

EFFECT OF FEEDBACK ON
PERFORMANCE AND
JOB SATISFACTION IN AN
ORGANIZATIONAL SETTING

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ABSTRACT

EFFECT OF FEEDBACK ON PERFORMANCE AND JOB SATISFACTION IN AN ORGANIZATIONAL SETTING

By

Jay S. Kim

This study examined the effect of feedback on job satisfaction and performance in an industrial organization. Basically, this study investigated (1) the degree of job satisfaction before and after the feedback intervention as a reinforcer, (2) the differential effect of the different modes of feedback on workers' job satisfaction, (3) the degree of performance of work groups before and after the intervention of feedback as a reinforcer, and (4) the differential effect of the different modes of feedback on performance in an industrial organization.

The nonequivalent control group design was employed to investigate the effect of feedback on performance and job satisfaction in an industrial organization. Four separate plants where about 220 employees were performing service type jobs were assigned to three experimental groups and the control group. Three experimental groups received "extrinsic feedback", "intrinsic feedback", and "extrinsic and intrinsic feedback" respectively, and the control group received "no feedback" during the experimental period of three months.

A pretreatment satisfaction measure which was obtained through an attitude survey taken prior to the experimental intervention was used

as baseline in analyzing the job satisfaction data of the experimental period. For performance measures, the average performance measures of the previous year were used as baseline in the analysis of three monthly performance measures during the experimental period. The analysis of variance with repeated measures and covariance analysis were employed to investigate the pre-post difference for experimental groups and the differential effect of different modes of feedback on performance and job satisfaction.

Results showed that there was statistically significant improvement on three out of four performance measures investigated. Further, the performance measure of the three experimental groups combined was significantly better than the control group on two objective performance measures. While the combined feedback (i.e., extrinsic and intrinsic feedback) had greater impact on performance than did intrinsic feedback or extrinsic feedback, that difference did not produce as significant an effect as the presence or absence of feedback in this study.

Findings related to the effect of feedback on job satisfaction showed conflicting results. It was shown that on all four intrinsic job satisfaction dimensions investigated in this study, no pre-post differences were observed. On the other hand, workers' job satisfaction related to interpersonal dimensions increased after feedback. In contrast, significant decreases in job satisfaction with "present pay" and "job security" were found. Additionally, there was no differential effect of different modes of feedback on job satisfaction. When initial differences among the four groups were adjusted, no statistical difference between the groups was observed.

In general, the results of this study support one of the basic premises of research based on reinforcement theory, that behavior can be changed directly without going through the process of attitude change. Feedback given to workers in this study has focused on the observable task performance, not on the workers' job satisfaction. The findings showed that job satisfaction of workers was less affected by feedback while job performance was improved as a result of feedback.

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By

Jay S. ^{and} Kim

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CHAPTER I

INTRODUCTION AND REVIEW OF LITERATURE

Introduction

Ever since Skinner stated that "behavior is a function of its consequences," there have been both a wide variety of controversy among behavioral scientists and valuable theoretical development by his followers. In recent years a concerted effort has been made by social scientists to apply the reinforcement principles and their implications for describing and modifying the behavior of human beings in various organizational settings. While several field research studies on reinforcement principles and behavior modification techniques have been conducted in educational and in mental hospital settings, until recently it had been largely neglected in the industrial setting.

With the rising disillusionment with cognitive models in predicting and controlling human behavior, a number of theorists in the area of organizational behavior have begun to focus on the cognitive models as bases for research for the last several years. One of the basic premises of the research based on reinforcement theory is that if one attempts to change the behavior of others, he should focus on the behavior itself. It is assumed that behavior can be changed directly without going through the process of attitude change.



According to this premise, once behavior is changed, attitude will become consistent with that behavior. Thus, research studies based on reinforcement theory concentrate on the observable behavior and its relationships with the organizational contingencies rather than on the internal state of the worker which purportedly determines one's behavior.

Most of the research applying the principles of reinforcement to industry has focused on the monetary reward as reinforcer in the laboratory setting. Research focusing on the effect of feedback as a reinforcer on the performance of work groups within the reinforcement-based framework is virtually non-existent.

