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The Effect of Response Effort Reduction, Instructions, Group and Individual Feedback, and Reinforcement on Staff Performance

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THE EFFECT OF RESPONSE EFFORT REDUCTION, INSTRUCTIONS, GROUP AND INDIVIDUAL FEEDBACK, AND REINFORCEMENT ON STAFF PERFORMANCE

By
Gerald Lyn Shook

A Thesis
Submitted to the
Faculty of The Graduate College
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Gerald Lyn Shook
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INTRODUCTION

Since the publication of Science and Human Behavior (Skinner, 1953), large scale attempts have been made to extend procedures developed in the animal laboratories to applied settings (Ferster, 1967). The transition, in many respects, seems to have been made. Applied behavior analysis has developed its own evaluative techniques (Baer, Wolf, & Risley, 1968), its own journal (Journal of Applied Behavior Analysis, 1968 to present), and its own designations for people engaged in applied work (Homme, C'de Baca, Cottingham, & Homme, 1968). Behavior technology has been applied in a great variety of settings such as penal institutions (Cohen, Filipczak, & Bis, 1970), group homes for predelinquent youths (Phillips, 1968), mental institutions (Ayllon & Michael, 1959), institutions for the retarded (Lent, LeBlanc, & Spradlin, 1970), outpatient clinics (Bernal, Duryee, Pruett, & Burns, 1968), special classrooms (O'Leary & Becker, 1967), noninstitutional settings (Stuart, 1967; Azrin & Powell, 1968), homes (Hawkins, Peterson, Schweid, & Bijou, 1966), and public schools (Madsen, Becker, & Thomas, 1968). In addition, the last decade has seen a marked increase in the use of applied behavior analysis in the area of management and business.

The extension into business is a logical one. Applied behavior analysis emphasis on the reliable measurement of overt behavior is very attractive to business where success is measured in dollars and cents. This is reflected in the work of Feeney: "We do what works
... what gets a payoff. For us, this behavioral approach got results" ("Where Skinner's Theories," 1972, p. 65). Feeney's early efforts (1966) at Emery Air Freight made him a leader in applied behavior analysis with management procedures in business. He reported in Organizational Dynamics ("At Emery," 1973, p. 41) that Emery's management is "... sold on the merits of Skinner's ideas, not because of their logic or the eloquence with which they are frequently proposed, but because so far at least they have paid off handsomely in each area Emery has seen fit to apply them." In addition to the above-mentioned article on Emery Air Freight, that issue of Organizational Dynamics contained an interview with B. F. Skinner ("Conversation: An Interview," 1973) and an article entitled "Can Behavior Scientists Help Managers Improve Their Organizations?" (Cherns, 1973); thus underscoring the widespread emphasis on Skinnerian principles in management and business. Feeney's success at Emery Air Freight was based partially on one project. Because a certain container packaging process had been "pushed," Emery's management and workers assumed that the containers were used 90% of the time it was appropriate for them to be used. Feeney and a five-member task force took data on container usage and discovered that containers were being used appropriately only 45% of the time. The employees obviously had the prerequisite behaviors for container loading in their repertoire; what was needed in Feeney's estimation was to couple positive reinforcement with feedback for correct container usage. Feedback was provided through a check sheet at the end of each shift that the worker totaled to see whether he met the 90% criterion set up by
Feeney. In addition, supervisors were encouraged to provide positive reinforcement for improvement in performance. If the employee did not meet criterion, he was not criticized but was praised for keeping accurate records. The results were impressive. In 80% of the offices where the techniques were tried, performance jumped from 45% correct container usage to 95% in a single day. This resulted in an estimated savings of $520,000 a year. In addition, the high rate of achievement was maintained for a number of years. This procedure coupled with other examples of applied behavior analysis enabled Feeney to save Emery Air Freight $3,000,000 in a period of three years (Davis & Webster, 1968; "Emery Salesman Ask," 1970; Laird, 1971; "New Tool: Reinforcement," 1971; "Where Skinner's Theories," 1972). In more closely scrutinizing Feeney's procedure for increasing container usage at Emery Air Freight, one finds problem areas that can be further broken down. First, containers were not always available to the workers or easily accessible to them. In addition, supervisors would occasionally assign competing tasks that would interfere with correct container usage. Second, it was found that instructions as to when containers should be used were somewhat ambiguous. Third, neither individual or group feedback was available to the employees informing them of how their performance compared with the 90% criteria required. Fourth, positive reinforcement contingent upon appropriate use of containers was lacking.

