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A Classification and Review of Group Contingency Procedures Used in Educational Settings

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by

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Lois Marie De Mersseman

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Contingencies of reinforcement form a continuum. At one extreme an individual's reinforcers are totally dependent on his own behavior, while at the other extreme an individual's reinforcers are wholly dependent on the behavior of others. Located in the middle is the contingency commonly considered to be a "group" contingency; that is, both the individual's responses and the responses of others contribute to the determination of the consequences. Any team sport may be cited as illustrative of this situation: the centerfielder may be an All-Star, but he will enjoy a victory only if the other eight team-members play satisfactorily. Ranged along the continuum are a multitude of contingencies which differ in the relative extent to which an individual's responses and those of his team-members, or classmates, determine the ensuing consequences.

The present paper is an attempt to delineate the essential components of a group contingent procedure. Classroom applications of the contingency are classified into two types for discussion. The uses, advantages, and drawbacks of group contingencies are listed and discussed, and finally, some of the ethical considerations inherent in the procedure are reviewed.

Definition of a Group Contingency

Bandura (1969) made explicit the definition of group contingent situations accepted implicitly by most researchers at that time: "individual rewarding outcomes depend upon the level of group performance and, conversely, censurable behavior by any given member may produce negative consequences for the entire group [p. 280]." This statement rightfully describes group contingent punishment as a practice which demands no special treatment. There seems to be no reason for assuming that the presentation of punishers and reinforcers require different analyses, as there is no essential procedural difference in an individually applied contingency program. This definition is limiting, however, in that only one type of contingency is identified. That is, rewarding or punishing consequences are dependent on the average or cumulative responses of all group members. The proportion of individual to group responses determining the consequences is basically one/N, where N is the total number of individuals. In a class of twenty students, each contributes to 5% of the group average in the reinforcement procedure Bandura designates. Similarly, when cumulative responses are measured, each student has an equal opportunity to make a response.

Group contingencies have been referred to as a procedure in which a "group of persons is handled as an

individually responding organism" (Schmidt & Ulrich, 1969, p. 174). This definition implies that the dependent variable would consist of a cumulative or average measure. Again, only one procedure is identified.

A recent paper outlined the main dimensions of a cooperation procedure (Hake & Vukelich, 1972). Assuming that the two subjects of a cooperation episode can be viewed as a "group," the analysis is easily extended to a group contingency procedure. For such an extrapolation, their definition could be rephrased as follows: An individual's reinforcers are at least in part dependent on the responses of others. The statement implies that although reinforcers for an individual must be partly contingent on responses made by someone else, they may in fact be totally contingent on them. It also suggests that consequences may vary from the one/N proportion in the relative extent to which they are self-determined or group-determined. Thus, a procedure may be termed a group contingency when reinforcers are delivered to individuals: 1) contingent on the responses of the entire group; 2) contingent in some proportion on their own responses and those of the group, other than one/N; 3) contingent in any proportion on their own responses and those of a subset of any size selected from the group; and 4) contingent wholly on the responses of one or more other students. As we shall see, these distinctions are helpful in that

certain types of group contingencies are more appropriate for dealing with certain classroom situations than others. For example, the first type is most often used when the overall classroom rate of some behavior is to be modified, while the third type is applicable when the teacher wishes to increase the motivation of a subset of three students while maintaining motivation in the rest of the class. Obviously, this description includes one extreme of the reinforcement continuum as well as its mid-range. Cooperation studies rarely incorporate punishment. However, in conjunction with the discussion concerning group contingent punishment, the final definition should read: an individual's behavioral consequences are at least in part dependent on the responses of others.

Classification of Group Contingency Procedures

As we have seen, under a group contingency a person may be largely responsible for his reinforcers and punishers, or they may be presented on the basis of someone else's behavior. This distinction provides the two primary divisions under which group contingency procedures may be classified. Hake and Vukelich (1972) have used the terms "interdependent" and "dependent" to identify these two dimensions in a cooperation procedure. In a group contingency situation the term interdependent will be adapted to designate a contingency in which consequation

of a student's behavior is at least potentially determined by both his own responses and the responses of one or more other students. When a student's reinforcers and punishers are programmed solely according to the responses of one or more other classmates, the contingency will be designated as dependent. The contingencies are classified commensurate with the type under which the majority of the students involved are working. For example, when the average responses of two students determines reinforcement for the entire class, the procedure is termed dependent, even though consequation for the two specific students would be considered interdependent. In the same way, if one student is determining reinforcement for his classmates, the procedure is not an individual contingency, since the majority of those involved are being rewarded on a dependent basis.[1]

A possibly common application of an interdependent contingency in a classroom situation would be initiated when the teacher stated: "Two more words and no one is going to recess." For each student, recess depends on his own silence and that of all his peers. The dependent group contingency is called into play by the promise: "As soon as Sally finishes cleaning up her desk we can all go to lunch."

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[1]Hake and Vukelich (1972) described several other dimensions of cooperation procedures which were not considered to be relevant to the present discussion.

Table 1

Classification of Group Contingencies into Interdependent and Dependent Procedures

INTERDEPENDENT	DEPENDENT
Andrews (1971)	Carlson et al. (1968)
Barrish et al. (1969)	Coleman (1970)
Eleftherios et al. (1972)	Evans & Oswalt (1968)
Grandy et al. (1972)	Greenberg & O'Donnell (1972)
Hall et al. (1972)	Hathaway (1971)
Hall et al. (1968)	Patterson (1965)
Hathaway (1971)	Patterson et al. (1965)
Herman & Tramontana (1971)	Straughan et al. (1965)
Jacobs (1970)	Schmidt & Ulrich (1969)
Lovitt et al. (1969)	Wodarski (1971)
Mattos et al. (1969)	Wodarski et al. (1972)
McAllister et al. (1969)	Wodarski et al. (1973)
McNamara (1971)	Wolf et al. (1972)
Medland & Stachnik (1972)	
O'Leary & Becker (1967)	
Packard (1970)	
Schmidt & Ulrich (1969)	
Sulzbacher & Houser (1968)	
Willis & Crowder (1972)	
Wodarski (1971)	
Wodarski et al. (1972a)	
Wodarski et al. (1972b)	
Wood (1971)	

Review of Group Contingency Applications

Interdependent Contingencies

Interdependent contingencies have been used in a variety of situations. The majority of studies concerned consequences presented contingent on a cumulative or average measure of some dependent variable for the class as a whole, consonant with Bandura's (1969) definition. Several investigations, however, have manipulated the proportion of individual reinforcer-determining responses and those of a select group of students (Hathaway, 1971; Wodarski, 1971; Wodarski, Hamblin, Buckholdt, & Ferritor, 1972, 1973). For example, 50% of a student's reinforcers might depend on the number of responses he makes, while the other 50% is determined by the average number of responses made by two classmates. The proportions and number of students in the "target" group could vary. This latter series of articles compares individual, interdependent, and dependent contingencies, and will be discussed following the separate reviews of studies using interdependent and dependent procedures.

Interdependent Contingencies Compared to Individual Contingency Procedures

Perhaps the primary question to be asked of a group contingency procedure is whether or not it is as effective in the modification of classroom behaviors as individual contingencies have proven to be. Six studies have sought

to answer this particular question, and they uniformly concern interdependent contingencies.

