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THE EFFECTS OF A CONTINGENCY SYSTEM ON THE RATE, CONTENT AND LENGTH OF UNDERGRADUATES' VERBAL RESPONSES

A Dissertation

Presented for the

Doctor of Education

Degree

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ABSTRACT

This study involved an experimental analysis of undergraduates' verbal behaviors in which the efficacy of two strategies and their functional relationship to four dependent variables (length, content, frequency of comments and percentage of students participating) were examined. Students' opinions of the systems were also collected. One strategy involved only self-recording, while the other involved the administration of points contingent upon the student's verbal participation in class discussions.

Sixty-two undergraduates in three sections of adolescent psychology served as subjects. The students ranged in age from eighteen to twenty-four and were in their sophomore, junior, or senior year of study. Eight graduate students in a Department of Educational Psychology and Guidance served as observers. The students were observed throughout an entire ten-week quarter for two thirty-minute discussion sessions per week. Rating of teacher behaviors was performed to ensure consistency within and between groups and to reduce the possibility of teacher behaviors confounding the effects of treatment.

The observers recorded the length, frequency, and content of every student comment during the discussions. The content of each comment was measured on a nominal scale of three categories: comments which asked a question, comments which provided a specific example, and comments which provided new information to the discussion.

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Acceptable observer reliabilities (85 percent agreement) were achieved during training for all observers. Thereafter reliabilities were computed bimonthly for all observers on both teacher and student behaviors.

Points for participating in class discussions were administered to two classes according to a multiple baseline design with one reversal. The third class served as the Control group in which students merely self-recorded their verbal behaviors. The phases of the study for all three classes were: baseline, points or self-recording, reversal.

Line graphs were plotted to illustrate the percentages of students participating throughout all phases of the study in the three classes. Nonparametric statistics were also used to analyze changes in participation percentages and changes in the frequencies of responses within each discussion period. Tabular presentations and histograms were the primary methods employed in illustrating teacher behaviors, as well as the content and length of student responses.

Nine major conclusions were derived from the study: (1) The contingency point system significantly increased the percentage of students participating and the frequency of individuals' comments during each discussion. (2) Self-recording did not result in significant increases in percentage of students participating or in the frequency of individual comments within each discussion. (3) The majority of students to whom points were administered rated the system favorably, agreed that points should be used in other college classes, and reported that the points were responsible for their increases in participation.

(4) Neither self-recording nor points increased percentages of participation during reversal above baseline; but frequencies of individual comments did maintain treatment effects in the groups to whom points had been given. (5) Points were more effective with reticent students than with students who were consistently verbal throughout the study. (6) Self-recording did not result in any increases in participation for students who never verbalized during baseline. (7) A larger percentage of students decreased their participation during self-recording than during the point phase. (8) The administration of points did not result in comments of different content than those during baseline or those in the Control group. (9) Neither the point contingency nor self-recording significantly affected the length of student comments.

Suggestions for further research were provided.

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CHAPTER I

INTRODUCTION

Why do some students remain nonverbal during class discussions? Available research explains this reticence in several ways. Reticence may result from insecurity over making unacceptable responses, lack of knowledge in the subject area, or fear of being unable to communicate clearly (Applegate, 1969; Securro, 1971). The behavioral approach upon which the present study was based defines the lack of verbalization as a result of inadequate past and present reinforcement (Meacham, 1971). Regardless of the causes, entire school systems are presently being designed around the learning technique of frequent classroom discussions (Glasser, 1969). Thus the basic issue becomes that of how to design expedient programs for increasing students' rates of verbal exchange. Surprisingly, educational psychologists have directed virtually no attention to the application of behavioral technology to this widely shared aspect of their professional lives--college classroom interactions (Johnston & Pennypacker, 1971).

Importance of Group Discussion

As inappropriate behavior has been traditionally defined as behavior that interferes with order, quiet, and stillness, the goal of increasing verbal emissions might first warrant empirical justification (Winett & Winkler, 1972). Many researchers have questioned whether

silence is a desirable characteristic for classroom learning or for societal group situations. Data indicate there is a high positive correlation between an individual's own self-concept regarding his discussion skills and the concept that his peers have of him (Crovel, 1955; Goldman, 1972). Similarly, high participators, regardless of age or sex, received more nominations for top scholar, leader, and popular class member than low participators (Ahlbrand, 1970). These data, of course, do not imply a cause-effect relationship. Research did indicate, however, that when reticent students increased their verbal output, a significant rise in their sociometric status occurred (Bavelas, 1965). Thus there is evidence that reinforcing students for their increased verbal behaviors can improve their self-concepts and status with their peers.

Research with juvenile delinquents (Sarason & Ganzer, 1973) indicated that participation in discussion groups prompted more positive attitudes, behavior change, and less recidivism among participants than control group subjects. Other research (Schroder, 1974) revealed that college students who participated in group discussions expressed more positive attitudes towards the instructor and the course than the students who were in the lecture-format sections of the course. The researcher attributed this phenomenon to the possibility that the congenial atmosphere provided for the social needs of students with high social needs, while not discriminating against those with lower social needs.

Further data suggest the advantages of group discussions for more universal goals. People who participated in one community discussion

series reported becoming more open-minded and becoming more active in other group situations (Ford, 1969). Findings at Northwestern indicated that discussion courses produced decreases in dogmatism ratings (Larson & Gratz, 1970). In the domain of racial conflicts, black and white students who participated in a six week inter-group discussion program related more effectively together afterwards (Williams, E., 1972). When video-tapes of class discussions were exchanged between schools of different racial and cultural compositions, students reported that they had developed a better understanding of people from different environs and an awareness of the importance of communicating through discussion (Dash, 1969).

Learning retention and school success also seem to be highly correlated with participation in group discussions. Larson demonstrated that students who participated in discussions learned the content better than those who merely listened to debates (Larson, 1971). In college classes, student-led groups gained and retained more improvements on test scores than instructor-led groups. The advantage was attributed to the fact that students participated more frequently in the student-led groups (Clement, 1971). Other data show that assessments by observers regarding the success of class discussions are directly related to the students' rates of participation (Hopkins, 1971). Not surprisingly, the degree of verbal behavior is often erroneously regarded by educators as an index of a student's intelligence (Meachan, 1971). Such erroneous assessments could result in harmful stereotyping, affecting both the style and quality of the teacher's behavior within

the classroom. Certainly, then, there is credibility in the assumption that increasing students' verbal output during discussions could have invaluable repercussions for our societal and educational processes, as well as for the students themselves.

Mechanical Reinforcement of Discussion

Historically research on group discussions has been directed toward such topics as relevancy, status of the leader, and group size. However, since the demonstration that verbal responses can be operantly conditioned (Greenspoon, 1951), two approaches to the delivery of reinforcement have become prominent: the mechanical and the social.

Various researchers have employed lights as the mechanical feedback, contingent upon the subjects' verbal responses during group discussions. The earliest studies reported that the amount of target verbalization could be increased significantly by flashing a light which signified a commendable response (Aiken, 1963; Oakes, 1962). Further data suggested that the lights had to be contingent upon the verbal behaviors, rather than administered at predetermined intervals; and that the lights could be used to decrease verbal output of dominant students (Bavelas, 1965). A tone, defined as signifying approval, also has been used successfully to increase verbalization of subjects (McNair, 1957). More recent research hypothesized that verbal output of university students would increase with presentation of lights, which signified that the speaker had emitted a facilitating comment (David, 1972). The resulting data showed that students' rates of responding did increase and that the behavior did not return to baseline after the lights were

withdrawn. Thus mechanical feedback has repeatedly demonstrated its potential for increasing members' comments during discussions.

Social Reinforcement of Discussion

More popular in the literature, however, are the studies utilizing social, verbal delivery of reinforcement. A comparison of social versus mechanical delivery of reinforcement indicated that contingent group social approval was more effective than the mechanical light for increasing verbal behaviors in discussion groups (Goldman, 1972). Studies on social approval have confirmed the efficacy of contingent verbal rewards from a teacher, counselor, or group leader (Alsworth, 1972; Evans, 1971; Hardy, 1972; Krasner, 1958; Krumboltz, 1973; Sarbin, 1968; Shephardson, 1972; Skinner, 1957; Trezie, 1972; Zurita, 1966). Data even suggest that this verbal approval is effective with students of superior intelligence and achievement (Atkinson, 1973). Social approval was also equally effective in increasing verbal participation with open and close-minded group members (Alexander, 1967). An elaborate mechanical means of providing subjects with immediate social praise has also been successfully used. Students, wearing an earphone during discussions, received praise from an outside observer (Vogel, 1970); and their verbal participation increased.

Furthermore, a stepwise regression analysis from other research indicated that the frequency of teacher verbal approval was directly related to grade level (Friedman, 1972). This research showed that students received more positive attention from teachers and were more verbal in the first seven grades of school. Thereafter, both the

amount of teacher praise and the rate of students' verbal output decreased through grade twelve. The class of verbal responses used in these studies on social approval included statements such as: mm-hmm, good, right, okay, and paraphrases of students' comments. As delineated by Cook (1968) and others (Ginot, 1969; Hunter, 1970; Krumboltz, 1973; Williams & Anandam, 1973), there is now a sizeable body of literature devoted specifically to training educators in the effective use of social approval.

In addition to increasing response rates, operant conditioning has successfully controlled the content of responses (Greenspoon, 1951; Verplank, 1955; Wilson, 1956). Social approval by the subject's peers has also increased the rate of verbal participation (Backrach, 1961; Pepinsky, 1958). Loree (1960) demonstrated, however, that practicing discussion skills without being praised afterwards did not have a significant impact on the subjects' response rates. The experimental group participated in a general discussion about its class performance, then received verbal praise while viewing a videotape of their discussion. The control group simply participated in a discussion about the processes involved in group discussions, but received no praise or videotape viewing. The experimental group improved significantly in future discussions, while the control group showed no significant improvement in their response rates.

In all of these studies involving social approval, the subjects had to be cognizant of the approval before the verbal behavior increased. Data show that when subjects are unaware of the contingencies or are

unable to perceive the intended reinforcer, few increases in verbalizations occur (Herson, 1970; Mandler, 1956; Spielberger, 1962; Williams, J., 1964).

Self-Recording and Token Systems

Token economy systems are not greatly affected by the failure of subject awareness, since the rewards are more tangible than social praise. A token system, similar to that used in the present study, successfully increased student verbalizations, although the groups involved were subdivisions of the entire class of thirty (Zuberbier, 1971). The researcher's eighth grade subjects, divided into discussion groups of six, functioned under three treatment conditions. Subjects under the first condition were merely instructed to participate equally in a discussion. The second group of subjects awarded themselves poker chips for each verbal response, and the third group functioned with neither instructions nor tokens. The token condition yielded the highest rates of verbal responses, followed by the instructed group. Some maintenance of treatment effects was shown during posttreatment discussion sessions. Application of this principle has also been shown effective with hospitalized adolescents (Zweback, 1972). Tokens were presented to the eight group members contingent upon statements focusing on their own problems. Verbalization was predictably controlled through differential use of the tokens. The verbal behaviors of the typically nonverbal adolescents were shaped and were eventually supported by peer social approval.

