Md = 27.5$).

DISCUSSION

Data from the present study suggest that group-oriented contingency systems are effective in reducing class levels of disruptive behavior. Although lowest levels of disruptive behavior were realized under the interdependent contingency phases, the experimental design does not necessarily demonstrate the

TABLE 1
NUMBER OF DISRUPTIVE BEHAVIORS AS A FUNCTION OF CONDITION, DAY, AND TEAM

Condition	Day	Team	
		Tigers	Elephants
Baseline 1	1	13	19
	2	15	12
	3	16	20
	4	20	14
	5	17	18
Interdependent 1	6	7	9
	7	5 ^a	7
	8	5 ^a	7
	9	5 ^a	3 ^a
	10	2 ^a	4 ^a
Dependent 1	11	3 ^a	6
	12	10	13
	13	5 ^a	13
	14	10	5 ^a
	15	9	7
Independent 1	16	12	20
	17	5	6
	18	11	10
	19	13	7
	20	20	17
Baseline 2	21	12	10
	22	15	7
	23	14	10
	24	8	18
	25	10	18
Interdependent 2-	26	13	5 ^a
	27	5 ^a	14
	28	3 ^a	2 ^a
	29	4 ^a	4 ^a
	30	2 ^a	5 ^a
Dependent 2	31	8	8
	32	5 ^a	4 ^a
	33	8	9
	34	5 ^a	9
	35	11	3 ^a
Independent 2	36	10	15
	37	9	13
	38	13	25
	39	15	12
	40	9	16

^aDesignates team which earned reinforcement for that day.

TABLE 2
 MEDIANS, MEANS, STANDARD DEVIATIONS,
 AND RANGES AS A FUNCTION OF CONDITION

Condition	Median	Mean	Standard deviation	Range
Baseline 1	34	33	3.19	27-36
Interdependent 1	12	11	3.49	6-16
Dependent 1	16	16	4.54	9-23
Independent 1	21	25	9.27	11-37
Baseline 2	24	24	2.37	22-28
Interdependent 2	8	11	5.90	5-19
Dependent 2	14	14	2.76	9-17
Independent 2	25	27	5.55	22-38

superiority of the interdependent contingency system in controlling disruptive behavior. As mentioned previously, the sequential ordering of treatments (A, B, C, D, A₁, B₁, C₁, D₁) does not allow one to rule out cumulative carry-over effects as an influence in reducing group disruptive behavior. However, the current data indicate that the interdependent and dependent contingency systems led to the greatest decreases in disruptive behavior. Interdependent and dependent contingencies were more effective probably because of the element of group cooperation these contingencies introduced into the classroom. Children on each of the teams continually cued and praised respective team members or captains for emitting low rates of disruptive behavior. They also verbally reprimanded their peers whenever instances of disruptive behavior occurred. No such evidence of group cooperation was noted under the independent system, since this contingency was based upon a competitive rather than a cooperative criterion for reinforcement. Future research should attempt to replicate the current study using an alternating treatments design (Barlow & Hayes, 1979) in which baselines and treatments are alternated more frequently.

Group-oriented contingencies, particularly the interdependent and dependent systems, possess several advantages. One advantage is that each subgroup or team can be reinforced as a unit rather than relying on administration of individual reinforcement. Teachers should find group reinforcement much more efficient and free-up their time to pursue other important classroom duties such as academic instruction; small group or individual work; and/or nonacademic pursuits such as art, class discussion, music. Another advantage of group contingencies is that it sets the occasion for peers to act as behavior-change agents. Peers on the respective teams are often observed to socially reinforce (e.g., praise, pats on the back) both themselves and team members for the successful achievement of the reinforcement criterion. Group contingencies often have the residual effects of teaching cooperation, which has been shown to be an important social skill related to peer acceptance (Gresham, 1981). One variable that has received relatively little investigation is that of sociometric status before and after the implementation of group contingency systems. Future research should investigate the variable of sociometric status of children under each of the three contingency systems.

The role of informational feedback under each of the three contingency systems is another variable that merits more intensive study. In the current study, informational feedback in the form of marks on the board for each occurrence of disruptive behavior was perhaps most salient under the interdependent and dependent contingency phases. Under the independent contingency, the teacher recorded the occurrence of a disruptive behavior on a piece of paper attached to a clipboard, a much less obvious recording procedure. Board recording amounted to salient, direct, and response-contingent feedback on the inappropriateness of a child's disruptive behavior. Hayes (1976) provides an extensive discussion of the effects of feedback, instructions, and reward in group contingency programs.

Group-oriented contingency systems appear to be a versatile technique in controlling the behavior of entire classes of children. This has been demonstrated in both special and regular education classrooms. These contingency systems seem to produce a degree of group solidarity and cooperation that is typically not found in individual contingency programs. Although preliminary evidence suggests the effectiveness of group-oriented contingency systems, future research will have to evaluate the long-term effects of these systems on children's educational and social development.

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