Andrews (1971) measured the "task-relevant" behaviors of a class of eighth and ninth graders enrolled in a remedial math program. After baseline measures were taken, an interdependent contingency was initiated in which the class could earn free time when all students exhibited task-relevant behavior. Feedback was given via a clock which accumulated minutes of appropraite behaving and a buzzer which signalled occurrences of non-task-relevant behaviors. During this condition task-relevant responses increased from a baseline average of 67% to 90% of the session. The teacher was then instructed to contingently praise and attend to individuals behaving appropriately, while the interdependent contingency remained in effect. Task-relevant behaviors dropped slightly to 89%. A further decrease, to 78%, was demonstrated in the next condition when only the individual contingency was in effect. A final application of the interdependent contingency alone effected an increase of task-relevant responses to 94%. The author reported individual data for the students, and the results suggest that those with lower baseline rates improved more immediately and to a larger extent than those exhibiting high baseline rates. However, a measure of teacher attention to task-relevant behaviors revealed that fewer praise responses were emitted during the

individual contingency than in any of the other conditions except baseline. Conclusive evidence of the superiority of the group contingency cannot be shown therefore, since higher rates of teacher attention may have functioned to increase task relevant behaviors in those conditions.

McNamara (1971) attempted a study of the calling-out responses among three groups of junior high boys placed in a special school for behavior problem children. The boys, operating on a token economy system, were given points for being on time to class and being ready to work. An experimental radio-controlled system was used to provide feedback to the teacher on his appropriate and inappropriate attending responses. Teacher attention to call-outs was reduced to zero before the final phase, during which one class received non-target consequation, one received individual consequation, and the third, group consequation. In the first situation, each student was alloted three bonus points and one was remanded each time the teacher had to prompt the student to work on an assignment. The second class also received three points, but an individual lost a point for each of his call-outs. In the group consequation class a call-out by any student resulted in all students losing one point. The author described this situation as: "The whole class was punished for a single student's misbehavior [p. 209]." Calling-out was reduced substantially in variability and

number in both group and individual classes, indicating that an interdependent contingency is at least as effective as an individual contingency for decreasing inappropriate talking.

A similar experimental design was used by Herman and Tramontana (1971) to investigate the effects of group and individual contingencies on rates of disruptive behavior during rest periods. Head Start children were divided into two groups of three each matched on baseline rates. The groups were taken separately to an experimental room for shaping. Subjects in the individual contingency group were reinforced for appropriate resting behavior with balls, tokens exchangeable for toys, placed in a bin by the experimenter. Individuals in the interdependent contingency group earned tokens only when all three students were engaging in resting behavior simultaneously. Neither contingency was effective until the students were instructed as to what they must do in order to win the balls. Although both conditions demonstrated equally effective results, the authors believed a "cellar effect" may have confounded the differential effects, since disruptive behavior decreased to zero under both interdependent and individual contingency conditions.

One of the first applications of an interdependent contingency to academic, rather than social, behavior was reported by Lovitt, Guppy, and Blattner (1969).

The number of perfect spelling test papers from a fourth grade class was recorded during a baseline condition in which spelling lessons were given on Monday, Tuesday, and Thursday, a trial spelling test on Wednesday, and the final test on Friday. Under this typical instructional situation about one-fifth to one-half of the class earned 100% on their Wednesday and Friday tests. In the second phase of the study, final tests were given every day, and free time during the week's remaining spelling periods was made contingent on a perfect paper on any day. The third phase consisted of this same contingency, but with the added stipulation that if every student got 100% on the same day the whole class would be allowed to listen to the radio for fifteen minutes. Only four days of data are reported during this phase. Whereas the number of perfect papers increased to approximately twice that of baseline during the individual contingency, the results of the combined contingencies indicated a still greater improvement. The superior effectiveness of the combined contingencies is somewhat surprising, considering that the group reward was never attained and would seem to be a difficult criterion for a class to meet. A rival hypothesis could be entertained that the higher scores during the second and third conditions resulted from a "practice effect," in that the students were presented with the 10-word test five days per week instead of twice.

A more ambitious investigation by Jacobs (1970) incorporated scores of gain on five subtests of the Stanford Achievement Test as the dependent variable. Four experimental groups and one control group were instructed with Science Research Associates materials. A random reward group received non-contingent free time, while students in an individual reinforcement contingency group earned three minutes of free time for each completed exercise in the SRA program. The interdependent contingency group was also reinforced with free time, but contingent on a "predetermined" period of appropriate studying exhibited by all students. A fourth group underwent a combination of the individual and group contingency conditions. No definition of "attending" was offered nor were any of the behavioral data presented. In this study it is apparent that rewarding studying behavior and rewarding completed exercises could have functioned quite differently, and that the type of contingency--group or individual--is not the only important variable manipulated. The author's conclusion that group contingencies are approximately twice as powerful as individual contingencies, and that individual operant conditioning actually impedes growth, must be seen as tentative, at best. Throwing further suspicion on the results, the random reward group gained more than the individual contingency group. This outcome contradicts a vast amount of data

supporting the value of individual contingency contracting in maximizing academic achievement.

The final study comparing the differential effects of group and individual contingencies, conducted by Grandy, De Mersseman, and Madsen (1972), was a systematic replication of the "good behavior game" originally devised by Barrish, Saunders, and Wolf (1969). In the Grandy et al. (1972) experiment a class of fifth graders was observed for rates of out-of-seat and talking-out behavior during math and English periods. Following a multiple baseline design, an individual contingency was instituted in the English period while baseline observations continued during math. The students were told that they would be playing a game in which all who consistently followed the talking-out and out-of-seat rules would win one-half hour of free time at the end of the day. The percent of intervals in which talk-outs occurred decreased from 43% to 3%, while out-of-seat responses, already at a low rate of 5½%, decreased further to 3%. After a return to baseline conditions, an interdependent contingency was applied during English. In this condition the whole class could win free time if there were no more than five occurrences of the target behaviors. The results of this phase closely resembled data from the individual contingency condition. A final application of the interdependent game to both math and English resulted in virtually a zero rate of inappropriate

responding. Each time a contingency was applied in English period some generalization of effect was noted in math. The authors concluded that the interdependent and individual contingencies were equally effective in the reduction of these target behaviors.

Interdependent Contingencies Used in Conjunction with Individual Contingencies

Based on the preceding six studies, it appears the interdependent group contingencies are as effective as individual contingencies in the modification of some classroom behaviors. Equally pertinent is the finding by several researchers that modifications brought about through either type contingency system could be maximized by applying the other concurrently or at a later time.

The possibility that the effectiveness of individual contingency systems may be enhanced by a superimposed interdependent contingency was suggested by Hall, Panyon, Rabon, and Broden (1968). A beginning first grade teacher was able to increase studying behavior from a baseline average of 51% to an average of 62% when she contingently attended to studying pupils. The teacher desired to raise the level of studying further during the thirty-minute experimental session, so a second contingency was instigated. If the class as a whole had studied "enough," according to the teacher, they were allowed to play a game when the period was over. The Observers noted an average 17%

increase in the amount of study behavior exhibited by the students as a whole. Data from a reversal and a second application of the contingencies suggest that the combination of teacher attention and a group game was indeed responsible for maximizing studying in this classroom. The superiority of the interdependent contingency may, of course, have resulted from the nature of the reinforcer and not from an inherent aspect of group procedures.