A variation of this token procedure most similar to the present study was conducted with an entire class of thirty junior high school students (Fotos, 1968). The program involved both self-recording and token rewards. Each group member received a copy of the class seating arrangement before the discussion began. Students were then instructed to place a mark by the appropriate person's name when he or she contributed verbally to the discussion. Each student also recorded his or her own responses. The instructor also explained that a grade would be administered to each student at the end of the discussion contingent upon the frequency, not correctness, of his or her comments. At the close of the discussion, each student tallied his own marks, conferring with other members for accuracy. No punishment was administered, although the less verbal members were called upon more often by the instructor to enable them to contribute. Although this contingency program was not conducted under research conditions, the teacher reported paramount increases in the students' rates of verbal responding. Since the results of Fotos' program were not recorded by objective observers, nor compared with individual baselines, generalization of his findings need further empirical verification.

However, there are further data which lend objective support to Fotos' subjective conclusions. A study by Page (1973) revealed that students who set daily participation goals and recorded their rate of responding did increase their verbal output. In another study three recording strategies were utilized with undergraduates (Securro, 1971). Under the first condition, students recorded their own rates of

responding. To control for the Hawthorne effect, the subjects were told that the study was to check the reliability of students' recording behaviors. Under the second condition, the instructor recorded students' rates of responding without their knowledge; and under the third condition, both the instructor and students recorded. The results indicated that increased talking was dependent upon sensitizing the subject by the self-recording method to the fact that he was or was not contributing to the discussion. This finding is also consistent with the previously cited research showing that the subject's awareness of contingencies seems essential for increasing his rate of responding (Hersen, 1970; Mandler, 1956; Spielberger, 1962; Williams, J., 1964).

Statement of the Problem

Studies employing tokens and/or recording, however, have not answered questions related to the content of the students' responses, maintenance of treatment effects, or the effectiveness of a token program on an entire college class. The majority of previous studies have dealt only with the quantity of responses in small group situations. The present study, therefore, was designed as an attempt to integrate these issues into a token reinforcement program for undergraduates in a discussion oriented course. Specifically, this investigation sought to examine the following issues: (1) whether administering a contingent point system would significantly increase college students' rates of responding; (2) whether the point system would increase the percentages of students responding; (3) whether the content of responses would vary under reinforced and baseline conditions; (4) whether response rates would

return to baseline during reversal; (5) whether the length of responses would vary under the reinforced and baseline conditions; (6) whether the process of self-recording without the token rewards would affect the dependent variables; and (7) whether students' attitudes toward the contingency system would be favorable or unfavorable after treatment.

The questions of prime importance were whether the students' response rates would increase under the treatment conditions and whether greater numbers of students would respond under the point system. The questions regarding content, length, self-recording and transfer effects simply supplied additional data concerning the extraneous effects of the token system. The instructors explained the contingencies to the students, but did not attempt to elicit responses from the less verbal subjects through questions specifically directed to them. Neither were the subjects divided into small groups, as research has already demonstrated a positive correlation between group size and rates of responding (Hobbs, 1970).

CHAPTER II

METHOD

Subjects and Setting

The study was conducted in three undergraduate classes at The University of Tennessee, Knoxville. Sixty-two students in the adolescent psychology classes, twenty-five males and thirty-seven females, served as subjects. The subjects ranged in age from eighteen to twenty-four and were in their sophomore, junior, or senior year of study. The classes met for seventy-five minutes two days a week for ten weeks.

The two instructors were doctoral students in the Department of Educational Psychology and Guidance who were familiar with the principles of behavior modification. These classes were selected because the instructors, aware of the effects of social approval on students' response rates, could more easily control the consistency of their reinforcing behavior than instructors not familiar with the operant approach. Two of the classes were scheduled on the same days of the week; one at 10:30 and the other at 1:30. The third class met on consecutive days at 8:30 A.M.

Rating Student and Peer Responses

Eight graduate students in the Department of Educational Psychology and Guidance served as observers for the three classes. Two observers were present during each class discussion. A pair of observers was

permanently assigned to each of the three classes for the entire quarter, and two observers served as alternates. During a discussion, each observer sat across from the ten or eleven students he or she was assigned to observe throughout the quarter. The instructor and students were arranged in a circle according to a prearranged seating chart which remained permanent throughout the study. Confusion regarding the identity of the subjects was minimized by giving the observers a copy of the seating chart for referral during each observation. Data were collected for all sixty-two students in the three classes for the entire study.

Each observer had recording forms on which to categorize each student's response as "brief", "average", or "long". "Brief" signified a response of less than five seconds; "average" a response of five to twenty seconds; and "lengthy" a response of more than twenty seconds. Beneath the spaces for recording the response length, three other blanks were allotted for recording the content of responses. The content was measured on a nominal scale by categorizing comments into three divisions: (1) comments which asked questions; (2) comments which provided information not previously discussed; and (3) comments which provided a specific example to illustrate an idea. The observers then marked one, two, or all three of the appropriate blanks after the students responded, depending upon how many categories the response fulfilled. A portion of this form with hypothetical data is illustrated in Figure 1. If the student's response did not fulfill any of the three categories, the spaces remained empty. The length of the response,

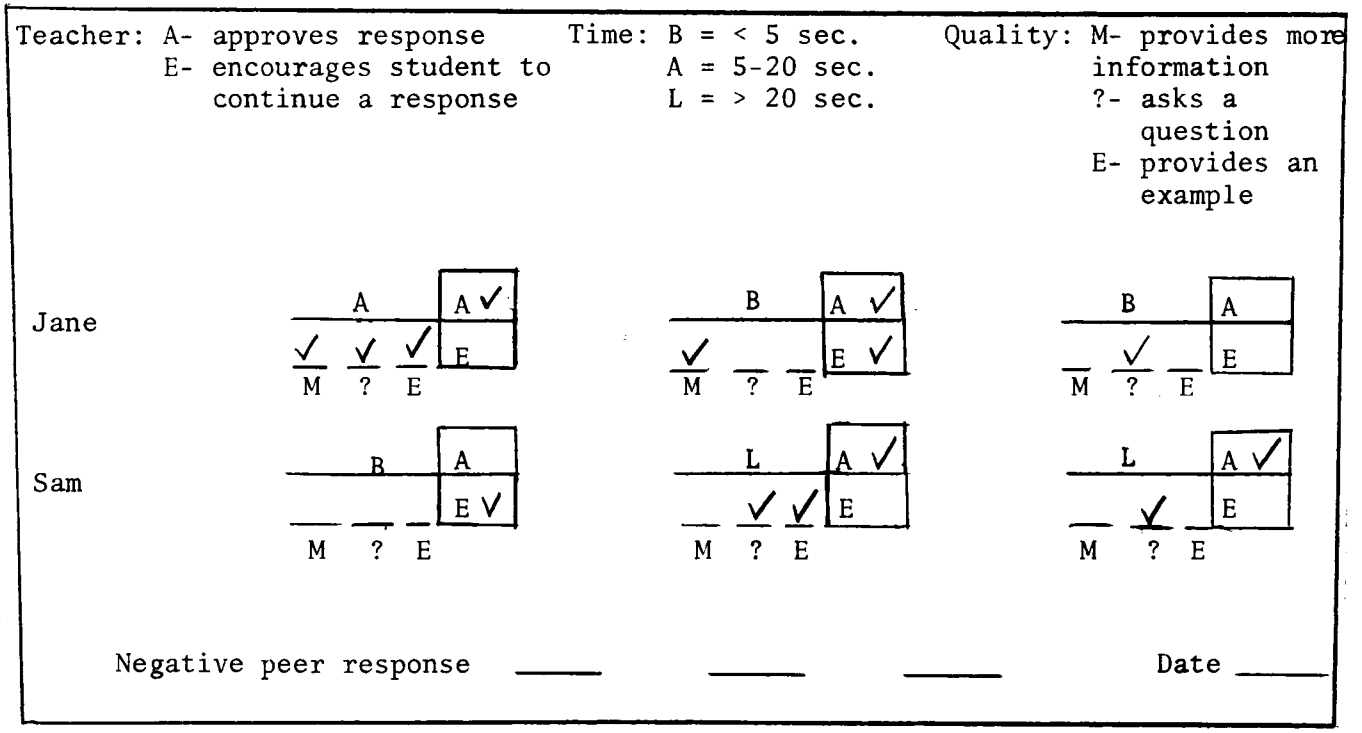

Figure 1. Sample portion of student behavior rating form with hypothetical data.

however, was still recorded. These empty blanks indicated that, although a student responded, the comment did not meet minimum quality criterion in any category. Comments which received no ratings in any of the three categories were labeled as "unclassified" in the results section of the present study (see Appendix A).

The student behavior recording form (Figure 1) also included a category for negative peer responses which might decrease rates of participation for other class members. Examples of responses which were to be recorded in this category are included in Appendix A.

In order to ensure that subjects remained naive to the experiment, the E instructed observers not to discuss the study with the undergraduates enrolled in any section of the course. The two instructors gave the following information to their students at the beginning of the quarter:

> During this quarter we will have two visitors with us who, in studying effective teaching methods, will be observing and recording some of my behaviors. These visitors will not be participating in our class activities or discussions; but please leave space for their chairs outside our circle.

Rating Teacher Behavior

The two observers in each of the three classes also recorded the instructors' responses during class discussions. The instructors' verbalizations were recorded in four categories: (1) higher and lower order questions (see Appendix B); (2) verbal disapproval of the student's response; (3) specific approval of the student's response; and (4) statements which encouraged the student to continue his response (Appendix C).

Although the two teachers were instructed not to disapprove students' responses, the observers were trained in how to record any teacher comment which occurred in this category (see Figure 2).

After each day's class, the experimenter notified teachers if their behaviors in any of the categories were deviating excessively from the mean behaviors during that phase of the study. This feedback system was initiated to ensure more consistency within and between phases of the study for each instructor's behaviors; thereby, reducing the possibility of teacher behaviors confounding the effects of treatment.