**Reducing Response Effort**

It might very well be the case that the first step a manager
should take in increasing responding would be to reduce response
requirement. In the instances of Feeney's container program, this
meant that he always made sure a supply of containers was on hand and
that they were accessible at all times. Likewise, it was important
that supervisors did not assign jobs involving competing behaviors to
the employees.

Instructions

The relationship between instructions and consequences seems to
be a crucial one. It is questionable indeed that workers assigned a
given task and instructed to perform the task would do so for an
extended period of time without either feedback or positive conse­
quences for doing the task or negative consequences for not doing
the task. Brethower & Rummler (1966, p. 14) describe this relation­
ship in the following fashion: "There are many techniques for obtain­ing
the desired behavior from subordinates--the most common being to
tell people what is to be done. Most people know from experience
that there is a certain correlation between what the manager tells
them and what he rewards or punishes. As long as the manager sees
to it that the correlation is high, telling them to do things works.
Since it does work fairly often, however, the manager may forget to
make sure that the reinforcement and punishment contingencies are
maintained. Employees learn such inconsistencies rapidly, which is
why the manager's job is only half finished when he tells someone to
do something. He must follow through and assure that the desired job
behavior is consistently rewarded." In Feeney's instance, for
example, it is highly questionable that mere posting of instructions as to when to use containers would have been effective on a long-term basis in maintaining appropriate container packing behavior or that it would have been effective at all even on a short-term basis had not a history of consequences for following instructions been present. In a study examining the effect of instructions on elementary school teachers, it was found that instructions alone produced inconclusive results (Cossairt, Hall, & Hopkins, 1973). Quilitch (1975) found that memos to institutional staff proved to be ineffective in an attempt to increase the number of active residents through staff leadership of activities.

Feedback

Until Feeney's procedure was instituted, employees had little knowledge either on an individual or group basis where they stood in relationship to the criteria established for them. It is generally agreed that feedback is a crucial portion of an adequate management system (Brethower, 1967; "Emery Salesmen Ask," 1970; "Performance Audit," 1972; Feeney, Gilbert, & Rummler, 1971; Rummler, 1972; "Training: Placebo," 1970). It is often difficult to separate feedback as a consequence for behavior from reinforcement as a consequence. In a study of both individual and group feedback given to institutional attendants regarding the daily use of operant training methods, it was found that an increase was noticed as a function of the introduction of the feedback system (Panyan, Boozer, & Morris, 1970). Quilitch (1975) found that individual feedback combined with
scheduling of activities for institutional staff resulted in an increase in number of active residents on the wards examined. It was found, however, that feedback alone produced inconclusive results in increasing teacher praise for student attendance behavior (Cossairt et al., 1973).

Reinforcement

As with feedback, reinforcement is thought to be an integral portion of performance systems (Brethower, 1967; "Emery Salesmen Ask," 1970; Feeney et al., 1971; "Performance Audit," 1972; Rummler, 1972; "Training: Placebo," 1970). The reinforcement procedure is necessary for two reasons. First, in many instances reinforcement is necessary for employees to acquire correct responses; and second, some form of reinforcement is usually necessary to maintain appropriate employee responding. Management systems and training programs often fail because appropriate maintenance systems are often neglected (Brethower, 1967). Feeney's procedure not only resulted in a rapid acquisition of appropriate container usage but also proved to be effective in maintaining appropriate behavior for a period of several years. Monetary reinforcers were effective in modifying the tardiness behavior of industrial workers (Hermann, de Montes, Dominguez, Montes, & Hopkins, 1973), with punctuality increasing as a function of these bonuses. In another study, cash awards contingent on improvement in psychiatric patients resulted in an increase in appropriate behavior of patients (Pomerleau, Bobrove, & Smith, 1973). Positive reinforcement, delivered for appropriate responding in each
component of a multicomponent training chain was demonstrated as being an effective technique in training the hard-core unemployed (Beatty & Schneier, 1972). Bonuses given on a fixed ratio schedule of reinforcement were found to be more effective than continuous reinforcement schedules in increasing the rate of IBM card scoring (Yukl, Wexley, & Seymore, 1971). Both of these reinforcement systems, however, were more effective than the nonbonus condition. Gupton and LeBow (1971) found that an increase in both low frequency and high frequency sales occurred when the opportunity to make a high frequency sale was made contingent on making a number of low frequency sales.

In another study, a combination of instructions, feedback and social praise was found to be effective in increasing the number of times teachers would praise students in an elementary school situation (Cossairst et al., 1973). Loeber (1971), in a study examining the effect of patient improvement or the promise of cash rewards as potential reinforcers for psychiatric ward staff, found that the promise of reward increased accuracy of treatment; however, treatment accuracy did not improve as a function of improvement of the patient.