A second experiment reported in the same article by Hall et al. (1968) used essentially the same techniques to increase studying behavior in a class of seventh graders. Contingent teacher attention to individuals effected an 18% increase in studying, however the final level of 65% studying time was not deemed high enough by the teacher. An interdependent contingency was then applied, during which out-of-seat responses and other behaviors which were disturbing to the class were recorded on the board. For each mark, 10 seconds were deducted from the 5-minute between-period break. When 24 or more marks were scored the entire break was forfeited. With competing behaviors being punished, studying rose to 76%. When baseline conditions were reinstated, studying decreased to a condition average of 60%. Final application of the individual and interdependent contingencies resulted in raising study behavior to a high level of 81%. In the first experiment, studying

appeared to be trending upward when the group contingency was applied, and any further improvement in the target behavior may not have been attributable to the second contingency. However, a sharp increase in studying (which was trending downward in the last several sessions of the individual contingency condition) occurred when group procedures were introduced in the second experimental class, lending some support to the hypothesis that an interdependent contingency can enhance the improvements gained with individualized methods.

McAllister, Stachowiak, Baer, and Conderman (1969) have written that: "It may be argued that a group-oriented approach will not function in the same way with all members of the group [p. 284]." Individual reactions to experimental manipulations cannot be analyzed when data is reported as a group measure. Nonetheless, students who don't respond as desired to the contingencies will probably be quickly noticed by the teacher regardless of the nature of the data, especially as these students' behavior becomes proportionately more inappropriate than their peers'. Such individual variation in the effectiveness of an interdependent contingency is reported by several researchers. Barrish et al. (1969) encountered two students who invariably earned the most marks against their team while the class played the Good Behavior Game (to be discussed later). One day one of these students announced that he refused to play the game any longer. After con-

consultation with the other students, the teacher decided not to penalize the entire team, but to punish the individual student. Six times during the study this individual contingency was imposed on one of the two "problem" students. In their replication of the Good Behavior Game, Medland and Stachnik (1972) forsaw this problem and devised an effective means for avoiding it. Any student accumulating four or more marks was liable to expulsion from the game on the following day. The student was isolated at the back of the room and also forfeited the special reward at the end of the week. No student ever received more than two marks per day, however, so this time-out procedure was never employed.

Several other experimenters have found the addition of individual consequation useful when modifications resulting from an interdependent contingency were less than desired. Wood (1971) reported such a method in an article compiling several behavior modification projects attempted by teachers. "Verbal outbursts" were recorded on a golf counter by the teacher of a highly disruptive class. The experimental sequence is rather vague, but it appears that students were threatened with losing their gym period if 25 or more inappropriate verbalizations were recorded. "Outbursts" decreased to slightly below criterion with the exception of one session during this phase, after baseline rates of 18 to 38 times per day.

The criterion was lowered to 15 in an attempt to further reduce the undesired responses. Additionally, individuals who talked without permission were noted by name and isolated at the back of the class for the remainder of the day when they accumulated three responses. Disruptive talking gradually decreased to approximately seven responses per session over the final three days of this condition. The separate effects of the individual and group contingency procedures can not be interpreted in this experiment, since the group criterion was lowered simultaneously with the instatement of the individual contingency.

Schmidt and Ulrich (1969) conducted an experiment using a decibel meter for measuring sound intensity levels while applying individual and interdependent contingencies. The teacher of a second grade class announced to the students that they could earn extra gym time for being quiet during reading period. The experimenter set a timer at five minutes, and if the students remained below 42 decibels during that time, they could earn two minutes of gym. However, if the noise level reached 43 db the clock was reset to five minutes and reinforcement delayed. Classroom noise decreased from consistently more than 50 db to approximately 38 db under this condition. Reinforcement contingencies were changed considerably during the next phase, as students were required to earn all their gym time. Also, students

who alone created noise over 42 db lost five minutes of class-earned gym time. A similar individual contingency was established at this point for out-of-seat responses, a behavior also considered to be disrupting in this class. Generally, the sound intensities remained the same in this phase, but a greater number of timer resettings had occurred during the first phase--13 as compared to three. The authors thought these resettings may have been due to "less disciplined individuals" since they decreased when the individual contingency was introduced.

These studies conclusively demonstrate that the interdependent contingency can be a powerful technique in classroom management. The procedure effectively modifies classroom behaviors when used singly or in conjunction with individual contingencies. Interdependent contingencies would appear to be a practical choice when the teacher desires only a general modification of behavior and is not greatly concerned with altering the behavior of a few specific students. The argument can be presented that a teacher may more easily implement a group contingency with a class because data-gathering is confined to a simple operation in contrast to the numerous observations which individual contingencies entail. The primary value of a group contingency procedure, however, resides in the fact that all of the students in the group are reinforced for cooperating in an attempt to eliminate the punishable

behavior. Peers would be primed to ignore or punish obstreperous behaviors rather than contribute to its occurrence through attention (although evidence is certainly convincing that disapproval functions to reinforce inappropriate responses for some individuals). Peer influence is the variable presumed to be operating uniquely in a group contingency. These two aspects of group procedures--recording ease and peer influence--will be returned to later in this discussion.

Aspects of some Interdependent Contingency Systems

Competition. Andrews (1971) has written that: "Positive behavioral effects have been produced with group contingent procedures, but the variables producing the effects are not yet entirely clear [p. 5]." One variable thought by many researchers to be influential is "competition." This idea was probably borrowed from Soviet educational technology in which competing rows and "links" of students form an essential part of group contingency procedures.

Barrish et al. (1969) divided a fourth grade class into two teams, recording talking-out and out-of-seat behaviors during math and reading periods. A Good Behavior Game was initiated during math in which the team with the fewer number of inapporpriate responses, or both teams if neither nad more than five, would win

certain privileges such as wearing victory tags and taking part in special projects at the end of the day. The percent of observation intervals scored for talking-out and out-of seat responses decreased 77% and 73%, respectively, from baseline rates. When the game was withheld from math and instituted during reading, a comparable reduction in the dependent variables occurred. The interdependent contingency obviously effected a sizeable modification of talking-out and out-of-seat behaviors, however the Grandy et al. (1972) application of the Good Behavior Game brought similar results without incorporating team competition. This outcome would seem to indicate that competition is not necessary for effective interdependent contingency applications for at least some behaviors and programs. One advantage of a competition procedure, although perhaps a slight one, is that the cost of the reinforcer may be reduced since only some of the students win.

Feedback to students. Whereas competition has not been extensively used in group contingency research, the larger portion of the literature describes some method of presenting feedback to students. Although many procedures lend themselves to a quite simple feedback apparatus, some experimenters have contrived sophisticated equipment for providing information to the students of their accumulated responses or reinforcers. Feedback may prove to be

an integral variable in successful group contingencies, but few researchers have systematically investigated this component.

For the Barrish et al. (1969) experiment the teacher made a mark on the chalkboard each time she noticed the occurrence of a target response. Feedback was not provided to the students by Grandy et al. (1971) and the results demonstrate that the procedure's effectiveness was not weakened.