Observer Training and Reliability Checks

Observer training consisted of two phases, both conducted in the quarter prior to the study. In the first phase, the experimenter explained the recording procedures and methods for categorizing student, peer, and teacher responses. Then the experimenter and observers listened to simulated audio tapes of student and teacher responses and recorded their observations according to the categories on the observation forms (Figures 1 and 2). Interrater reliability was established in this phase by dividing the number of agreements between observers and experimenter by the total number of agreements plus disagreements. The percentage of agreement between each of the eight observers and the experimenter was first computed for each of the eleven student and teacher behaviors identified in Figures 1 and 2. Then a mean percentage of agreement was derived for each observer and the experimenter by combining the percentages of agreement from all of the eleven categories. The categories of behavior upon which the mean percentage of agreement

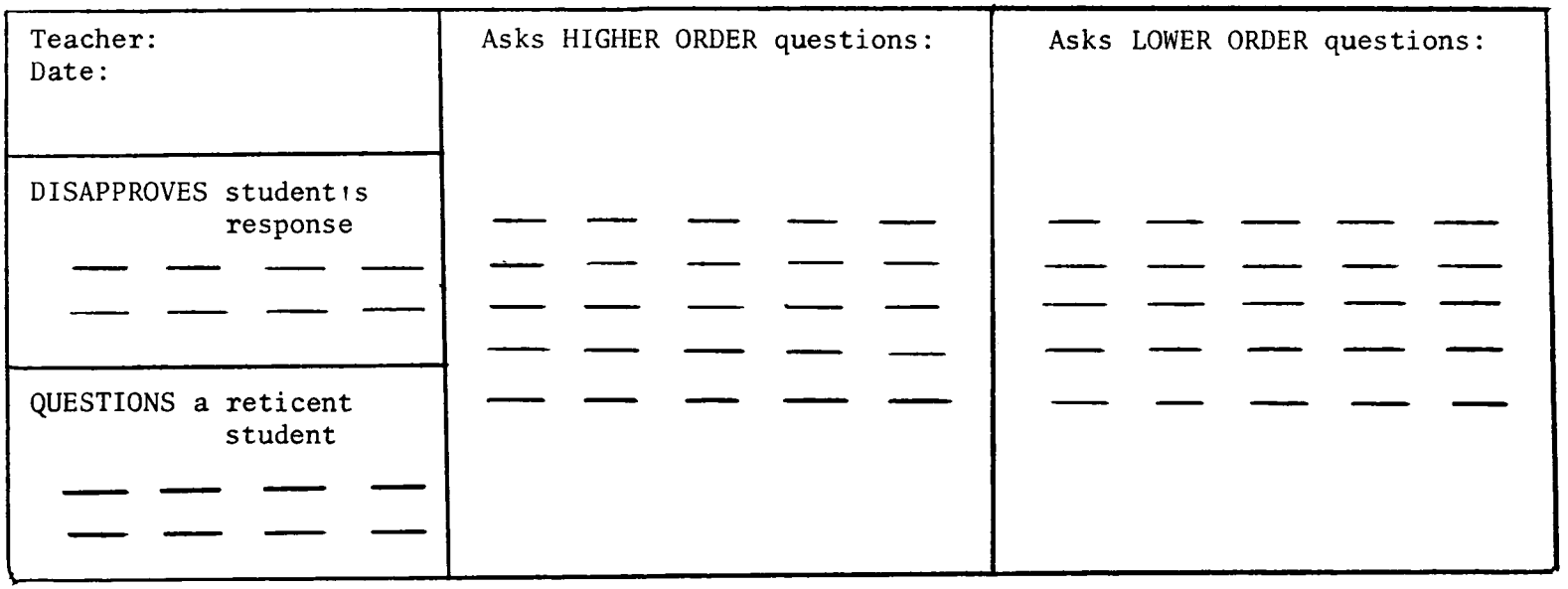

Figure 2. Sample rating form for teacher behaviors.

was based both prior to and during the study included: length of student comment, teacher approval, teacher encouragement, student comments which asked questions, student comments which provided an example, higher-order teacher questions, and lower-order teacher questions. Three categories which were included in the reliability ratings prior to the study, but which did not occur during the study were: negative peer responses, teacher questions to a reticent student, and teacher disapproval of a student's comment. The ranges of observer agreement are provided in Appendix D. The observers and experimenter had to achieve an agreement of 85 percent for six five-minute segments of responses (see Appendix D).

In the second phase of training, the experimenter and observers simultaneously observed actual class discussions. During these observations, the observers and experimenter recorded behavior according to the categories in Figures 1 and 2, pages 13 and 16. After the observation, the experimenter and subjects checked their responses and discussed the discrepancies. This second phase of training continued until interrater reliability was established by observers achieving an agreement of 85 percent for three consecutive fifteen-minute classroom observations (see Appendix D).

In addition to the checks for interrater reliability during the training sessions, reliability was computed at various times throughout the study. These reliability ratings were collected bimonthly by having all observers rate thirty-minute audio-taped discussions and by obtaining an agreement of 85 percent for each five-minute segment of the tape

(Appendix D). Reliability during phase two of training and during the actual study were computed by the previously explained method used during the first phase of training.

Experimental Procedures

The overall design of the study involved both inter- and intra-subject comparisons. Data were recorded for all sixty-two students during class discussions throughout the ten-week quarter. These discussions were prescheduled in order to occur with equal frequency and duration throughout the different phases of the study. The first forty-five minutes of each class meeting were used for audio-visual presentations or readings by the teacher. The last thirty minutes were used for the class discussion. The classes discussed the same materials and issues questions at the same time in the quarter, as designated by a calendar and syllabus to which each instructor adhered as closely as possible. The chances of students' response rates differing as a result of different content or opportunities to verbalize, therefore, were minimized. Furthermore, all students were presented the course readings. outside speakers, audio-visuals and tests on the same schedule. This provided further equality among the subjects regarding their exposure to the materials.

Treatment Implementation: Point Contingency

The two instructors did not inform the students in any way regarding the content, frequency, or length of their responses. The students received four points contingent only on responding once per class. Further instructions would have confounded the reliability of data

regarding the dependent variables. The instructors gave the following directions in written and oral form to two of the three classes on the first day of class:

> The majority of our class meetings will be devoted to class discussions based upon your personal opinions of the readings, speakers, films, and issues questions described in your course syllabus. During the class periods designated on your calendar, you will receive four points for verbally participating in the discussion (in addition to the one point which you will receive throughout the quarter for just attending class). These points will be added to the others which you have accumulated throughout the quarter from activities outlined in your syllabus; and your final grade will be computed. There is no penalty for not participating verbally or for not attending class, since you may still earn this same credit through other activities described in your syllabus. Although your verbal participation will not be formally rewarded on the days other than those designated on your calendar, the most stimulating discussions are those in which everyone contributes; rather than those in which the teacher is expected to "entertain" you for the entire meeting. Your contributions to our discussions are valuable.

At the end of each class period during the contingency phase of the study, students handed the instructor their self-recording forms (see Figure 3). The students received the following instructions prior to the days during which the point system was in effect:

> During the next six class meetings you will be receiving four points each day for contributing to our class discussion. Please record your attendance and participation on the form and return the form to your teacher each day as you leave.

Treatment Implementation: Self-Recording System

The Control group, which received no points, performed self-recording during one phase of the study (see Figure 4). The following oral and written instructions were given on the first day of class.

> The majority of our class sessions will be devoted to class discussions based upon your personal opinions of the readings, films, speakers, and issues questions described in

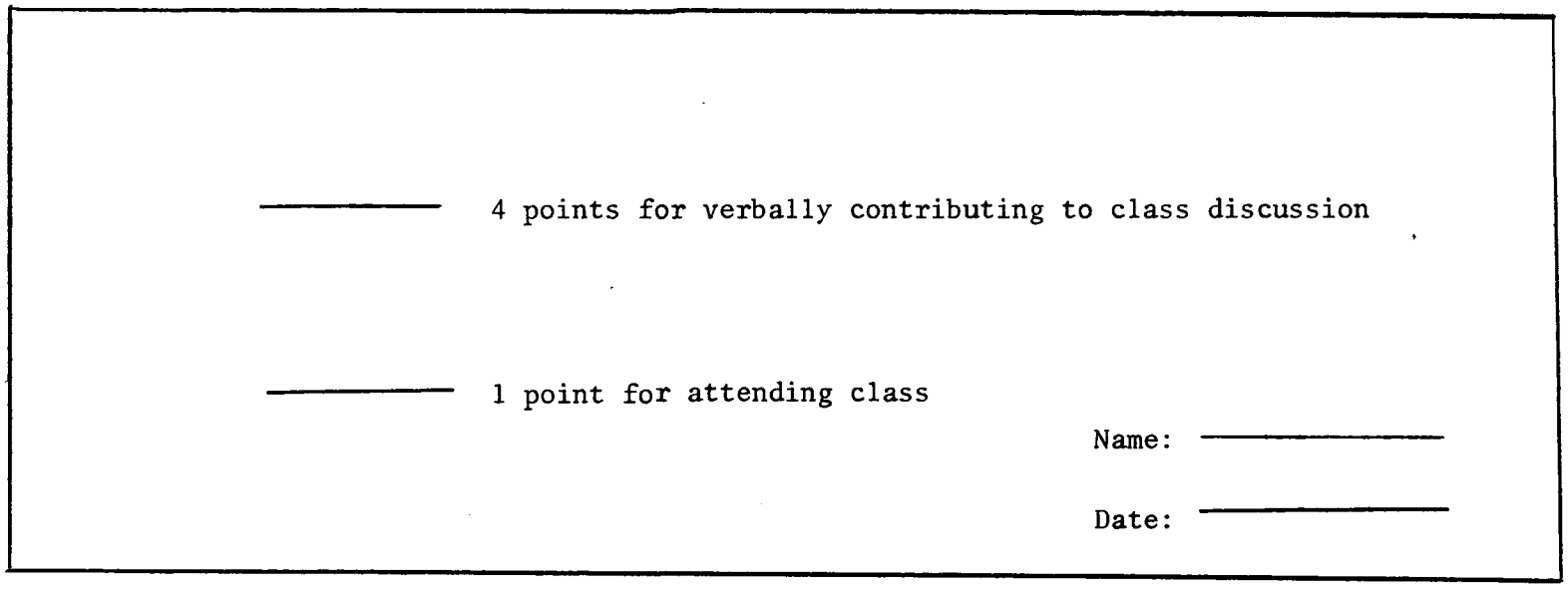

Figure 3. Sample student self-recording form for two groups receiving points.

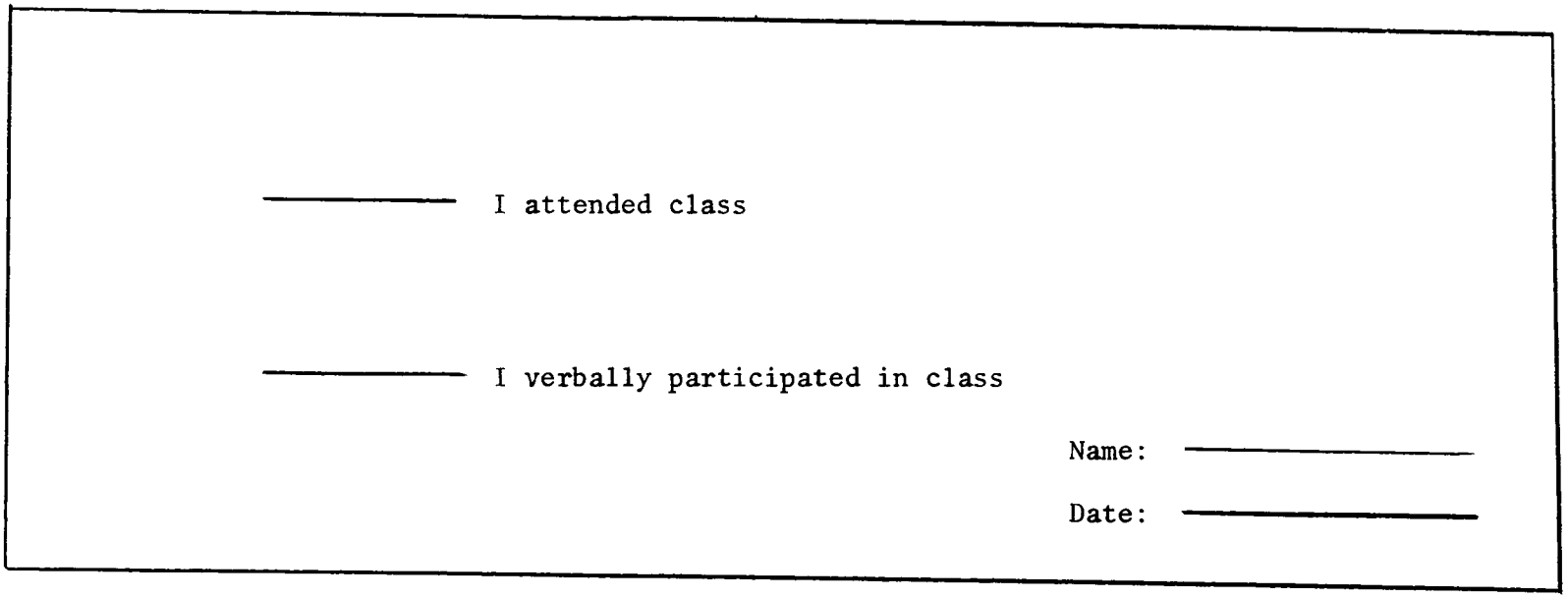

Figure 4. Self-recording form for control group.