It was the purpose of this study to investigate several components of Feeney's procedure. The first component involved arranging the environment to facilitate the initiation and maintenance of the desired response by lowering the response effort required. The second component investigated the effect of instruction on a response acquisition basis and on a response maintenance basis. The third and fourth components involved the effect of group feedback and of individual feedback on response rate of the subjects. The fifth
component investigated the effect of response contingent positive reinforcement on response rate. Positive reinforcement was chosen as opposed to punishment partially as a function of the undesirable concomitant reactions which may result from the use of punishment (Azrin & Holtz, 1966) and the questionable effects of punitive techniques (Schmidt, 1969). Inexpensive reinforcers were used in order to make the study more applicable to "real world" management situations where additional monetary reinforcers may not be available because of economic or administrative restrictions. In addition to positive reinforcement, posters were used as promotional items. It was found (Fielding, Errickson, & Bettin, 1971) that posters were effective in reducing unwanted behavior on the part of institutional staff.

The behavior investigated, although directly specific to situations where data collection by employees is an integral part of programming, is analogous to many of the everyday work behaviors found in management and business situations. Employee sign-in, equipment return at shifts' end, work station cleanup, regular report writing, and filling out appropriate forms are all examples of the routine sorts of behaviors that would fall into the class of everyday work behaviors. This class of behaviors typically has few reinforcers associated with the task itself and, therefore, must be maintained through management imposed contingencies. It is the purpose of this study to investigate "positive" means of control as opposed to the escape-avoidance procedures typically utilized.
EXPERIMENT I

Method

Subjects and Setting

The subjects in this study consisted of 18 part-time, paid therapists at the Kalamazoo Valley Multihandicap Center who were also either advanced undergraduates or graduate students in psychology at Western Michigan University. All subjects had worked at the Multihandicap Center for at least one semester (15 weeks) prior to the onset of the study and had access to the Multihandicap Center Handbook, which outlined graphing requirements. In addition to the above criteria, subjects were chosen on the basis of zero percent responding during the baseline phase.

Response Definition

The behavior examined was the current graphing of client behavior by the subjects. A current graph was required for each one and one-half hour (or portion thereof) that the subject worked at the Multihandicap Center with clients. A current graph was defined as data for that day (or the words "no data" written above that day) being charted on the appropriate location by 4:00 p.m. of the day that the data were collected. Graphs were checked on a daily basis shortly after 4:00 p.m. by the Multihandicap Center's Head of Research. Criteria for phase change consisted of the data for three consecutive days falling within a range plus and minus five percent
of the mean of those three days. Reliability checks were made by the Multihandicap Center's Coordinator and were computed by dividing the total number of agreements by agreements plus disagreements and multiplying by 100. A total of six checks were made with at least one check per phase.

Procedure

**Baseline.** Bulletin board spaces were made available adjacent to the subjects' work areas. These areas were each labeled "Graphs," but no further information was posted. If the subject questioned the Program Coordinator or Head of Research about the graph areas, he was told that a more convenient space was being made available for data posting. Graph paper and other posting materials were, as always, available from the Multihandicap Center's Secretary.

**Response effort reduction.** Graph sheets for each individual were posted in the appropriate graph area. These graphs consisted of a grid without labels for the axes or title. The subjects' names were written on their particular graphs. Under each graph, a procedure description sheet was posted. Subjects that questioned the posting of graphs and data description sheets were told that it was an attempt to make the posting of data more convenient.

**Instructions.** An instruction sheet was posted on the Multihandicap Center's notice board the last day of the response effort reduction phase. It included a short rationale for data posting, instructed subjects to post data, and delineated the criteria for
current graphs. This sheet was initialed by all subjects indicating they read the notice. No contingencies were mentioned for keeping or not keeping graphs current. Graphs posted by the experimenter in the response effort reduction phase remained in place for the duration of the study.

Group feedback. Instructions and experimenter-posted graph sheets remained in place during this phase. A notice was posted on the Multihandicap Center's notice board (a location checked daily by staff) which read "Of a sample drawn from employees, the following percentage had current graphs." This was followed by the date and percentage of subjects' graphs that were current. No contingencies were mentioned. Dates and percentage of subjects' graphs were added to the notice on a daily basis. Percentage of graphs current was computed by dividing the number of subjects' graphs current by the total number of subjects' graphs that were posted; this quotient was multiplied by 100.