A second replication of the Good Behavior Game, offered by Medland and Stachnik (1973), used a more elaborate system of feedback and did attempt a component analysis. Out-of-seat, talking-out, and "disruptive" behaviors were measured in a fifth grade class which had been divided into two reading groups for instructional purposes. The teams were maintained for the experiment, however reinforcers were equally available to both teams; they were not competing. Winning the game by accumulating less than five inappropriate responses entitled the team to three minutes of extra recess. An additional reward of one hour free time was awarded if a team totaled less than twenty black marks per week. Two sets of lights were used to signal the teams: a green light meant "all's well" and a red light indicated that "someone has made an error and the team should be careful." The first time the game was played, an average 98% reduction in inappropriate behaviors

occurred. A return to baseline conditions resulted in a gradual increase in inappropriate behaviors, although not precisely to baseline level. In the next phase, rules concerning the target behaviors were read to the class daily, as they had been during the game condition. A slightly lowered rate of responding resulted. The operation of the lights was then added to the rules and a further reduction resulted; one group's data is essentially the same as the game phase. Both groups emitted slightly fewer inappropriate responses in the final game phase. This study demonstrates that rules and feedback, after association with contingent reinforcement, were quite effective in maintaining lowered rates of out-of-seat, talking-out, and "disruptive" behaviors for at least a few weeks. The authors stated that further experimentation in which the components are evaluated prior to their use in the game would complete the analysis of the controlling variables.

The accumulation of responses or reinforcers is frequently shown via a timer apparatus, as in a second experiment by Schmidt and Ulrich (1969). The termination of a 10-minute interval set on a timer signalled two minutes of extra gym time, but if the noise level exceeded 42 db, as measured by a decibel meter, the experimenter blew a whistle and the timer was reset to ten. Also, when the timer ran to zero, two minutes of free "talk time"

was allowed before starting the next 10-minute period. The first time the interdependent contingency was initiated, decibel readings decreased to 38-40 db from the baseline measure of 50-55 db. After returning to baseline conditions and an increase to 46-48 db, a second application of the contingency resulted in lowering the sound intensity levels to 37-39 db. The procedure was quite effective, although the design does not allow for an interpretation of the influences of the several variables. It is possible that after being paired with reinforcement, the timer and whistle may have maintained lowered sound levels, as found in the Medland and Stachnik (1972) experiments.

Neither of these studies controlled for apparatus-novelty effects as in research by Packard (1970). Selected students from each of four classrooms were observed as a group by their teacher for attending behaviors. During baseline, the teachers used a stopwatch to record cumulative attending time. To control for the novelty of the apparatus, a second baseline was taken after a timer had been introduced into the setting. The timer measured accumulated periods of appropriate attending, while a light on top of the timer signalled occurrences of non-attending by any student. Although this condition was in operation only two days there does not appear to have been any behavioral changes. In the third component phase students were instructed in the operation of the

apparatus relative to their attending behaviors. A temporary increase in the dependent variable occurred during this condition for some students in some grades. The main intervention consisted of token-mediated reinforcement contingent on a criterion amount of group attention. If the criterion was met each student earned three points, and achievements exceeding the criterion by 5% resulted in an additional two point bonus. Reinforcement was phased-out by gradually increasing the attention requirement. When the class had reached criterion performance for three consecutive days, the time required was raised 5%. When the criterion was exceeded by 5% on any one day it was raised to that amount for the next session. All but one class responded immediately and significantly to the reinforcement contingency, and the slower class eventually attained a 35% increase in attending time over the previous three conditions. Data from the next condition, which employed a return to the instruction phase, suggested a decrease in the amount of attention exhibited by all classes. A lower-limit response-cost contingency was added in the final interdependent contingency condition, wherein three points were deducted from each student's earnings when the class failed to meet criterion by more than 5%. Group attending was raised to a consistent 70-85%.

In a technical note, Willis and Crowder (1972) described an apparatus they used in a replication of the Packard (1970) study. The operational definition of "attending" designated by Packard was adopted for observing attending behavior in a first grade class. The teacher was able to operate a clock by means of a portable wireless switch. Class attention was shaped by shifting the requirement for a brief movie from one minute attending per 60-minute period to 31 minutes. The experimental sequence was similar to that in the investigation by Packard and demonstrated comparable behavioral functions. Data from an independent observer indicated that the teacher was less than precise in her measurement of classroom attending. The degree to which this error obstructed the success of the procedure cannot be determined.

A much more elaborate device was designed by Eleftherios, Shoudt, and Strang (1972) for displaying rewards earned for in-seat behavior. Every 15 seconds an observer scanned the class for a count of those exhibiting the appropriate behavior. When all students had remained in their seats for 30 seconds, one light of a horizontal row containing eight lights was illuminated. After the entire row was won a vertical column of six was begun, however, any occurrence of an out-of-seat response erased all lights earned in the horizontal progression. Thus,

the procedure incorporated a reinforcement delay element similar to the Schmidt and Ulrich (1969) study. Completing the column of vertical lights earned a cooky and milk party for the pupils. These techniques succeeded in virtually eliminating any out-of-seat behavior. A contingency reversal phase was next instituted in which the game machine, labelled "sick," rewarded out-of-seat behavior on the same schedule that previously had reinforced students for remaining in their seats. The target behavior reached an uncharacteristically high rate until all contingencies were removed and the behavior returned to baseline level. Out-of-seat responses again literally disappeared upon a final instatement of the group contingency game.

The last article to be reviewed in this section was authored by Mattos, Mattson, Walker, and Buckley (1969). Working in an experimental classroom based on a token economy, these researchers attempted to manipulate attending behavior, assignment completion, and disruptive behaviors through an unsystematic application of several variables. In all phases of the experiment students received tokens individually for exhibiting "good social and academic behavior." Major disruptive responses resulted in time-out during the first phase and were not consequated in the second phase. An individual contingency on completed assignments and a time-out procedure for

minor disruptions were instituted in the third phase. These variables were supplemented with an interdependent contingency on task-oriented behavior during phase four. The teacher set a timer which was allowed to run when all students were "task-oriented" and reset when any student emitted a non-task oriented response. Timer intervals were "short" at first and gradually lengthened during the condition; students earned points commensurate with the length of the interval. Task-oriented behavior averaged 71%, 51%, 81%, and 85%, respectively, for the four phases. Although the combination of variables used in the final two phases appeared to result in higher rates of task-oriented behavior, the program could scarcely be replicated due to a lack of technological detail. In all other applications of a timer-clock, intervals were established with a variable-interval schedule. However, the schedule followed in this study--gradual lengthening of intervals--may be a satisfactory alternative for shaping "attending" behavior.

As a rule, in the preceding studies non-school personnel were used to observe specific classroom behaviors and operate a machine which informed students of their success or failure under the interdependent contingency procedure. Data from some experiments imply that feedback provided by the apparatus functions as conditioned reinforcers or punishers. In fact, Medland and Stachnik

(1972) found that feedback alone maintained low rates of inappropriate responding after association with contingent reinforcement even after an intervening baseline period. A reinstatement of rules and feedback alone did not control increased attending in the Packard (1970) study, although the immediately prior condition entailed seven days of contingent reinforcement. In this study a component analysis was undertaken before the first interdependent contingency condition, contrasting with the placement of the separate variables in the Medland and Stachnik experiment. Apparently, exposure to a condition in which feedback does not differentiate situations of reinforcement from non-reinforcement functions to weaken its power as a conditioned reinforcer or punisher when presented following a period of association with contingent consequation. The durability of feedback effectiveness may be related also to characteristics of the intervention phase, that is, longer contingencies may foster stronger feedback control.