> your course syllabus. You will receive one point for each class meeting which you attend. There is no penalty for not attending class, since you may earn this same amount of credit through other activities described in the syllabus. Although your verbal contributions during class discussions are not formally evaluated in any way by the teacher, the most stimulating discussions are those in which everyone contributes, rather than those in which the teacher is expected to "entertain" you for the entire meeting. Your contributions to our class discussions are valuable.

This control condition was included in the study in order to assess the effects of self-recording on the dependent variables. Since previous research had suggested that self-recording alone increased verbal response rates (Fotos, 1968), this process needed to be assessed so that the potency of points as a reinforcer would not be confounded by the self-recording behavior. The Control group received the following instructions prior to the phase in which they performed self-recording:

> For the next few weeks you will be recording your own class attendance and participation. There is no reward for verbalizing; and no penalty for not verbalizing. Please return your form to the teacher as you leave each day.

Assignment of Treatments

There was random assignment of treatments to in-tact groups. Since random assignment of subjects to groups was not possible, baselines were collected for all sixty-two subjects as a means of assessing homogeneity within and between groups. The Control group and one treatment group were taught by the same instructor. The second instructor taught the other treatment group. The three classes underwent treatment and self-recording conditions as illustrated in Figure 5.

As Figure 5 indicates, groups 1 and 2 received points for participation at different times during the study. This multiple

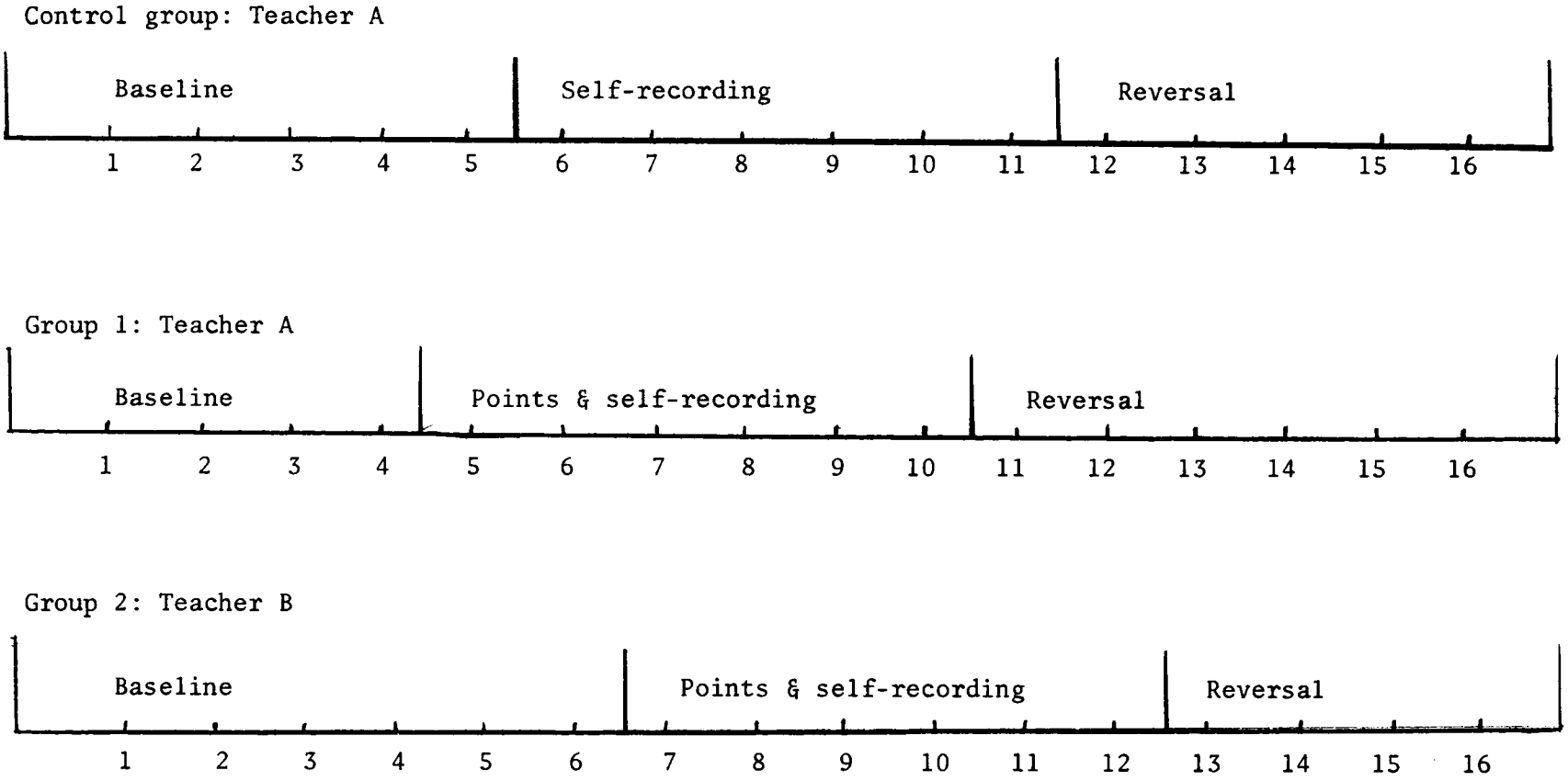

Figure 5. Delineation of experimental conditions.

baseline technique was utilized to demonstrate that changes in the dependent variables were functions of the treatment condition, rather than functions of extraneous variables. If the treatment conditions had been implemented simultaneously, extraneous variables (i.e., campus activities, national events, course examinations) could not have been discounted as possible explanations for student behavior changes.

Attitude Questionnaire

In order to answer the research question regarding students' attitudes toward the point and self-recording systems, the experimenter designed an attitude questionnaire (Appendix E). The questionnaire was administered to all students at the conclusion of the study after course grades had been calculated. This enabled students to freely express their opinions without fear of teacher retribution. The major issues which the questionnaire addressed were: (1) whether the point system should be used in college classes, (2) whether the point system decreased enjoyment of the discussions, (3) whether students believed they would be more verbal in the future, and (4) whether students attributed their participation increase to the points.

CHAPTER III

RESULTS

Data regarding student and teacher behaviors for all three groups are presented in four forms. (1) Histograms, based on mean percentages, are utilized to indicate changes in the content and length of students' comments during all phases of the study: baseline, treatment, and reversal. (2) Mean frequencies and percentages of teachers' behaviors during each phase are presented in tabular form. (3) Data regarding the efficacy of the self-recording and point systems for increasing the frequencies and percentages of student response are descriptively presented in discrete curves (line graphs). (4) These data were also analyzed via nonparametric tests. The resulting data for all three groups indicated significant behavioral changes during various phases of the study.

Students' attitudes toward the study and toward discussions in college classes were measured by a questionnaire (Appendix E). The resulting data were analyzed by frequency distributions which compared subjects whose behaviors had decreased, increased, or remained unchanged during the self-recording or contingency phases of the study.

Percentage of Student Participation

Point system vs. self-recording. The efficacy of the point system for increasing the numbers of students participating during class

discussions can be visually ascertained by examining Table 1 and Figure 6. In Figure 6 the circled dots indicate days during which students received points for participation. In both groups which received points for participation, the percentage of students verbally participating in the class discussions increased.

TABLE 1

MEAN PERCENTAGE OF STUDENTS PARTICIPATING DURING EACH PHASE

	Baseline	Treatment	Reversal
Control: Self-Recording	46	47	50
Group 1: Points	60	90	54
Group 2: Points	72	86	80

Previous research indicated that the mere process of self-recording might increase the behavior being recorded (Page, 1973; Securro, 1971). This hypothesis was tested with the control group. The control group received no points for participation at any time during the study. As indicated descriptively (Table 1 and Figure 6), the percentage of students verbalizing in discussions did not increase during the self-recording phase.

In addition to the descriptive analysis, nonparametric statistics were used to determine if the observed differences within each of the three groups were significant between the baseline and treatment phases. This was accomplished by averaging the number of days each student in the three groups responded in discussion during the baseline and

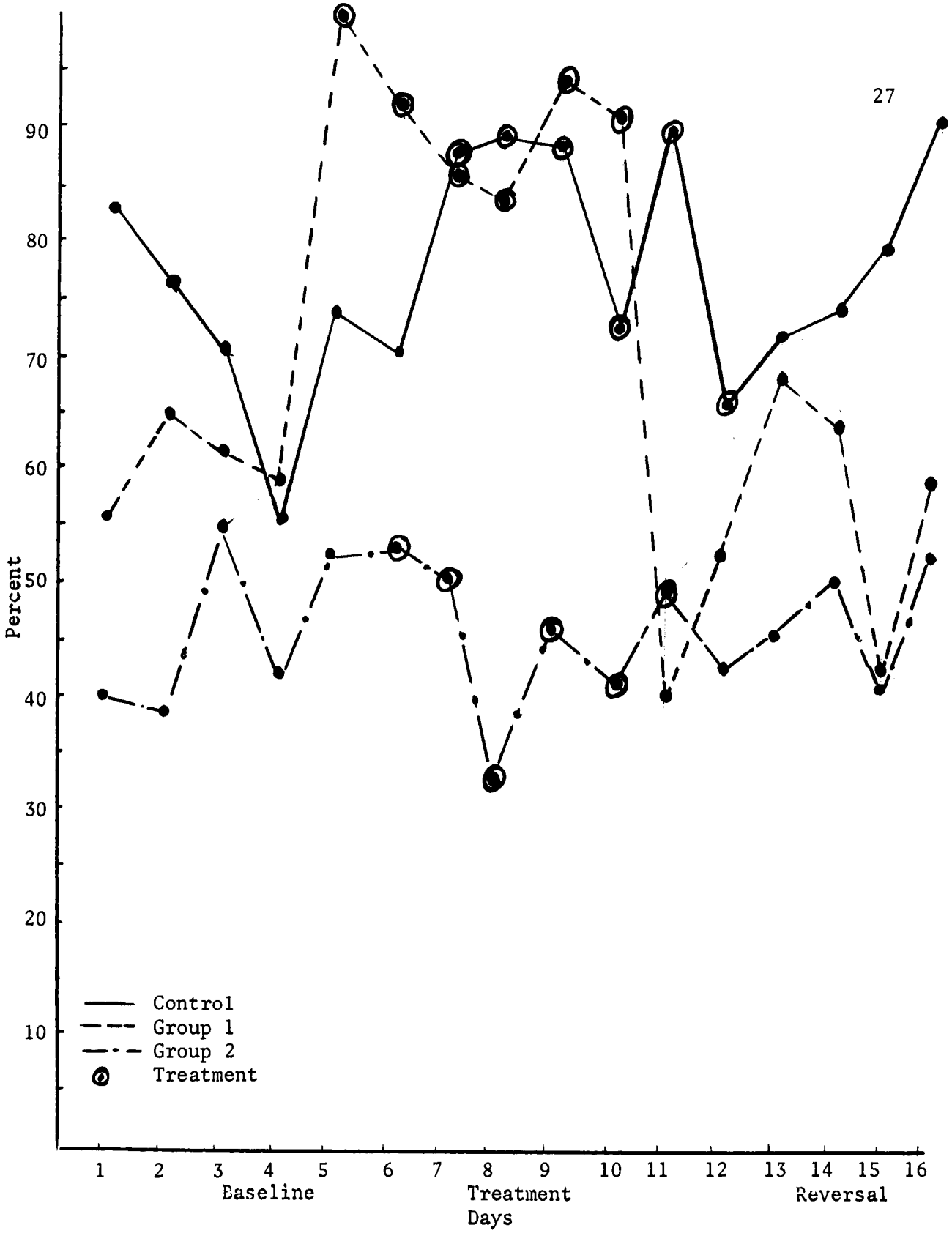

Figure 6. Percent of students responding in thirty-minute discussion for all groups throughout all phases.

