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CONTINGENCY MANAGEMENT IN AN INTRODUCTORY PSYCHOLOGY COURSE PRODUCES BETTER LEARNING[1]

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For the contingency management techniques first devised by Keller (1966, 1968) to become a widely accepted teaching method, it is necessary that they be shown (1) to be applicable to general subject matter and (2) to be superior to traditional lecture methods. The present study demonstrated (1) by successfully teaching the material from a standard psychology text. The superiority of contingency management was established by direct comparison of final examination scores from comparable groups taught the same subject matter by either Keller's method or traditional methods. Students taught by Keller's method also rated the course more favorably.

Since Keller (1968) first introduced the systematic application of principles of learning derived from laboratory studies to the teaching of a college subject, his techniques have seen increasing use. Several studies have been done or are in progress to determine the factors most critically responsible for the effectiveness of the method (*cf.* Farmer, Lachter, and Blaustein, 1968). But certain basic questions remain to be answered, questions which would be among the first to be asked by a professor who is considering adopting these techniques.

The first concern would be: can the techniques be applied to any organized body of knowledge? Many of those who now employ the techniques either use textbooks that focus upon the area of the experimental analysis of behavior (*e.g.*, Farmer *et al.*, 1968) or have prepared materials that they deem particularly appropriate to the use of contingency management techniques (*e.g.*, Malott, personal communication). Since most introductory courses, including those in psychology, rely upon a general textbook, one purpose of the present study was to test whether contingency management techniques could be used to teach the subject matter of a standard textbook, Kendler's *Basic Psychology* (1968).

Secondly, and of fundamental importance, the question naturally arises as to whether students will learn more when these techniques are used. Ancillary to this is the question as to whether students would, by their own criteria for a good course, rate a course using these techniques higher than they would a course taught by traditional methods. Thus, the second major purpose was to assess the effectiveness of contingency management techniques in these respects.

Before the experiment itself, a feasibility study was conducted. During the summer of 1968, a general introductory course based on Kendler's *Basic Psychology* (1968) was administered to 165 students in five separate classes. It was found that: (1) general material, *i.e.*, statistics, physiological psychology, verbal learning, forgetting, *etc.*, could be presented using Keller's method. (2) Students tended to achieve relatively high grades on objective final examinations. (3) The students rated the course very highly. We were favorably impressed with these results but felt that more data were needed to justify the expansion of this program to our regular introductory course. Consequently, the purpose of the present study was to compare directly the results

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of a course section using contingency management techniques to results obtained by comparable students in conventional lecture sections covering the same material.

METHOD

Subjects

Students. 880 students at C. W. Post College registered in four introductory psychology sections without prior knowledge of what method would be used to teach the course. The initial registration figures were as follows: Experimental class, 221; Control class A, 229; Control B, 213; and Control C, 217. Twenty-seven students withdrew from the experimental class, 36 from Control A, 29 from Control B, and 20 from Control C before the final exam.

Staff. In the experimental class, one of the authors supervised two graduate assistants and 19 undergraduate proctors. The proctors received academic credit for their duties; each proctor was responsible for about 12 students (range 7 to 18).

In each of the control sections, the instructor was assigned one graduate assistant. Nine additional graduate assistants were available, when needed, from a grading pool.

Procedure

Specific details of procedure used in the experimental class may be found in Keller (1968). The course was the first of a two-semester introductory sequence. To make the course compatible with the second semester, which was to be taught by conventional techniques, the second edition of Kendler's *Basic Psychology* (1968) was divided into twelve 20-page units, with the assignments covering chapters 1, 3, 4, and 7 through 11. The control classes used the same textbook and covered the same material.

The control classes met three times a week for 50-min lectures and were tested three or four times; the experimental students were assigned two 50-min proctoring sessions a week in which to take unit tests and to receive a proctor's help.

Students were required to pass, with a perfect score, each unit test, consisting of 10 fill-in questions, before receiving a study guide for the next unit. Each study guide was designed by the authors to call the students' attention to concepts we considered central to the topic of the unit. On the average of once a week the instructor presented a lecture, demonstration, or film. It was stated that only those students who had passed the appropriate number of units were to attend these presentations, but no attempt was made to enforce this ruling.

At the end of the semester, the instructors from all the sections selected 50 multiple-choice questions from the instructor's manual for use as a common final exam. All items were agreed to be appropriate and representative of the material covered in each course. While some of these items had previously appeared on 1-hr examinations in all the control sections, none had been seen by the experimental class. All final examinations were given at the same time and were closely proctored. To guard against contamination of the results by cheating, alternate forms of the exam were appropriately distributed. The exams were graded by graduate students using a punched answer key and were spot-checked by the instructors. Before the exam date, students were told how the final exam would weigh in the determination of course grades as follows: Experimental group, 40%; Control A, 40%; Control B, 50%; Control C, 50%.