Return to baseline. Return to baseline was instituted after a one-week vacation and at the beginning of a new semester. This was done for two reasons: first, this most closely approximated the initial baseline phase; and second, to return to baseline involved removing the experimenter-posted graphs, which, if done during the semester, might have aroused suspicion, thus affecting data in Experiment II. Experimenter-posted graphs, instruction sheet, and group feedback sheets were removed; thus reinstating original baseline condition.
**Results**

Initial baseline conditions, represented in Figure 1, resulted in no responding for all 18 subjects in each of the 13 sessions. Introduction of the response effort reduction phase saw a small increase in percent of current graphs with a range between 0% and 11.6% and a phase mean of 5.7%. The addition of instructions in the following phase led to an increase in responding to 46.5% the first session of the phase. However, responding gradually decreased throughout the phase, stabilizing at around 25% at phase end. Correct responding ranged between 10% and 60.5% with a phase mean of 31.7%. The following phase, the addition of group feedback, showed little change in responding. Correct responding ranged between the 23.3% and 25% with the mean for the three-session phase being 23.9%. Return to baseline resulted in a zero level of responding for each of the phases and sessions. Reliability was 100% for each of the five phases.
Figure 1

THE PERCENT OF CURRENT GRAPHS PER SESSION FOR EXPERIMENT I

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% CURRENT GRAPHS

SESSIONS
EXPERIMENT II

Method

Subjects and Setting

The subjects in this study consisted of five part-time, paid therapists and one full-time therapist at the Kalamazoo Valley Multihandicap Center's Youth Component. The Youth Component is housed in the facilities that are removed from the main Multihandicap Center site where Experiment I was run. The subjects were also either advanced undergraduate or graduate students in psychology at Western Michigan University. Three subjects had also participated in Experiment I. Criteria for subject selection was the same as in Experiment I.

Response Definition

As in Experiment I, the behavior examined was current graphing of client behavior on the part of the subjects. Criteria for current graphing and data collection were the same as in Experiment I. Criterion for phase change for the first four phases was the same as in Experiment I; however, time constraints prohibited strict adherence to these criteria for the last three phases and changes were made as function of phase trends being stable and different from those in the previous phase. Reliability checks were made by the Multihandicap Center's Youth Component Coordinator and were computed by dividing
the total number of agreements by the total number of agreements plus disagreements and multiplying by 100. A total of 27 checks were made with at least two checks per phase.

Procedure

**Baseline.** Baseline was identical to Experiment I, except that graphing materials were available from the Youth Component Coordinator as opposed to the Multihandicap Center Secretary.

**Instructions.** The instructions phase was identical to Experiment I with the exception that the response effort reduction component was not included.

**Group feedback.** The group feedback phase was identical to Experiment I with the exception that the response effort reduction component was not included.

**Individual feedback.** Individual feedback was provided on a daily basis through a "percent of current graphs" chart. Subjects' names were listed vertically along the left margin, and dates were listed horizontally across the top. Data were collected on the percent of current graphs posted for each individual and listed on the chart for each of the subjects. Percent of current graphs was computed by dividing the number of graphs that were current for that day by the number of graphs that were supposed to be posted; this quotient was multiplied by 100. Instructions and group feedback remained in effect for the duration of the phase.
Figure 2
THE PERCENT OF CURRENT GRAPHS PER SESSION FOR EXPERIMENT II
Instruction II. Both group feedback and individual feedback were discontinued; thus reinstating conditions found in the instructions phase of Experiment II.

Reinforcement, instructions, and group and individual feedback. This phase included a continuation of instructions, the reintroduction of group and individual feedback, and the addition of a reinforcement component. Reinforcement consisted of one- or two-sentence social reinforcers from the Youth Component Coordinator for 100% posting each day. In addition, the subject could become a Current Overt Grapher (COG) if his graphs were up-to-date 80% of the days for a period of five days (one work week). Reinforcers for being a "COG in the system" were social reinforcers from the Youth Component Coordinator, recognition as a COG leading to attention from other employees in the component, being recognized as a COG at a staff party held in his or her honor, and a COG badge to wear at work. An extensive poster campaign was launched at the onset of this phase, and posters were humorously coercive in nature and did not specify reinforcers available for appropriate responding.

Instructions III. Both group and individual feedback and instructions were discontinued; thus reinstating conditions found in the first instructions phase and the second instructions phase of Experiment II.