treatment phases. Three Friedman Two-Way Analysis of Variance by Ranks tests (Siegel, 1956, pp. 166-172) were then applied. The results of the tests substantiated significant differences for Group 1 (X_r^2 = 11.6, p = .05, critical = 3.8); but no significant differences for the Control group (X_r^2 = 0) or Group 2 (X_r^2 = 3.4). The Wilcoxon Signed Ranks Tests (p = .05) were than applied to probe specific differences between the three phases for Group 1. The results of the Wilcoxon (Table 2) indicated that the point system was superior to the baseline condition for increasing percentage of students participating; however, the reversal and baseline behaviors were not significantly different. The results can be summarized as follows: for the Control group, baseline = self-recording = reversal; for Group 2, baseline = points = reversals; and for Group 1, points > baseline = reversal. It should be noted, however,that Group 2 approached significance.

TABLE 2

RESULTS OF THE WILCOXON MATCHED PAIRS SIGNED RANKS TEST FOR PERCENTAGE OF STUDENT PARTICIPATION IN GROUP 1

Two by Two Phase Comparison	T	Level of Confidence	Statistically Superior Treatment[a]
Baseline X Points	13	.05	points
Points X Reversal	15	.05	points
Baseline X Reversal	40.5	.05	neither

[a]Condition with highest number of students participating in discussion.

Neither the Friedman nor Wilcoxon tests, however, account for the magnitude of differences between conditions. Further descriptive data are therefore necessary to establish precisely the effects of the point and the self-recording systems. For example, as indicated in Table 3, of the 23 percent of students in Group 1 who did not participate at all during the first phase of the study, none remained reticent throughout the phase when they were rewarded with points. This was in contrast to 14 percent of the students who remained quiet during all class discussions in the self-recording Control Group.

TABLE 3

PERCENTAGE OF STUDENTS WHO NEVER PARTICIPATED IN DISCUSSIONS

	Baseline	Treatment	Reversal
Control Group	14	14	14
Group 1	23	0	0
Group 2	0	0	0

These data show that the point system was far superior to self-recording in that none of the reticent students in Group 1 returned to their original silence during the treatment or reversal phases.

Other data related to the efficacy of the self-recording and the contingency systems can be seen in Table 4. These data are based on the percentage of days during each phase that the various S's participated in the discussion. Although the point system resulted in a decrease in participation for 9.5 percent of the students, a significantly larger

percentage (29 percent) of students decreased their participation in the Control group during the self-recording phase.

TABLE 4

MEAN PERCENTAGES OF STUDENTS PARTICIPATING FROM BASELINE TO TREATMENT PHASES

	Participation Decreased	Increased	No Change
Control Group	29	42	29
Group 1	4	56	40
Group 2	15	59	26
Groups 1 + 2	9.5	57.5	33

Of particular interest in Table 4 were the students who composed the categories of "no change in participation" and "participation decreased." Individual data of these students provided additional information relating to their atypical behaviors in comparison to their respective groups.

Subjects whose participation decreased with points. The four students composing the 9.5 percent whose participation increased when points were administered were all males. The extent of their decreases, however, was relatively minor when daily responses were considered (Table 5).

To help explain the decreases in participation of these four atypical students, their attitudes toward the point system and class discussions were ascertained from the questionnaire administered at the end of the study (Appendix E).

TABLE 5

NUMBER OF DAILY RESPONSES FOR STUDENTS WHOSE PARTICIPATION DECREASED FROM BASELINE TO POINT PHASE

	Days											
	Baseline						Points					
Subjects	1	2	3	4	5	6	1	2	3	4	5	6
Tom	4	0	0	0	4	0	0	0	0	0	0	5
Bill	8	4	11	9	6	22	12	0	abs.	11	11	0
William	2	1	1	0	7	2	2	2	0	0	0	1
Joe	4	1	9	ab.	-	-	abs.	1	1	0	0	3

Tom was the only student of the four who stated that his hostility toward the point system "caused" his reticence. On the questionnaire he indicated that the point system should not be used again in college classes, lessened the quality of discussions, and decreased his enjoyment of the discussions. He also stated that he learned more from listening to discussions, than from participating in them. He also wrote: "To me the point system was repulsive and in no other class did I have a problem communicating." This student also evaluated the entire course as "useless". Obviously his dissatisfactions extended beyond the point system.

Bill also stated that he did not like the point system; however, he explained that points did not lessen his enjoyment or the quality of the discussions. This student also responded that the class discussions were always meaningful to him. Furthermore, although disliking the point system, Bill stated that he had been more verbal in this class

than in any other college classes, and that he believed he would be more verbal in the future as a result of participating in these class discussions.

The last two students, Joe and William, rated the contingency system favorably and stated that other classes should use the points. On the questionnaire, neither expressed any negative attitudes towards the points or towards the class discussions. Both also stated that they had been more verbal in this class than in any others and that this verbalization had been facilitated by the administration of the points. Thus the slight decrease in the participation of these two students does not seem related to the point contingency.

Subjects whose percentage of participation was unchanged with points. As previously indicated (Table 4), 33 percent of the students who received points for participating in discussions did not change their percentage of daily participation from baseline to the treatment phase. This 33 percent was composed of fourteen students from treatment Groups 1 and 2. Of these fourteen, thirteen participated every day during baseline and treatment. These data imply that those students who underwent the least amount of change as a result of the administration of points were individuals who were quite verbal during baseline--students who did not need any extra incentives to participate. However, the frequency of responses within each discussion period did increase slightly for half of these fourteen students, even though their percentage of daily participation remained unchanged (Table 6). The administration of points, therefore, did affect the behaviors of some consistently verbal students.

TABLE 6

MEAN NUMBER OF DAILY RESPONSES FOR CONSISTENTLY VERBAL STUDENTS WHOSE RESPONSE RATE INCREASED DURING THE POINT PHASE

	Baseline	Points
Nancy	7.3	8.7
Joe	8.1	9.6
Debby	7	8.2
Anita	.75	2.2
Deborah	3.5	4.3
Joel	6.5	15.7
Suzanne	2.3	3.2

Subjects whose participation increased with points. The majority of students in the two treatment groups (57.5 percent) increased their participation during the point phase. As indicated in Table 7, the overwhelming majority of students reported that their verbal behaviors had increased as a result of the point system and that they were more verbal in this class than in their other classes. An examination of the data from Table 7 indicates that the students rated the contingency system and its consequences positively. Students were in favor of using the system for increasing participation in other college classes.

Subjects whose participation decreased with self-recording. Six students, 29 percent of the Control group, decreased their rate of responding from baseline to the self-recording phase (Table 8). On the questionnaire administered at the end of the quarter, five of these students expressed pleasure with their participation in the discussions and with the quality of the discussions. No negative comments were

TABLE 7

ATTITUDE QUESTIONNAIRE: PERCENTAGE OF STUDENT RESPONSES FROM GROUPS WHO RECEIVED POINTS FOR PARTICIPATION[a]

Statement	Students Whose Participation Increased (N=23)	Students Whose Participation Was Not Changed (N=14)	Students Whose Participation Decreased (N=4)
Points increased my participation	85	70	75
The point system should be used in other college classes	75	85	50
I am more verbal here than in my other classes	85	100	75
I think I will be more verbal in future classes than I was before	85	100	75
I want to be a more verbal person	95	93	75
Discussions are meaningful to me in college classes	95	93	100
The point system lessened my enjoyment of discussions	0	10	25
The point system lessened the quality of our discussions	10	7	25

[a]All percentages indicate affirmative answers to the statements on the questionnaire.

TABLE 8

NUMBER OF DAILY RESPONSES FOR STUDENTS WHOSE PARTICIPATION DECREASED DURING SELF-RECORDING

	Days									
	Baseline					Self-Recording				
	1	2	3	4	5	1	2	3	4	5
Jim	4	2	5	4	3	5	0	ab.	ab.	0
Ming Kai	2	4	1	0	3	3	0	2	0	0
Mike	0	0	3	4	2	0	1	0	0	ab.
Patsy	3	6	0	0	2	ab.	0	0	4	2
Phil	0	0	1	1	0	1	0	0	0	0
Marian	18	11	14	17	7	12	6	0	ab.	21

expressed toward self-recording; thus the decreases in their behaviors were probably attributable to factors other than self-recording. One student, however, indicated that the self-recording made her aware of her dominance in the discussions. Marian, therefore, consciously attempted to decrease her verbalizations during the self-recording phase.

Subjects whose participation was unchanged in self-recording. Six students' (29 percent of the Control group) behaviors remained unchanged during self-recording. Four of these students remained reticent throughout the entire baseline and self-recording phase. The other two S's were the only students in the entire class who participated during every discussion which they attended throughout the entire study (Table 9). These data indicate that self-recording resulted in no significant changes in the participation of students who were either consistently verbal or silent from the first during the baseline phase.

TABLE 9

NUMBER OF DAILY RESPONSES FOR STUDENTS WHOSE PARTICIPATION REMAINED UNCHANGED DURING SELF-RECORDING

	Days									
	Baseline					Self-Recording				
	1	2	3	4	5	1	2	3	4	5
Brenda	0	0	0	0	0	0	0	0	0	0
Leanne	0	0	0	0	0	0	0	0	0	0
Nancy	0	0	0	0	0	0	0	0	0	0
Patsy	0	0	0	0	0	0	0	0	0	0
Amy	15	ab.	6	7	22	14	3	15	ab.	15
Christy	6	ab.	2	ab.	2	5	ab.	ab.	2	ab.

Subjects whose participation increased with self-recording. Forty-two percent of the students in the Control group increased their participation during the self-recording phase. An examination of their responses on the attitude questionnaire (Appendix E) revealed that the majority stated they would not be more verbal in the future and that they did not perceive themselves as having been more verbal in this class during self-recording than in baseline. The majority of these students whose participation had increased also stated that, although they wanted to become more verbal in discussions, they were no more verbal in this class than in any of their other classes.