Included with the exam was an anonymous rating sheet, handed in separately from the exam. The students were asked to rate the overall quality of the course on a 0 to 10 scale, with 0 labelled as "extremely poor" and 10 as "extremely good". Other scales were included to provide more detailed information for the individual instructor.

RESULTS

The distribution of final exam scores in the experimental and control groups appears in Fig. 1. The mean score out of 50 possible points for each of the groups was: Control A, 35; Control B, 34; Control C, 34; Experimental, 40.

An analysis of variance showed the overall effect to be highly significant ($F = 35.5$, $df = 3, 764$; $p < 0.005$). *Post hoc* t-tests revealed that the most substantial differences among groups existed between the experimental group and each of the control groups ($p < 0.0001$ for each comparison). By contrast, the differences among the control groups were slight, with none reaching the 0.01 level of significance in spite of the large number of subjects.

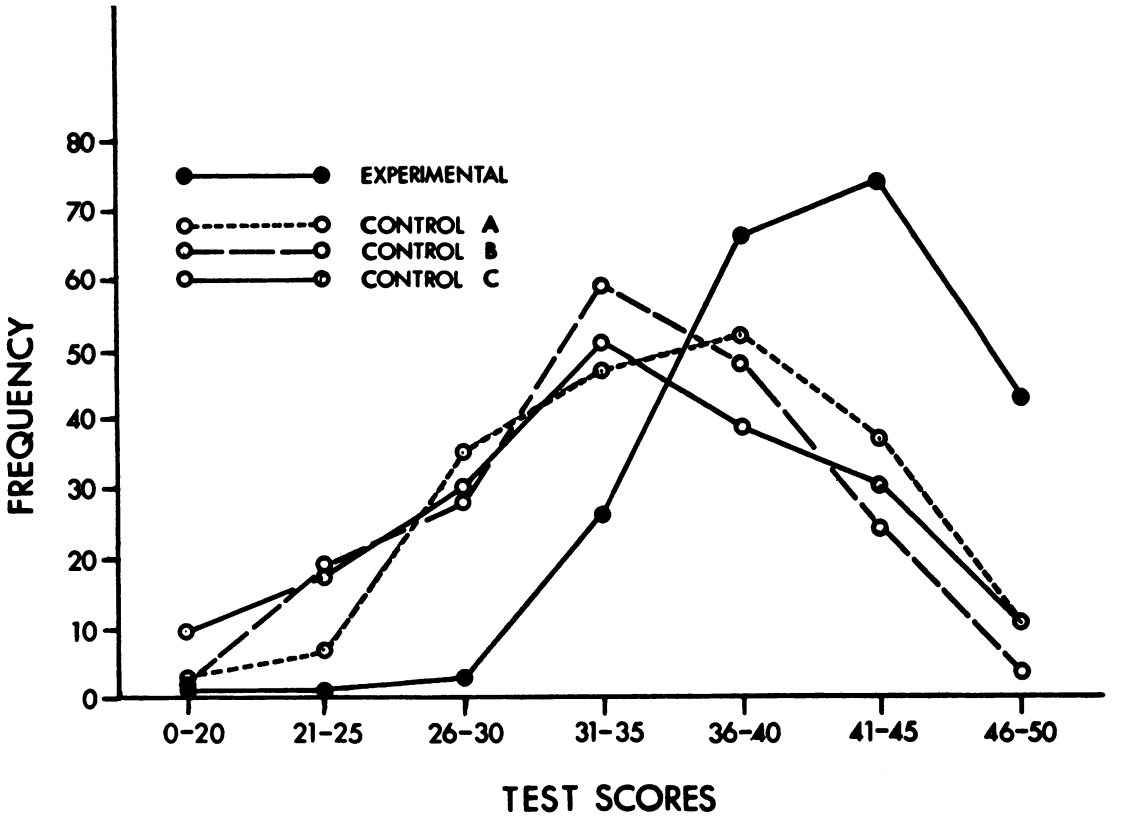

Fig. 1. Distribution of test scores for the three control classes and the experimental class. The mean score for the experimental class was 40; for Control A, 35; Control B, 34; and Control C, 34.

Likewise, the student ratings showed that the experimental group rated the course higher than did the control groups. These data are seen in Fig. 2, and an analysis of variance showed the overall effect to be highly significant ($F = 78.9$; $df = 3, 706$; $p < 0.005$). The mean ratings were: Control A, 6; Control B, 7; Control C, 5; Experimental, 9. *Post hoc* t-tests again showed that the experimental-group ratings were higher than each of the control-group ratings ($p < 0.0001$). At the same level of significance Control B was higher than either of the other control groups, which did not differ significantly from each other ($p = 0.31$).