Results

Baseline conditions, represented in Figure 2, resulted in zero
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responding for all six subjects in each of the phases eight sessions. Introduction of instructions saw a small increase in percent of current graphs and a return to zero for the last four sessions in the phase. Percent of current graphs ranged between 0% and 5.9% with a phase mean being 1.7%. The addition of group feedback led to an increase in responding to a stabilization point of 23.5% with a phase range of between 0% and 23.5% and a mean of 13.7%. The further addition of individual feedback resulted in variable responding that was generally consistent across the phase and higher than any previous phase in this experiment. The second instructions phase showed an overall decrease in responding with a range of between 0% and 46.7% of current graphs and a phase mean of 17.8%. The addition of group and individual feedback and reinforcement in the following phase resulted in an overall increase and percent of current graphs. Responding ranged from 33.5% to 88.2% with a mean of 60.3% for the phase period. In a return to instructions alone, the third instructions phase showed a decrease in responding to zero the final session of the phase. Percent of graphs current ranged from 0% to 52.9% with a mean for the phase being 26.5%. Mean reliability for Experiment II was 98.3% with a range between phase means of 96.1% to 100%. 

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GENERAL DISCUSSION

The data indicate varying degrees of success in effecting change in the rate of data posting as a function of various antecedents and consequences. Reducing response effort seems to have a small effect on rate, increasing it slightly. It may be reasonable to assume that the effectiveness of response effort reduction is directly related to the amount the response effort is reduced. That is, the relatively low response effort task may show a little increase in responding as a function of reduction of response effort. In addition, the lack of responding may be due to aversive properties of the task that are not affected by response effort reduction. It may also be the case that response effort reduction by itself may result in a relatively small increase in response rate; but when introduced in combination with another manipulation, the results may be far more pronounced. Support for this notion is found in the fact that the mean is far higher (30.1%) with instructions plus response effort reduction in Experiment I than it is for instructions alone (0%) in Experiment II for the three subjects that were included in both experiments. The introduction of instructions has the initial effect of increasing response rates (although a greater increase was noted in Experiment I than in Experiment II) but loses its effectiveness over time. The initial effect may also be due to the informational value of the instructions. The initial effect of instructions on a given individual is probably largely dependent on the consequences that have
accompanied instructions in that individual's past. Individuals that have been reinforced for responding to instructions, or more probably have been punished for not following instructions, are more likely to respond when instructions are posted. The reduction in response rate during both instructions plus response effort reduction in Experiment I and the introduction of instructions alone in Experiment II indicates that the effect of instructions without consequences is not a very durable one. Group feedback resulted in a stabilization of responding at approximately the same level both when accompanied with instructions and response effort reduction as in Experiment I and when accompanied with instructions alone as in Experiment II. This level was essentially a continuation of the stabilization level of the previous phase (instructions plus response effort reduction) in Experiment I. However, the stabilization level of group feedback was an increase over the stabilization level of the instructions alone in Experiment II. Individual feedback in addition to group feedback and instructions was clearly more effective in controlling behavior than any of the previous phases mentioned, although there was high daily variability. However, as mentioned above, it is usually difficult to provide feedback without simultaneously providing reinforcement for appropriate responses. Posting feedback further complicates the issue because response rate for one subject is clearly visible to all subjects or any individual entering the room; thus adding the element of group control to the issue. This study demonstrates that the most effective way to control behavior is through a combination of instructions, group and individual feedback, and reinforcement. Although
the COG system was in effect for this entire phase, only one person actually came in contact with this consequence. COG reinforcement occurred after a total of nine sessions during this reinforcement phase with only two sessions occurring after the reinforcement. It is interesting to note that the COG reinforcement party occurred immediately after the phase's high point session and was attended by all subjects. Thus, although only one subject came in contact with all of the COG reinforcers, all subjects did gain the opportunity to attend the party as a function of the one subject meeting criteria. The following low section of the phase may be explained in terms of post reinforcement pause or in terms of the subjects only having to post four out of the five days to meet criteria; thus making it unnecessary to post the first session of that five-session week.

The study demonstrates that there are effective techniques for increasing the rate of low-rate, everyday work behaviors. None of these methods require the expenditures of any funds other than the salaries of the supervisory personnel. Although the study was involved in a human service setting, it is felt that its general findings are applicable to a number of managerial situations. Although the administration and supervision of even the most complex phase in the study was, on an average, not time consuming on a daily basis (supervisors estimated that generally less than 10 minutes a day was spent on administration and supervision involved in the study), procedures could be streamlined even further. Reinforcement being thinned out as response rate rose to a reasonably high and stable level; behaviors being sampled rather than recorded on a daily basis, thus making it
possible to avoid daily administration of procedures; and feedback being provided on a random rather than daily basis are all examples of techniques that may be possible to implement and still retain a high rate of responding.
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