Effect of Reversals on Percentage of Student Participation

Table 1, page 26, and the statistical tests indicated that the percentage of student participation decreased from the treatment to reversal phases for both groups which had received points. The self-recording, although producing no significant increase during treatment, showed a slight increase in percentage participating during reversal.

Further data (Table 10) revealed other differences between the two systems during baseline and reversal phases. These data are based on the percentage of days during each of the two phases that the various Ss participated. For example, a student who attended four of the five classes during baseline and participated on two of these days was given a 50 percent participation rating for his baseline phase. If this same student attended all six classes during the reversal phase and participated on two of these days, he was given a 30 percent participation rating. Two percentages were obtained by this method for all students in the study. Then each student was categorized in one of three divisions within his class: decreased, increased, or unchanged participation. For each of the three groups, percentages of students within the three divisions were then computed and presented in Table 10.

TABLE 10

CHANGES IN PERCENTAGES OF STUDENT PARTICIPATION FROM BASELINE TO REVERSAL

	Decreased Participation	Increased	No Change
Control	43	28	29
Group 1	41	18	41
Group 2	36	37	27
Groups 1 + 2	38.5	27.5	34

As can be seen from Table 10, the two Groups, 1 and 2, which received points during treatment phases, divided into three nearly equal categories during reversal. Approximately one-third of the students maintained a higher level of participation than in their baseline; about

one-third returned to their baseline; and about one-third performed at a rate below their baseline. None of the students, however, who had remained totally quiet during baseline (23 percent) returned to their baselines. Inspection of individual data for Groups 1 and 2 revealed that the majority of students who fell below their baseline performance during reversal had been the most consistently verbal students during the first two phases (see Table 11).

TABLE 11

NUMBER OF STUDENTS PER GROUP WHOSE PARTICIPATION DECREASED BELOW BASELINE DURING THE REVERSAL PHASE

	Control	Group 1	Group 2
Students who spoke at every class during baseline	2	7	1
Students who spoke at more than 50% of baseline classes	6	2	5
Students who spoke at fewer than 50% of baseline classes	2	0	1

Comparisons of the baseline and reversal data for the three groups revealed that a large percentage of students returned to levels of performance below their baselines during the reversal phase. Forty-three percent of the Control group and 38.5 percent of the two groups which had received points decreased their participation below baseline rates during reversal. Thus a maintenance of treatment effects regarding the percentage

of students participating was not demonstrated for any group during the reversal phase.

Frequency of Student Response in All Three Phases

In order to ascertain changes in the frequencies of student responses during each thirty-minute discussion, a mean of each subject's total responses per day was computed for each phase of the study. The Friedman tests were then applied. The data indicated that no significant differences existed between phases for any group (Control group: $X_r^2 = .595$; Group 1: $X_r^2 = 3.56$; Group 2: $X_r^2 = 1.37$). Group 1, however, did approach significance (critical value = 3.8 at the .05 level). Descriptive data further explained the differences between groups (Table 12). Students in the two groups receiving points responded more frequently during treatment and reversal phases than during baseline. The control students responded at essentially the same rate throughout the study.

TABLE 12

MEAN NUMBER OF CLASS RESPONSES IN EACH THIRTY-MINUTE DISCUSSION DURING EACH PHASE

	Baseline	Treatment	Reversal
Control Group	53.6	56.3	50.7
Group 1	50.7	65.6	62
Group 2	64.4	83.2	94

The efficacy of the point system for increasing the frequency of responses seemed to generalize during the reversal phase of the study

for both groups, since neither of the two groups returned to their baseline frequencies when the contingencies were withdrawn. This generalization of treatment effects did not seem to occur, however, for the Control group which returned to a response frequency slightly below their original baseline.

Content and Length of Student Comments

A graphic analysis (Figure 7) revealed that some differences in the lengths of students' comments occurred between the various phases of the study within each of the three groups. The hypothesis that students might become extremely "long winded" when rewards were administered for verbalization was not confirmed. To the contrary, the students in Groups 1 and 2 which received points for participation emitted fewer long responses during the treatment phase than in their baseline or reversal phases. The data indicated overall, therefore, that neither self-recording nor points resulted in significant changes in length of students' comments, with the exception that points decreased the percentage of extremely long responses.

As can be seen from Figure 8, the mean percentages of students' comments in the various content categories varied very slightly between phases of the study within and between groups. A difference did exist between the three groups in that Group 2 supported their comments with specific examples more often than the other two groups during all phases of the study. However, the categories remained relatively unchanged throughout the three phases of the study for each group. The content of students' comments was not significantly affected by rewards

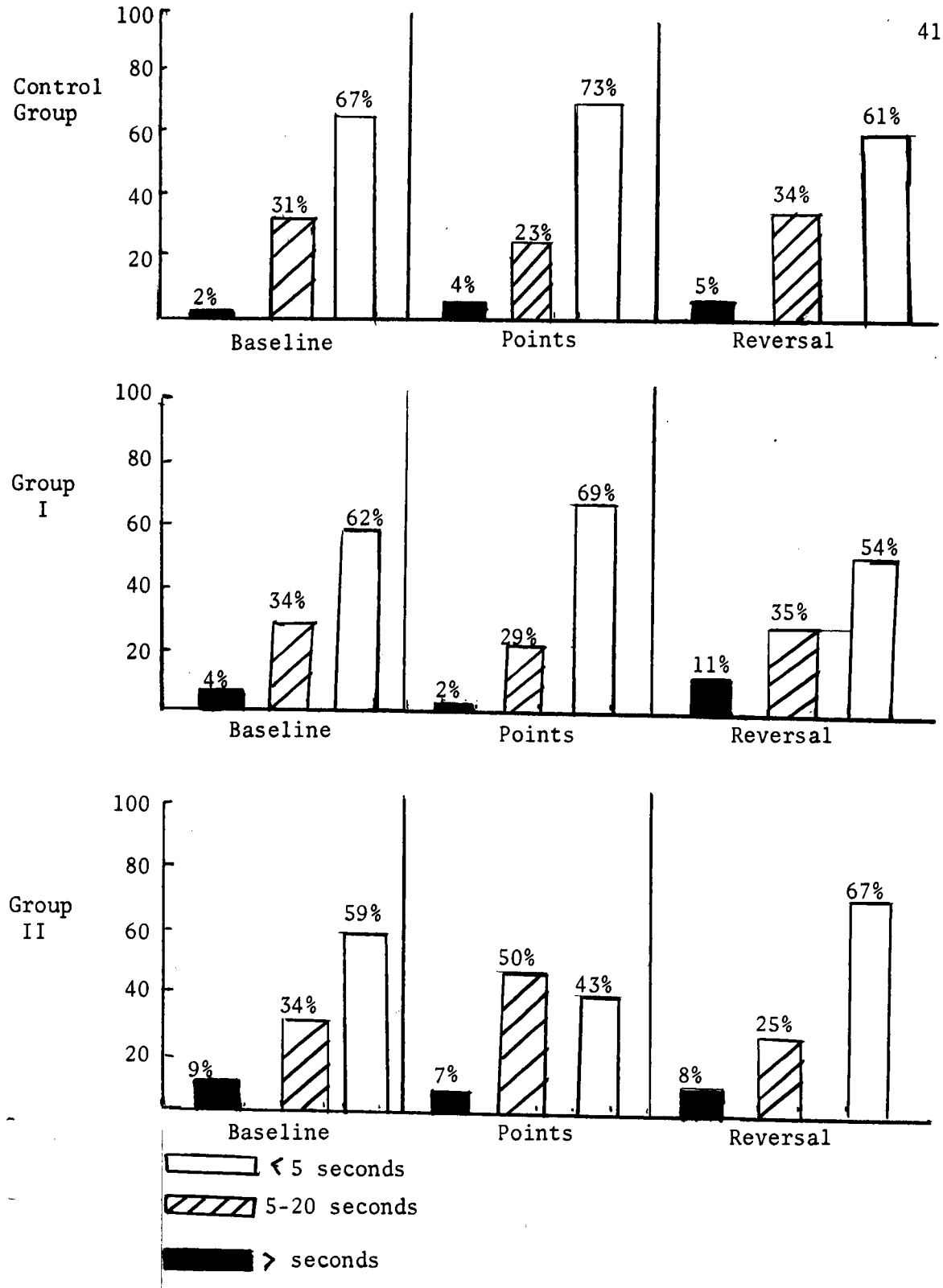

Figure 7. Mean percentages for lengths of students' comments.

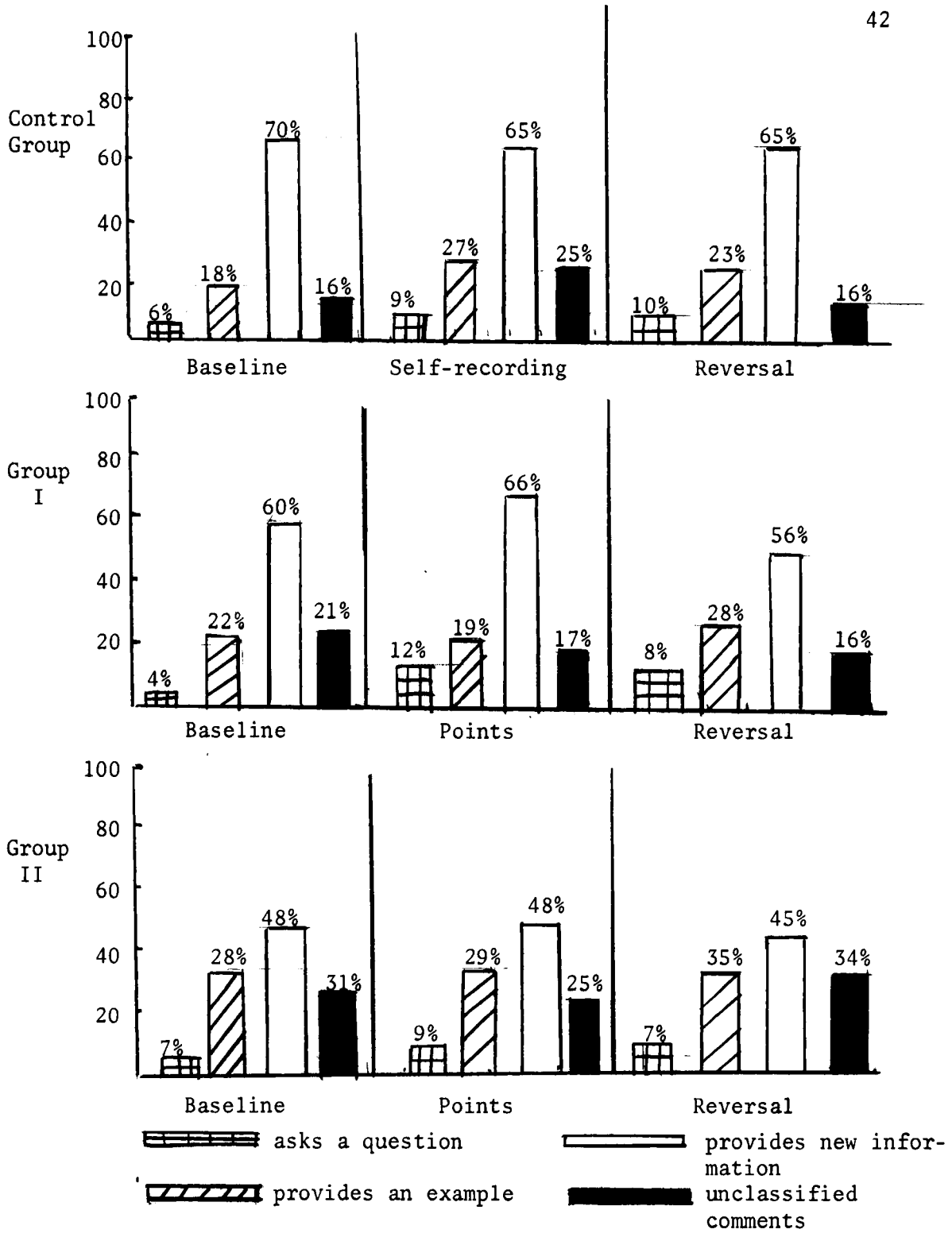

Figure 8. Percent of student comments in each content category.

or self-recording. It should be noted in Figure 8 that the percentages within each phase do not equal 100 percent. This is due to the nominal rating system which allowed a student's response to fulfill more than one content category.