The teacher as observer and recorder. Teachers controlled the feedback apparatus in the Packard (1970) and Willis and Crowder (1972) investigations, and, since in both cases the equipment included a timer or clock, they also were responsible for recording the dependent variable. Packard realistically admits that "since the teacher's role in this study was to carry on her normal

teaching activities while recording the attending behaviors of the class as a whole, it was presumed that her observations would be intermittent and imprecise [p. 26]."
No direct measurement of this imprecision was attempted, since the author felt that the teacher's success in observing and recording could be judged in light of the overall behavioral control resulting from the intervention. Nonetheless, imprecision undoubtedly undermines the efficiency of behavioral programs as consequences become proportionately non-contingent. The degree of error which can be tolerated in specific programs should be analyzed as far as possible.

Teacher-recording adds an element of economic practicality to a contingency management system, group or individual. Interdependent contingencies, though, are often touted as inherently possessing simple methods of observing and recording data. The teacher or experimenter records a gross score rather than tracking individual scores for the students. Many times when consequation revolves around a criterion of responses, as in the variations of the Good Behavior Game, responses need only be recorded up to the criterion. Although this practice may jeopardize the accuracy of data in an experimental investigation, the teacher may be justified in adopting the compact method. Several teacher-recording systems are explored in the literature, but surprisingly

few have exploited this supposed advantage of group contingent techniques. Four articles which did incorporate teacher-recording are reviewed.

Data were recorded for one hour each day by a first grade teacher participating in research by Hall, Fox, Willard, Goldsmith, Emerson, Owen, Davis, and Porcia (1971). A mark was recorded on a tally sheet each time a student directed a verbalization at the teacher without permission. Reliability checks, taken by a student aide, were in 100% agreement with the teacher's records. The experimental intervention consisted of an interdependent contingency on talking-out which allowed students to play a game at the end of the day if fewer than 12 responses were recorded. An interpretation of the effects of this group contingency was confounded by the simultaneous initiation of individual teacher praise. Talking without permission steadily declined from a baseline of 16 per session to an average of five responses per session during the intervention. For one week the contingencies were removed and talking-out responses increased. The target behavior returned to a low level when the contingencies were reapplied.

McAllister et al. (1969) reported a successful interdependent contingency management program in a class of junior and senior high school students. The English teacher of this low-tracked group

recorded talking-out and turning-around responses by placing a check mark for the first occurrence of either behavior on a form divided into minutes. Data therefore showed whether or not at least one target response had occurred during the observation interval, and the teacher's task was simplified. Baseline records indicated that talking-out and turning-around responses occurred in 25% and 15% of the intervals. The teacher was instructed to praise the group contingent on the absence of talking-out behavior. Praise was available every 30 seconds during the first minute of class, every 15 minutes during lectures, and at the end of the period if seat work was scheduled. The interdependent contingency was used in conjunction with individually contingent verbal reprimands which consequated approximately 94% of all responses. When the target behavior had decreased substantially the same contingencies were placed on turning-around behavior. By the end of the intervention the two behaviors were occurring in less than 5% of the intervals each day. The separate effects of praise and disapproval cannot be interpreted. Observers remarked that the students seemed "stunned" at the onset of numerous reprimands. The effects were maintained after this radical stimulus change and the authors believed the combination of contingencies to be responsible for this. The teacher remarked that recording behaviors was initially difficult

and distracting, but that the task became easier with practice. She felt that the change in classroom behaviors more than compensated for the teaching time directed to recording and dispensing appropriate comments. Reliability estimates (averaging approximately 92%) indicated that this teacher was as successful in performing an observational function in her classroom as the teacher in the Hall et al. (1971) study who used a slightly different method. When the target behavior(s) is (are) occurring at a high level, frequency counts are often inaccurate or impossible, and there is justification for a method in which only a proportion of the responses are recorded. In the Hall et al. experiment, however, the generally low frequency of talking without permission was amenable to an event recording method.

Sulzbacher and Houser (1968) trained a teacher of young mentally retarded boys in behavioral techniques. An interdependent contingency was established to deal with occurrences of the "naughty finger" as well as verbal references to it, including tattling. The teacher made available a 10-minute recess at the end of the day; an occurrence of any of the three target behaviors resulting in a subtraction of one minute. Responses were recorded by turning over cards labelled with numbers from one to ten, positioned so that they also provided feedback to the students. During the application of the contingency

target behaviors ranged from 0-6 per day as opposed to 12-20 during baseline.

A quite simple but basically subjective observation technique was used in a study conducted by O'Leary and Becker (1967). Individually contingent tokens had been used in a classroom of "emotionally disturbed" children to reduce talking-out, name-calling, out-of-seat behavior, etc. Recording individual behaviors required a few minutes of the teacher's time each day, and an interdependent contingency was instated in order to maintain class quiet during this time. The students were given from one to ten points dependent on the teacher's rating of the behavior of the class as a whole. These points were accumulated for a popsicle party at the end of the week. Seven out of eight possible rewards were earned. In the hands of some teachers this method of evaluation would probably be sufficient, however, for teachers novel to behavioral techniques a great deal can be gained from learning to objectively record operationally defined behaviors.

Dependent Contingencies with one Target Student

The preceding review of interdependent contingency studies encompasses a variety of "games," equipment, and settings, however they all include one basic element. That is, individual students within a class obtain

reinforcers dependent upon the behavior of every student in the class. The contingency is therefore useful for modifying overall levels of inappropriate behaviors as an end in itself, or, once the behavioral repertoires of the majority of the students have been modified, the teacher can concentrate more of her time on one or two persistently disruptive students. Dependent contingency systems allow that only a few students determine reinforcing or punishing events for their classmates. This type of system also has an obvious purpose. Invariably, most classes include one or two perennial behavior problems who have wrought disruption on a progression of classes and been unresponsive to the techniques of the most patient teacher. Under a dependent contingency system the teacher can motivate this student to act more appropriately without incurring jealousy and complaints of unfairness from the remainder of the class. The behavior of one student is consequated, but his peers share the reward. Not only does this serve to avoid the ill will of students, but it may in fact enlist their aid in the intervention attempt. Most studies incorporating this system have dealt with one target student, but the definition of a dependent contingency allows for a target group of several students.

Carlson, Arnold, Becker, and Madsen (1968) designed a dependent contingency for the remediation of severe

tantruming in an eight-year-old girl. The tantrums, occurring both at school and at home, were generally believed to be maintained through attention, and intervention procedures thus included giving reinforcers to students who ignored the target student when tantruming. The student could earn a star for each half-day of non-tantruming, while four stars achieved consecutively earned a class party with the target student distributing the treats. Tantrums decreased in frequency after an initial small increase.

A similar program was devised by Greenberg and O'Donnell (1972) for dealing with the tantrum episodes of a six-year-old. After instructing the teacher to reward the class with candy every one-and-one half hours in which no tantrums occurred and to time-out the student in the cloakroom for each tantrum, the experimenters retired from the situation. Two weeks later they returned to check on the problem and found that not only had the contingency for candy only been met once, but the teacher had been sending the target student to the cloakroom for any mildly disruptive behavior. Episodes of tantruming had remained at a rate of five or six per day. Instructions, made more explicit, were followed closely by the teacher during the next two weeks, during which time the behavior decreased to only one or two episodes per day. Further contacts made at two-week

intervals revealed that tantrums had been virtually eliminated.