DISCUSSION

The data indicate that students in the experimental group learned more and rated the course higher than did comparable students taught by conventional methods. The data from the final examination are especially convincing in light of several aspects of the procedure which, if anything, would have favored students in the control groups. First, the questions on the final examination were multiple-choice items selected by the instructors from the commercial test-item file. Students in the control groups had been given multiple-choice tests throughout the semester and, therefore, would have been more practiced in studying for this kind of final exam. Second, some of the items on the final examination had previously been given to the control groups on 1-hr examinations. Third, while bias could not be introduced by students selectively registering for sections of their choice, students could drop the course from their schedules. If there were greater numbers of dropouts in the experimental group than in the control groups, a bias favoring the experimental group could have been introduced by leaving students who were better able to handle the material or more favorably disposed toward the course. To the contrary, the experimental course was dropped by fewer students than on average dropped the control sections.

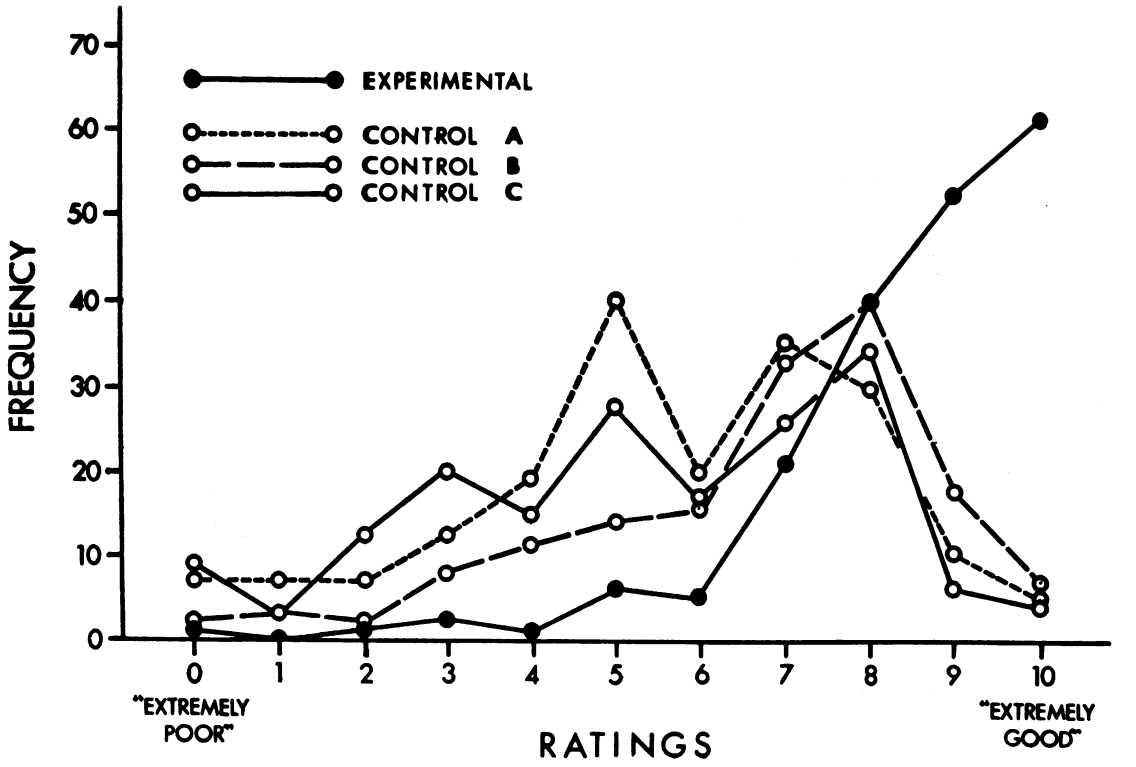

Fig. 2. Distribution of ratings for the three control classes and the experimental class. The mean rating for the experimental class was 9; for Control A, 6; Control B, 7; and Control C, 5.

One aspect of the experimental design produced a confounding which cannot entirely be dismissed. There were different instructors for the various groups, and it is possible that the instructor for the experimental group was a substantially "better teacher". However, we do not think this to be a likely explanation of the data, since his students in the previous year had achieved scores on objective examinations which were no higher than those of the present control groups. The instructors varied considerably in factors which could relate to teaching effectiveness (*e.g.*, orientation toward the field of psychology, amount of teaching experience, and sex). Since no substantial differences were seen among the control groups on final examination scores, we conclude that the method, rather than such confounded factors, produced the present results.

From the data which showed that the students in the experimental section rated the course highly, we merely conclude that students will readily accept the use of contingency management techniques. Clearly, there are many possible sources of variability in students' ratings of courses, and these were not systematically studied in this experiment.

Since this study was designed to compare two teaching methods, our data do not bear directly on the question of which factors are responsible for the efficacy of contingency management techniques. However, in the course of this study, certain potential improvements in technique were suggested. For example, to reduce procrastination, attendance at all proctoring sessions is strongly encouraged for students who are behind in unit tests. A further contingency now allows accelerated students to perform a laboratory experiment or to write a paper on an area of special interest. After the initial investment of time and institutional resources, this course now functions smoothly and with no additional costs as part of our general introductory psychology program.

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