Teacher and Peer Behaviors

Teacher behaviors were rated to determine if changes in student behaviors were a function of differences in teachers' responses in each phase of the study. The specific teacher behaviors recorded for each thirty-minute discussion were: frequency of higher- and lower-order questions, number of direct questions to a reticent student, and percentage of students' comments which received approval or encouragement to continue (see Appendices B and C).

The data as presented in Tables 13 and 14 indicate that there were no extreme variations in teacher behavior within or between groups. Thus the possibility of teacher behaviors confounding the effects of self-recording or contingent points seems to have been minimized. This consistency of teacher behaviors was facilitated by the experimenter's consulting with each teacher when changes in any of the categories of teacher behavior appeared to be occurring. The teachers were instructed to control any excessive behaviors prior to the next class discussion in order to maintain as much consistency as possible.

The observers had received instructions for recording negative peer responses (Appendix A). However, no behaviors occurred in this category for any of the three groups throughout the study.

TABLE 13

MEAN FREQUENCIES OF TEACHERS' QUESTIONS DURING DISCUSSIONS

Behavior	Baseline	Treatment	Reversal
Asks higher-order question			
Control group	10.6	13.6	9.6
Group 1	9.75	12	9.6
Group 2	11.2	10.6	9.5
Asks lower-order question			
Control group	3	3.2	2.2
Group 1	1.75	2	3
Group 2	2.3	4.6	2.5
Questions a reticent student			
	0	0	0

TABLE 14

MEAN PERCENTAGES OF STUDENTS' COMMENTS RECEIVING TEACHER APPROVAL, DISAPPROVAL, AND ENCOURAGEMENT DURING DISCUSSIONS

Behavior	Baseline	Treatment	Reversal
Approves student comment			
Control group	59.6	56.6	44
Group 1	52.1	48	45.6
Group 2	53.2	42.8	48.3
Encourages student to continue			
Control group	14.8	11.5	10.5
Group 1	10	12.5	8.6
Group 2	12.5	8.8	12
Disapproves student comments			
	0	0	0

CHAPTER IV

DISCUSSION

The teachers in the present study experienced a challenge similar to that of many college professors and public school teachers--how to increase student participation in class discussions. This study examined the effects of two behavior management strategies on four classroom discussion variables (length, content, frequency of comments and percentage of students participating). One strategy involved only self-recording, while the other involved the administration of points contingent upon the student's verbal participation in the class discussion.

Statistical and descriptive analyses revealed that the point system increased the percentage of student participation and the rates of individuals' responses within each discussion. The most significant increases occurred in the reticent and nonparticipating members of the class. Such findings corroborate earlier research (Fotos, 1968; Zuberbier, 1971; Zweback, 1972) which demonstrated that token systems increased verbal responses. Furthermore, the point system did not adversely affect the content of student responses. The length of students' comments also remained relatively unchanged when points were administered, although fewer lengthy responses were made during the point phase than during baseline.

In contrast to earlier studies (Page, 1973; Securro, 1971), the self-recording strategy did not result in significant verbal increases for the majority of students. Neither the percentage of student participation nor the frequency of responses increased significantly during the self-recording phase. Furthermore, self-recording did not produce participation from students who failed to participate during baseline. The data revealed that more students decreased their participation during self-recording than their peers who operated under the point contingency. Like the point system, however, self-recording did not significantly change the content or length of student comments.

Several explanations might be offered to account for these findings regarding the point and self-recording systems. The increases during the administration of points were probably the result of a variety of natural contingencies which emerged as students were "coerced" into participating in discussions: (1) the teacher has more opportunities to interact positively with students by attending to and complimenting their comments; (2) the students discover that negative peer responses which they anticipate do not occur; (3) verbal and nonverbal peer support emerge which facilitate further verbal interaction; (4) the discussions are perceived as more interesting due to the increased variety of ideas and questions; (5) the students, particularly the most reticent, are relieved to some degree of the responsibility of deciding whether their ideas are "good enough" to verbalize since the motivation can always be attributed to the point system.

From previous research (Ahlbrand, 1970; Bavelas, 1965; Crovel, 1955; Goldman, 1972) the interpretation might be made that the consistently verbal students, whose verbal behaviors were relatively unaffected by the administration of points, had already established positive self-concepts based upon success in previous group discussions. These students, therefore, would not need external rewards, such as points, to initiate or maintain their verbal responses. This hypothesis seems valid because none of these students reported on their questionnaire that "fear of speaking in groups" inhibited their rate of responding.

Possible explanations for the failure of the self-recording system to produce any significant increases in verbal participation are more difficult to formulate. The most apparent possibility is that the reticent students in this class simply did not have adequate histories of reinforcement for group discussions to compensate for the lack of extrinsic reinforcement for participation in this particular class. Their verbal behaviors were not emitted frequently enough to foster the natural contingencies which probably emerged in the groups receiving points. The more frequent periods of silence in the group might also have detracted from students' desires to participate. Instead of becoming more verbal to compensate for the silences, these students simply continued their reticence and allowed a minority of very verbal students to dominate the discussions.

Previous research which successfully utilized the self-recording system to increase participation (Fotos, 1968; Page, 1973; Securro, 1971) differed from the present study in several respects. The first

study (Fotos, 1968) combined self-recording with a grade contingency. The efficacy of the self-recording alone, therefore, cannot be determined from this data. A more recent study by Page (1973), however, relied on self-recording without any other reinforcers. The essential differences in the study by Page and the present study are that: (1) Page's subjects expressed a desire initially to increase their rates of participation; (2) his subjects set their own individual daily participation goals; (3) the subjects charted their progress daily by recording the actual frequencies of verbal comments. Securro's study (1971) also differed from the system of self-recording used in the present study. Securro's subjects were aware that they were participating in an experiment in which the accuracy of their recording was important. These subjects, therefore, maintained accurate daily accounts of their frequencies of participation. Apparently the daily feedback, individual commitment, and accurate recording were essential components for the success of a self-recording system which the present study lacked.

The data showed that the length and content of student responses remained relatively unchanged in all groups throughout the study. This might be explained in several ways. The slight decrease in unclassified comments during the administration of points might have resulted from the students' awareness that during these discussions they would be verbalizing for the point rewards. The students, therefore, might have pre-planned their comments by formulating questions before class or reading the materials more carefully in order to make more germane comments. Although the contingency system did not include teacher determined criteria for the quality of comments, students may have

received more peer reinforcement when their comments were "well thought out" and "creative". Peer responses such as attentive body posture, head nodding, and smiling often followed interesting comments. These nonverbal behaviors could have been functioning as reinforcers to students when thoughtful comments and questions were emitted. Thus the peer variables controlling the content of student comments would be operating equally in all three groups regardless of the self-recording or point systems. Similarly, the equivalence of response length across phases might be accounted for by peer reinforcement. That is, the verbal students decreased the length of their comments when more of their peers were attempting to speak. Peer reinforcement did not support extremely long comments.

Neither the self-recording nor the point system resulted in significant increases in the percentage of student participation during the reversal phase. The frequency of comments per discussion, however, remained higher than baseline rates during reversal for the groups who had received points. Analysis of these data (Table 11, p. 38) reveal that the majority of students who became less verbal during reversal were those who had been participating during 50-100 percent of the baseline discussions. Perhaps these students were made more aware of their rate of verbalization by the point system and attempted to decrease that rate during the reversal phase. An alternate hypothesis is that these verbal students were affected by the point system even during baseline. They could have been more verbal than they normally were in preparation for the discussions during which they would eventually receive rewards. The

majority of students who were originally silent or who participated during fewer than 50 percent of the baseline discussions did not decrease their participation during reversal. Apparently the brief duration of treatment allowed some natural contingencies to become well enough established to maintain these students' behaviors without the point system. The fact that the end of the school year was approaching might have contributed to those decreases in participation which occurred for both the high and low participating students--a symptom of general apathy toward course-related activities. If time had allowed, another treatment and reversal phase could have been administered and possibly clarified these reversal effects.

The failure of the point system to maintain percentage of participation above the original baseline is a source of concern. Perhaps this could be more effectively controlled if the reinforcers were administered on an increasingly variable interval schedule. By this method the teacher could encourage daily participation, while preparing the students for the eventual withdrawal of the extrinsic reinforcement.

The findings of the current study raise several questions regarding the ethical issue of intrinsic vs. extrinsic reinforcement: Shouldn't intrinsic reinforcement be allowed to control the student's verbal behavior? Are extrinsic reinforcers demeaning to college students? Won't the classroom become too mechanized and impersonal if points are administered for participation? Is it right to award points for a behavior such as participating in discussions?

Perhaps the ideal class discussion is one in which group members become so totally engrossed in the subject that verbal participation

develops "naturally". Previous research, however, does not support this notion (Applegate, 1969; Securro, 1971). Students who are genuinely interested in the discussion and say they desire to participate often remain reticent as a result of fear, lack of self-confidence and lack of previous reinforcement. As the self-recording strategy in the present study revealed, reticent students did not develop verbal behaviors despite the passage of time and array of discussion topics. Furthermore, the reticent students indicated on their questionnaire that the discussion topics were interesting and that they desired to become more verbal group members. Obviously, the expressed desire to participate and an interest in the topics were not powerful enough factors alone to produce verbal participation in these students. If all behaviors were dependent on intrinsic reinforcers, verbal participation for some students would simply never occur--despite their own desire to do so.

The students' responses on the attitude questionnaire verified that only a minority rated the point system negatively. The majority of students (80 percent) stated that the point system should be used in other college classes. It seems unlikely, therefore, that the majority of students considered the system dehumanizing, impersonal, or demeaning.

Finally there is the question regarding a reward system for behaviors such as participation in class discussions. Previous research, however, has substantiated the positive effects of participation on academic achievement (Clement, 1971; Hopkins, 1971; and Meacham, 1971). Additional benefits which may accrue from participation in discussions

are: more positive attitudes toward the instructor and the course (Schroder, 1974); more positive self-concepts (Crovel, 1955; Goldman, 1972); higher sociometric status (Bavelas, 1965); decreased dogmatism (Ford, 1969; Larson and Gratz, 1970); improved interpersonal relationships (Williams, E., 1972); and a better understanding of people from other cultures (Dash, 1969). Surely these benefits are as worthy of rewards as term papers and final exams.