An experiment by Evans and Oswalt (1968) focused on academically-oriented behaviors of several low-achieving students. In the first of two experiments, two fourth graders were treated in an attempt to heighten their progress in spelling. During the baseline phase a weekly spelling test of 10 words was administered to the class. In the second phase the teacher presented a word from the week's list to a target student (Student A) following spelling each day, with a correct response earning five minutes of extra recess for the entire class. The same procedure was undertaken with a second student (Student B) during the next phase, while Student A was returned to baseline condition. Under the dependent contingency each student's score increased 35 or 40 points to a level higher than the class average, although Student A's scores returned to below baseline when the contingency on his responses was lifted. Unfortunately, the efficacy of the dependent contingency in this case cannot be assumed due to confounding practice effects: that is, the higher scores could be attributed to the extra preparation provided by the daily trials. Had the consequences been dependent upon the weekly score alone, the effects of the contingency could be interpreted separately.

Essentially the same procedure was carried out next in math class, with the added stipulation that Student A would still be questioned daily by the teacher during the final phase even though reinforcement would be determined by the responses of Student B. Both students' spelling scores improved when the contingency was placed on their respective responses. Student A continued his superior performance even when reinforcers were no longer dependent upon his answers. That Student A's scores failed to reverse further supports the alternative hypothesis that "practice" was the influential variable. The authors can obviously not claim scientific control over their intervention.

Wolf, Hanley, King, Lachowicz, and Giles (1970) initiated a dependent contingency with an elementary school girl who frequently engaged in out-of-seat behavior. Contrary to the studies already reviewed, the target student in this program earned reinforcers only for the four students sitting closest to her in the room. The number of observation intervals in which the student was out-of-seat was successfully reduced under an individual contingency in which a cache of 50 points, valuable in the classroom's token economy, could be retained by remaining in-seat. Each time the student was out-of-seat when a timer (set on a variable-interval 2-minute schedule) rang, 10 points were deducted from the total. Further

reductions in the undesired behavior occurred when the rules of the "timer game" were modified "so that more children could play." At the end of each session in this condition the student's remaining points were divided equally among her four classmates. Although the student reaped fewer points in this condition as compared to the individual contingency condition, regardless of her behavior, out-of-seat responses became even more infrequent. Neither contingency was as successful in decreasing the behavior the second time that it was introduced.

A series of three articles has followed a dependent contingency program designed by Patterson (1965). For each 30 seconds that a "hyperactive" nine-year-old engaged in studying he was reinforced, first with an M & M and later with clicks from a counter as secondary reinforcers. At the end of the session the candy was divided among the classmembers. The data suggest that a quite significant decrease in responses incompatible with studying was effected in the course of the experimental manipulation. This study was designated a "pilot" study in a later article by Patterson, Jones, Whittier, and Wright (1965), which attempted to increase experimental validity by adding a control student to the design. The experimental student was taken to a special room each day, containing a desk, study materials and feedback equipment, where he was rewarded with candy or pennies

for each 10 seconds of studying. During the second phase the earned reinforcers were distributed among the class. Data, reported as condition averages of responses per minute, suggest that the dependent contingency was more powerful in controlling study behavior. In addition, the daily pre-trial observations revealed that the effects transferred to the classroom.

Straughan, Potter, and Hamilton (1965) successfully completed a systematic replication of the Patterson procedure in the treatment of a nearly mute educable-mentally-retarded boy. When the student responded to a statement or question, he heard a buzzer indicating that he had advanced one point in a progression toward a class party. After the party was won, which required an estimated 750 verbalizations, reinforcement consisted of M & Ms shared with the class. The authors asserted that clear, meaningful vocalizations became so frequent as to appear "normally" spontaneous.

In a final study (Coleman, 1970), four students, each from a different class, were chosen on the basis of high rates of aggressive and/or disruptive behaviors. Frequencies of talking-out, out-of-seat and studying behaviors were systematically observed. Portable radio control equipment was used to give feedback to the student when he displayed the desired behavior, and candy earned for these responses was divided among the class. Studying behavior increased both times the dependent

contingency was in effect and was maintained at a high rate by reinforcement alone when the feedback apparatus was removed in the final experimental phase.

This review of dependent contingency applications suggests that the procedure can successfully alter some severe behavior problems found in the classroom. Academic responses have not been scientifically controlled by the application of a dependent contingency on one target student's behavior. All articles in this section have been confined to a target of one. The techniques used in this management system, as well as in any other, must be thoroughly explained and monitored by the experimenters if unfortunate situations such as in the Greenberg and O'Donnell (1972) study are to be avoided.

Proportional Interdependent Contingencies and Dependent Contingencies with more than One Target Student

Thus far, one type of interdependent and one type of dependent contingency have been discussed, although numerous possible types are mentioned in the initial discussion. In a most interesting series of articles published recently, the multifaceted effects of individual, two kinds of dependent, and three kinds of interdependent contingencies are investigated and compared.

Hathaway (1971) studied the effects of several contingencies on the achievement of a class of fourth grade

pupils. Weekly assignments in math, spelling, and reading were developed by the teacher, and the scored gain between a pre and post-test on this material was recorded. The scores were standardized by dividing each of them by the average of the entire class. A Standardized Gain Score of 1.0 indicated average progress for that particular week. The class was divided into five groups, each undergoing a succession of five experimental manipulations in a different randomized order. Points (with inexpensive material backups) reinforced daily academic performances in a manner specified by two dependent contingencies, one interdependent contingency, and one individual contingency. A second individual phase consisted of points delivered for exhibiting "attending" behaviors. The two dependent procedures are termed "low performance" and "high performance" group contingencies by the author. In the first case, the entire class received points consistent with the average of the four lowest scores, while the top four scores were averaged to determine the amount of reinforcement in the second condition. The four target students were not necessarily the same each day. For example, an average of 87% for the four students earned nine points for each classmember. Interdependent contingency procedures resembled those already discussed, that is, reinforcement was determined by the overall class average.

Results, presented for the class as a whole, demonstrate that the individual attendance contingency produced the least achievement across all groups, while the two dependent contingencies effected the most improvement. However, data for the top three students and the lowest three students from each group indicate that the conditions influenced these two groups of pupils quite differently. The three students with the highest overall scores performed significantly better under the high performance dependent contingency than at any other time, but optimal performance by the three lowest students was achieved during the low performance dependent contingency. In fact, these students gained less during the high performance contingency than in any phase with the exception of the individual attending phase. Conversely, the three top pupils scored essentially the same in the low performance, individual, and interdependent contingencies. The author claimed that as the brighter students are not adversely affected by the low performance dependent procedure and the slower ones greatly benefitted by it, it is the program most suited to foster "egalitarian excellence" in the classroom.

The question asked by Wodarski (1971) concerned the parameters responsible for the notable effects of the low performance contingency. Furthermore, he wondered if some proportion of this particular contingency and

individual contingencies might not cause still greater academic gains. Although the author does not use the term, this procedure was an interdependent contingency in which the proportion of group to individual reinforcer-determining responses deviated from one/N. Dependent variables chosen for this study were the number of math problems correctly completed and the percent of spontaneous peer tutoring, while subjects included three classes of fifth grade children divided into four experimental and two control groups. The four contingency systems, presented to the experimental groups in a counterbalanced randomized order, were: 1) 100% individual contingency, 2) 67% individual and 33% low four performance contingency, 3) 33% individual and 67% low four performance contingency, and 4) 100% low four performance contingency. Under the proportional contingencies students earned 67 cents (play money) for each problem they worked correctly and 33 cents for the average of the four target students, or vice versa.

The separate results of each condition were pulled out and plotted as they were presented through time to the four groups. Data was not presented comparing the effects of the four conditions within a group of students. The data demonstrate that the dependent contingency led to more improved scores across time than the various other contingencies. However, when the data are replotted

for each particular group itself, the only definite conclusion that can be made is that the pupils scored lowest under the condition presented first, regardless of its nature. In only one group is the dependent contingency undoubtedly superior, and since this was the final condition presented to these students, "practice" may have contributed to its success. At any rate, the absolute number of problems worked correctly increased by approximately six, an increment of practical value could it be repeated. Due to variability and upward trending, the differential effects of the conditions for the top four and low four students is negligible. Although the influences of the contingencies on math achievement are inconclusive, their impact on tutoring behavior is interesting. Substantially more voluntary tutoring occurred under the dependent contingency; indeed, the percentage of peer tutoring demonstrates a positive linear relationship to the percentage of reinforcement determined by the lowest four scores. This effect can probably be considered significant even though the operational definition of tutoring followed by the observers incorporated five possible behaviors, only one of which described two students working together on the same problem.[2]

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[2]The definition included five behaviors: "1) One pupil asks the teacher to help another pupil with his

A later paper reporting this same experiment (Wodarski et al., 1972) also presented data concerning studying, non-studying and disruptive behaviors. The general conclusion was that the various reinforcement conditions did not lead to large differences in the three behaviors.

A third paper arising from this first investigation (Wodarski et al., 1973) dealt with the influence of the four contingencies on "cooperative behaviors." Cooperation was operationally defined exactly as "tutoring" had been, with one addition: "A pupil hands another pupil a material object such as a pencil, paper, or eraser needed by the other student to continue working on his assignment [p. 362]." As could be expected, the data demonstrated that cooperative behaviors increased in all experimental groups as the proportion of dependent reinforcement composing the contingency increased.

These authors reported the same experiment in three different articles, and fourth paper (Hamblin, Hathaway, & Wodarski, 1971) reviewed the original Hathaway (1971) dissertation and the Wodarski et al. (1972) paper. The authors' enthusiasm is perhaps exaggerated since the procedures did

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assignment; the teacher follows up the request by going to the pupil, 2) One pupil clarifies the teacher's instructions for another pupil..., 3) One pupil gives the meaning of a word in the assignment to another pupil..., 4) Together, two pupils ask the teacher for help on a problem and she assists them, and 5) Two pupils work on the same problem; one shows the other the principles involved in completing the problem... pp. 7-8 ."

not greatly modify the main dependent variable--academic scores. However, the study did discover a linear relationship between peer tutoring, or cooperation, and the percent of group responses determining reinforcement in the proportional interdependent contingencies. These differing proportional contingencies may produce other more systematic results not yet uncovered.

Economics of Group Contingency Systems

Some practical considerations of group contingency systems have already been noted. Specifically, group systems are appropriate in cases where the teacher will settle for general changes in the levels of desirable and undesirable behaviors, and also when the overall rate of some behavior must be modified before the teacher can concentrate on the repertoire of a few selected students. A dependent contingency reduces the probability that pupils might complain of one person being rewarded for responses that most students must do "for free." Furthermore, the system includes a safeguard against students who may "mysteriously" regress to the behaviors for which one pupil is receiving a great deal of special treatment.

As early as 1966, Quay, Werry, McQueen, and Sprague proclaimed the pertinence of group procedures:

> The economics of public schools obviously require the development of techniques that will allow children to be handled in a group situation by as few adults as possible. Most of the techniques of behavioral remediation have been developed for use on an individual basis and it seems crucial at this stage to attempt to extend these techniques to group situations...even if the techniques of behavior remediation should prove to be very highly effective when applied on an individual basis, they are nevertheless likely to remain economically unfeasible, unless they can be adapted for use in a group setting such as the classroom [pp. 513-514].

Sulzbacher and Houser (1968) maintain that group contingencies are economical for a variety of reasons including: 1) the system requires no special equipment, 2) alteration of class routine is minimal, and 3) little teacher time is required. As we have seen, though, a large portion of group research has entailed equipment, ranging from a timer-clock to an electrical light display board, and some programs demand more effort on the teacher's part than others. In less than half the studies reviewed have teachers taken on the responsibilities of observing and recording data, even though researchers prefer to be able to claim that their program is "self-contained." The teacher concerned with the Grandy et al. (1972) experiment recorded behaviors for only two days before requesting that the experimenter perform the task.

Group contingencies for academic behavior, that is, work output or accuracy, possess no recording advantages over individual contingencies, since individual grades must be recorded regardless of the basis of the reinforcers.

Some proportional interdependent contingencies may entail longer calculations than individualized programs. For example, in one phase of the Wodarski (1971) study, the average score of the four target students had to be computed, multiplied by .33, and added to each individual's score, which had been multiplied by .67; a tedious procedure for anyone.

If researchers continue to assert the economical feasibility and ease of group procedures, perhaps more effort should be made to design systems which do not require sophisticated equipment or recording methods. Indeed, evidence is inconclusive that feedback is essential to the success of a group contingency procedure.

Peer Influence and Group Contingencies

In group situations students might be expected to develop behaviors which discourage their peers from engaging in prohibited behavior, or to adopt a pattern of responses which may encourage the emission of desired behavior. It is to the definite advantage of each student to acquire these influential behaviors; his reinforcers depend upon it. Generally, a group contingency has three apparent advantages: 1) students are encouraged to consequate the behavior of their peers, 2) students are prevented from reinforcing the inappropriate antics of their peers, and 3) students are encouraged to set the occasion for

appropriate behavior, for example, by leaving a student alone so that his attending time is not interrupted. These possibilities were exploited to their fullest by Sulzbacher and Houser (1968). Students in the study were punished for displaying the "naughty finger," talking about it, or tattling on a student exhibiting the response. In order to avoid punishment, the students could take only one course of action: they had to ignore the behavior when it occurred. The teacher successfully eliminated the possibility of students disrupting class to reprimand someone emitting the response, and perhaps discouraged negative interactions between students altogether. In many instances the form peer influence takes may not be so carefully programmed, and this is a major drawback of the system. The teacher, in turning consequation over to the students, relinquishes a great deal of control; it would be a difficult task to monitor the encouraging and discouraging remarks made by all students. Students' praise and disapproval is perhaps not as consistent and contingent as desired, and target behaviors may therefore resist control.

Andrews (1972) recorded reactions of students to the task-relevant and non-task-relevant behaviors of their peers in a preliminary analysis of peer influence. He reported that students consistently "attended" and/or verbalized to peers engaged in task-relevant behavior

during group contingency conditions, while responding to non-task-relevant behaviors was most pervasive during baseline and individual teacher praise conditions.

The dependent contingency may maximize the effects of peer influence in that it converges on one, or a few, students. According to Greenberg and O'Donnell (1972): "In a situation where an individual child appears to be susceptible to peer influence, the therapy choice may be one where the child's peer group is reinforced dependent upon the performance of the individual child [p. 57]." The target student in that study was praised enthusiastically during periods of reinforcement. Similarly, classmates of low-achieving spelling students in the Evans and Oswalt (1968) experiment repeatedly urged the students to study and offered to help them do so.

When a group contingency is placed on academic production and/or accuracy, peer influence may take the form of tutoring. Wodarski (1972) emphasizes the value of tutoring, stating that it is spontaneous, requires little teacher supervision, and may bring about broader student awareness of the useful role he could play in society. Whether or not peer tutoring results in the academic advancement of students is a question in its own right. Hamblin and Buckholdt (1973) maintain that the effectiveness of tutoring on academic achievement is influenced by several factors including: "...differences

in the training of tutors, the age and skill of the tutor and tutee, the amount of time devoted to tutoring, the quality of instructional materials... pp.[2-3]," and the reinforcing consequences available for tutoring.