Conclusions

The major conclusions to be drawn from the present study are:

1. The contingency point system significantly increased the percentage of students participating in discussions and the frequency of individuals' comments within each discussion.

2. Self-recording did not result in significant increases in the percentage of students participating in class discussions or in the frequency of individuals' comments within each discussion.

3. The majority of students to whom the points were administered rated the system favorably, agreed that points should be used in other college classes, and reported that the points were responsible for their increases in verbal participation.

4. Neither self-recording nor points increased percentages of participation during reversals as compared to baseline behaviors; however, the frequencies of individual comments within each discussion did remain higher than baseline for the groups to whom points had been administered.

5. Points were more effective with reticent students than with students who were consistently verbal throughout the study; although the point system did increase the frequency of responding within each discussion for even the consistently verbal subjects.

6. Self-recording did not result in any increases in participation for students who never verbalized during baseline; whereas, the point system resulted in participation from such students throughout both treatment and reversal phases.

7. A larger percentage of students decreased their participation during self-recording than during the administration of points.

8. The administration of points did not result in comments of different content than those during baseline. A small decrease actually occurred in the percentage of comments rated as "unclassified" during the point phase.

9. Neither the point system nor self-recording significantly affected the lengths of students' comments, with the exception that the point phase resulted in a slight decrease in excessively long comments.

Suggestions for Further Study

Experimental replication in which:

1. The sex, race, age, cultural backgrounds, and academic levels (graduate vs. undergraduate, high GPA vs. low GPA students) of the students are different from the present study.

2. Self-concept and attitude scales regarding the relationship of student and teacher are used as dependent variables.

3. Maintenance of treatment effects are measured in other class situations.

4. Group vs. individually contingent consequences are compared (i.e., giving points to the entire class contingent upon a percentage of daily participation).

5. Academic variables such as the course grade and retention scores on posttests are used as dependent variables.

6. The reward contingencies are tied to the quality of responses.

7. The verbal behavior of Ss who receive de-sensitization training for fear of public speaking prior to the study are compared with the behaviors of Ss on the point system.

8. A self-directed behavior modification system for increasing daily responses is compared with the point system administered by the teacher.

9. The verbal behaviors of students who receive excessive teacher praise without points are compared with behaviors of students who receive no teacher praise but do receive points.

10. The point system is gradually phased out in order to maintain verbal behaviors in the reversal phase without the use of any points.

11. Direct experimental replication of the present study.

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APPENDICES

APPENDIX A

GUIDE FOR DEFINING NEGATIVE PEER RESPONSES AND "UNCLASSIFIED" STUDENT RESPONSES

I. Rate and record peer responses under the category of "negative responses" if:

1. They insult or criticize the speaker himself, rather than just disagree with the speaker's comment.

Examples: You don't know what you're saying.

You're really mixed up about that.

Anyone who thinks that is true certainly has a lot to learn.

2. They show total disregard for the speaker's opinion.

Examples: That's just absurd!

You can't really mean that.

I can't believe you'd think that.

That's a stupid statement to make.

II. Rate and record students' comments in the "unclassified" category if:

1. They do not ask a question, provide new information, or provide a specific example to illustrate an idea.

Examples: I guess so; I'm not sure; I never thought about that; It's hot in here; You're right; Good grief! That's about all.

APPENDIX B

RATING GUIDE FOR TEACHER QUESTIONS

As you record the teacher's responses, record those that are in the form of questions in one of the two categories described below. If the teacher asks a series of questions, rate only the last question asked. Questions directed to a specific student should be recorded as "encouragement to continue," not as a higher- or lower-order class questions.

I. Lower-Order Questions

Rate questions lower-order if:

1. They call for specific names, definitions, numbers.

   Examples: Who was the father of modern psychology?

   What is a negative reinforcer?

   When did Skinner invent his paradigm?

2. They call for "yes" or "no" answers.

   Examples: Do you agree with what the author says?

   Did you like the article by Paige?

   Do you think most adolescents would agree?

3. They call for specific information.

   Examples: What conclusion did Margaret Mead reach?

   How do the Jesus people convert adolescents?

   Where is there the most delinquency?

II. Higher-Order Questions

Rate questions higher-order if:

1. They call for students' own ideas or opinions.

   Examples: What do you think about Mead's conclusions?

   What do we mean by the term adolescent?

   Why do you think that?

2. They call for comparisons.

   Examples: What is the difference in male and female hormones?

   How were the Samoans different from Americans?

   What is the similarity between the two articles?

3. They call for speculations.

   Examples: Could we eliminate sex role stereotyping?

   How would behavior modification affect parents?

4. They call for some statement as to cause and effect.

   Examples: How do hormones affect sex role development?

   What caused the delinquents to rebel?

   What effect did the birth control pill have?

5. They ask "why" something has or will happen.

   Examples: Why did the Samoans differ?

   Why do some people object to behavior modification?

6. They call for examples to illustrate a point or principle.

   Examples: Give me an example of sex role stereotyping.

   Illustrate the concept of positive reinforcement.

APPENDIX C

CATEGORIES FOR DEFINING TEACHER'S BEHAVIORS:

DISAPPROVAL, ENCOURAGEMENTS, APPROVAL

I. Rate and record the teacher's behaviors (verbal only) as disapproval if:

1. They disagree with the student's comment.
   Examples: That isn't right.
   No, that's not what he said.
   No, you're confused on that point.

2. They embarrass the student purposely.
   Examples: I think a third grader could answer that more correctly.
   Oh, come on now.
   Did you even read these materials assigned for today?
   I hope there isn't anybody else in here that believes that.

3. They discourage the student from speaking up again.
   Examples: Well, I think you've told us enough for today.
   How about somebody else answering instead of Joe?
   Joe, let's let Jane answer that for us.

II. Rate and record the teacher's verbal behaviors as "approval" if:

1. They directly compliment the student's responses.
   Examples: I'm glad you brought that point up.
   That is a very important question which you asked.
   MMMM-hmmm (with nod or smiles).

2. They refer back to a student's comment.
   Examples: I think we might have missed what Joe said. Would you repeat it?
   Now what about what Sally said about Skinner?

If the teacher approves the student's comment while he is still speaking, record only <u>one</u> approval after the student stops talking.

III. Rate and record the teacher's behaviors as encouragement if:

1. They ask one specific student for further information following the student's response.
   Examples: Could you tell us more about that, Joe?
   I'm not sure I understand. Could you explain more, Sue?

APPENDIX D

TABLE 15

MEAN PERCENTAGES AND RANGES OF AGREEMENT BETWEEN OBSERVERS ON TEACHER AND STUDENT DISCUSSION BEHAVIORS

Observer	Training on Tapes	Training in Classes	Baseline	Treatment	Treatment	Treatment	Reversal
1	.93 (LQ.56-L.98)	.89 (A.80-L.99)	.89 (A.88-L.94)	.90 (LQ.80-L.98)	.93 (E.90-Q.94)	.89 (LQ.88-L.99)	.94 (LQ.90-L.99)
2	.86 (LQ.60-L.98)	.94 (A.88-L.100)	.93 (A.86-L.95)	.90 (A.68-HQ.99)	.92 (LQ.78-L.99)	.88 (A.80-Q.99)	.93 (A.88-L.100)
3	.86 (A.70-Q.90)	.92 (A.86-E.95)	.93 (M.78-Q.99)	.92 (LQ.80-L.99)	.90 (Q.81-L.92)	.90 (M.75-Q.96)	.89 (M.76-E.90)
4	.89 (E.80-Q.92)	.89 (E.79-L.100)	.90 (A.74-L.99)	.89 (A.80-Q.96)	.89 (L.88-A.92)	.89 (HQ.80-A.90)	.89 (L.80-L.92)
5	.92 (HQ.78-L.98)	.91 (L.88-E.99)	.89 (HQ.76-E.98)	.88 (LQ.80-L.90)	.93 (L.90-Q.99)	.88 (LQ.76-L.91)	.86 (HQ.62-Q.88)
6	.91 (Ex.90-Q.92)	.88 (Ex.86-Q.90)	.89 (Ex.80-L.98)	.93 (M.86-A.95)	.90 (M.80-HQ.92)	.90 (Ex.81-Q.93)	.92 (L.88-LQ.93)
7	.90 (Ex.60-Q.99)	.89 (Ex.88-L.92)	.89 (M.70-Q.90)	.90 (HQ.85-Ex.92)	.88 (LQ.76-L.92)	.89 (HQ.80-Ex.90)	.92 (HQ.78-L.99)
8	.88 (E.70-Q.96)	.89 (L.80-Q.98)	.92 (M.72-Q.94)	.90 (E.82-L.99)	.87 (M.68-L.98)	.94 (M.66-L.99)	.93 (E.89-Q.96)

Note: L = length of student comments; A = teacher approval; E = teacher encouragement; M = student comment which provided more information; Ex = student comment which provided an example; Q = student comment which asked a question; HQ = higher-order teacher question; LQ = lower-order teacher question; N = negative peer comment; R = teacher question to a reticent student; D = teacher disapproval.

APPENDIX E

COURSE EVALUATION OF CLASS DISCUSSIONS

Your name_____

Grade you will probably earn in this course_____

Age_____ Rank in school_____

You will receive 10 points for completing this. PLEASE ANSWER HONESTLY, as this in no way affects your course grade. Bring this with you on the last day of class.

1. At the first of the quarter, I liked the idea of being given points for participation.

   very much 12 11 10 9 8 7 6 5 4 3 2 1 not much

2. Looking back over the quarter, I now like the idea of being given points for participation.

   very much 12 11 10 9 8 7 6 5 4 3 2 1 not much

3. Being given points for participation made me more verbal than I would have been without them.

   agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

4. I think other college classes should use the point system for class participation.

   yes 12 11 10 9 8 7 6 5 4 3 2 1 no

5. Being given points lessened the quality of our discussions.

   agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

6. During the first half of the quarter, I spoke up during discussions.

   always 12 11 10 9 8 7 6 5 4 3 2 1 never

7. During the last 3-4 weeks, I have spoken up during discussions.

   always 12 11 10 9 8 7 6 5 4 3 2 1 never

8. I enjoyed participating in our class's discussions less when points were given.

   agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

9. I think having class discussions in college classes is meaningful to me as a student.

   agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

10. During discussions I did not have a chance to say anything.

    agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

11. I would like to become a more verbal person during class discussions.

agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

12. I learn more from just listening to other people than from participating myself.

agree 12 11 10 9 8 7 6 5 4 3 2 1 disagree

13. I am more verbal in this class than I am in my other classes.

very much 12 11 10 9 8 7 6 5 4 3 2 1 no more

14. I think I will be more verbal in my classes in the future as a result of speaking in here.

yes 12 11 10 9 8 7 6 5 4 3 2 1 no

15. The following were reasons why I did not speak up more in our class discussions: (check as many as apply to you; but if you check more than one, rank them with numbers).

___I was too scared in a group this size

___I was not interested in the topics

___I was afraid of the teacher's responses to me

___I felt my ideas were unimportant

___Other (explain on back)

VITA

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