Some Effects of Group Contingencies on Social Behavior

Group contingent procedures can provide benefits less obvious than economic feasibility and natural peer consequation. The group, or class, may hold aversive properties for some students, particularly if they have a history of being compared, implicitly and explicitly, to the group and always found lacking. For these students the class may take on more pleasing aspects if it is made the source of reinforcers. Secondly, students are typically chosen to be targets of a dependent contingency on the basis of abnormally high rates of deviant, disrupting behavior, and for these reasons are frequently disliked by classmates. Often, these students possess few social skills and do not function successfully in social situations. In a procedure where unpopular students can provide reinforcers for peers, their social standing in the class may improve as they become associated with enjoyable events. The target student in the Patterson (1965) study was usually applauded when the amount of reinforcement earned for the class was announced, and Straughan et al. (1965) observed that peer approaches to the

target student increased significantly throughout the intervention. Finally, as Wodarski (1972) pointed out, "helping" behaviors may acquire secondary reinforcing characteristics if paired with reinforcers a number of times.

Some Ethical Considerations

Few experimenters who have explored interdependent or dependent contingency management systems have stated an ethical position as strongly as Albert Bandura (1969).

> Pervasive and unrelenting application of group-oriented systems of reinforcement which stifle autonomy and self-determination clearly are antithetical to goals that are highly valued in most societies. Therefore, where interdependent contingencies are instituted to increase group unity and responsibility, each member should also be given opportunities for independent accomplishment [p. 282].

According to Bandura, group contingencies can function to dissuade individual achievement, transforming group members into mediocre performers contributing as little as is necessary to the group. This may indeed be the case were the magnitude of the group reward static. However, in many of the contingency systems we have reviewed, the group, and thus each individual within the group, earns reinforcers commensurate with the overall level of performance. Under such a system members of a group are directly reinforced for asserting their individual capabilities. Persons motivated for social reasons

may even produce higher quality work than those motivated by such typical reasons as individual quest for knowledge or personal greed. Social products and processes are often seen as irrelevant by the purist "knowledge seeker," who may be so totally absorbed in learning that he never actively produces anything. On the other hand, power or material gain, i.e., reinforcers, are much more important to the "greedy" individual than workmanship. The result of his labors may be just as crude as the market will allow. These behavior patterns would probably not be established in a group situation; other members would not permit them. When consequences are determined by the behaviors of several people, individuals benefit by aggressively seeking ways to help others function satisfactorially. Thus, certain tutorial, management, and leadership skills, highly valued in our society, may be learned more readily under a group contingency than under other systems. Creative actions are not necessarily stifled, as Bandura suggests, but may flourish.

Group contingencies encourage other behavior patterns generally considered valuable in our society. In a highly competitive cultural atmosphere, many people would find it refreshing to have discovered a management system which generates cooperation. As Cohen and Lindsley (1964) have pointed out: "Cooperative behavior <u>may</u> be shaped on an individual basis, but is a naturally-occurring

artifact of interdependent contingencies." We have already noted specific behaviors which students have learned in order to facilitate the procurement of reinforcers for the group. An analysis of the reviewed studies attests to the desirability of cooperative student interactions; only one experiment (Barrish et al., 1969) incorporated competition.

Not all of the group contingency programs reviewed succeeded in generating pleasant student interactions regardless of the absence of "competition." Schmidt and Ulrich (1969) report: "Peer consequences in the form of threatening gestures, arm moving, and facial expressions were observed being directed at more noisy members of the class [p. 174]." Students in the Packard (1972) experiment reminded or scolded others when they behaved in a manner which kept the timer from accumulating the "attending time" necessary for reinforcement. The purpose of a group contingency is not to save the teacher from performing her role as disciplinarian by turning punishment operations over to the students. If desired, the probability that students will reinforce appropriate behavior rather than punish inappropriate behavior can be increased in several ways. Students may be more positive to their peers when the teacher models praise and approval more often than disapproval. The students may be specifically instructed in ways of encouraging peers to engage in appropriate behaviors. For example,

students in the Patterson (1965) study were given a lesson in setting-controls when told that: "If you want to help E___ earn the candy you can do so by not paying any attention to him when he is 'working.'" Finally, a contingency may be placed on consequating behaviors; perhaps the teacher could praise the class for reinforcing behavior and maintaining a pleasant classroom atmosphere.

The possibility arises that certain types of group contingencies may be detrimental to students. Wodarski et al. (1973) deny that high-performing students suffer in an interdependent contingency in which low performing students determine most of the consequences. Their conclusion is unwarranted in that this phase of the experiment was in operation for only two weeks. Long term low-performance interdependent or dependent contingencies might well produce adverse effects in gifted students not discovered in this investigation. The effects any contingency produces over a long period of time should be thoroughly researched, not extrapolated from short-term investigations, as any scientist would agree.

A final ethical question pertinent to group contingent procedures is raised by Winett and Winkler (1972). These authors are concerned that behavior modification has been used not to revolutionize education but to support the status quo. Many articles appearing in the Journal of Applied Behavior Analysis, including several of those

reviewed in the present paper, were cited as being concerned with teaching children "to be still, to be silent, and to obey." If one assumes that the main purpose of school is to teach the three R's, one might argue that the utility of certain types of behaviors in achieving this goal can be investigated empirically. Perhaps, as a reviewer of the paper suggests, researchers should determine the levels of noise, movement, and other behaviors which produce optimum learning before striving to eliminate them. In a rejoinder to Winett and Winkler, Daniel O'Leary (1972) concludes:

> The behavior modification approach provides a set of rather well-defined procedures to change behavior, but the procedures do not spell out the goals or the behaviors which ought to be changed. Whether the goals of education in the year 2000 involve a structured class or an unstructured class, a class which emphasizes affective or cognitive development, it is the authors' opinion that the types of principles and procedures described will be helpful in reaching whatever goals our educational systems choose [p. 509].

Summary

This review defined group contingencies and then classified them into two main types: interdependent and dependent. The former was defined as a situation in which consequation of a student's behavior is at least potentially determined by both his own responses and the responses of one or more other students. When a student's reinforcers and punishers are programmed solely according to the

responses of one or more other classmates, the contingency was designated dependent. A comparison of individually contingent procedures with interdependent systems indicated that they were equally effective in controlling certain responses.

Various techniques for instituting the contingencies were analyzed, and components thought to be involved in producing the effect were discussed. Primarily, competition, feedback to students, and peer influence were noted as important variables. Possible advantages common to both interdependent and dependent contingencies are: the method of recording data can be simplified so that teachers can handle the process with only a minimal alteration of routine; the system can be operated without expensive equipment; students benefit by inducing their peers to behave in a manner necessary for reinforcement. Unfortunately, the literature revealed that these potential advantages were not being exploited to their fullest extent. Both interdependent and dependent contingencies were found useful for encouraging cooperative, pro-social behaviors, and additionally, helpful in lessening the aversive aspects the group may hold for certain students. Few researchers have approached the ethical considerations of group contingencies.

Group contingencies offer an effective, practical technique for inducing classroom behavior changes. The

procedures may be instrumental in the development of a wide variety of behaviors not generated by individual contingency systems. For this reason, a group approach offers much to the educator and psychologist concerned with the modification and control of behavior in the classroom.

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