The purpose of this research is two-fold. The first objective is to investigate (1) the degree of job satisfaction before and after the feedback intervention as a reinforcer, and (2) the differential effect, if any, of the different modes of feedback on worker's job satisfaction in an industrial organization. The second objective is to investigate (1) the degree of performance before and after the intervention of feedback as a reinforcer, and (2) the differential effect, if any, of the different modes of feedback on worker's performance in an industrial organization.

Thus, this study will attempt to expand our knowledge pertaining to the effect of feedback on job satisfaction and performance as they are manifested by the result of feedback in an organization. Prior to discussing the hypotheses and methodology to achieve these objectives, a review of the relevant literature is in order. The literature review will consist of four sections: (1) a brief description of reinforcement

theory, (2) the application of reinforcement theory in industry, (3) the effects of feedback on job satisfaction and performance, and (4) intrinsic versus extrinsic feedback as reinforcer.

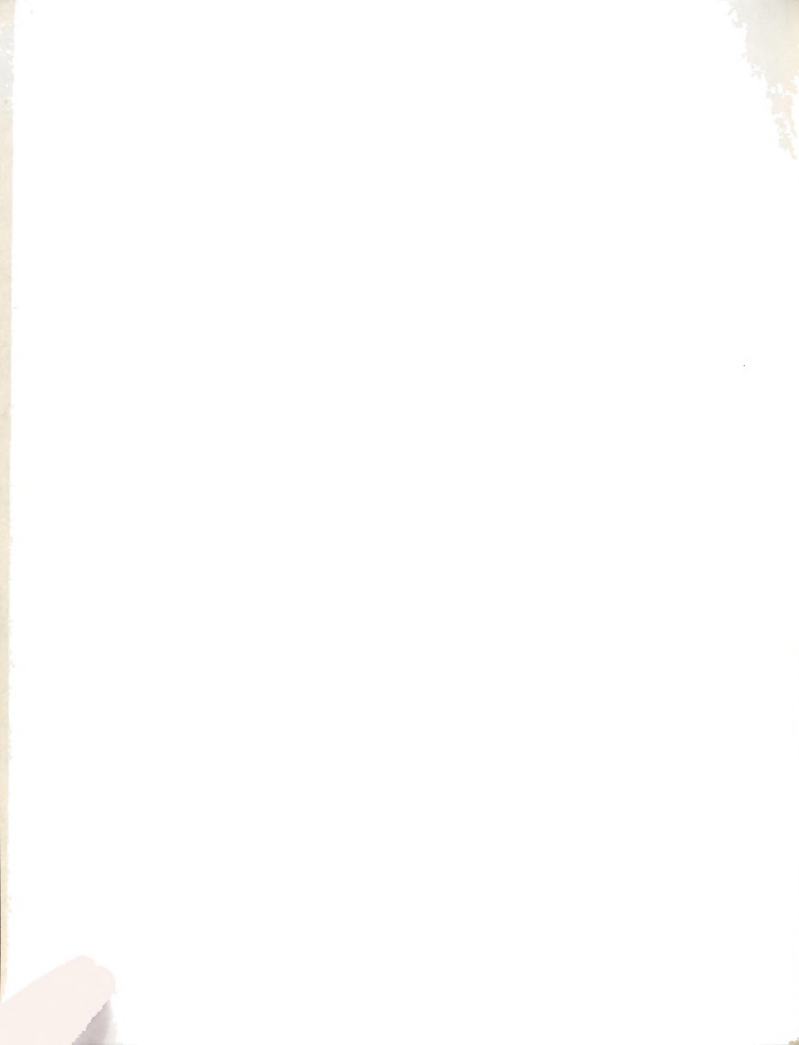
Review of Literature

Prior to the description of the research design, some of the relevant literature related to this study should be reviewed. This section starts with a brief description on reinforcement theory, followed by discussion on industrial application of reinforcement theory. Major emphasis, however, is placed on literature reviewing the effect of feedback on attitude and behavior, and the effect of different types of feedback on attitude and behavior.

Reinforcement Theory and Its Industrial Application

One of the basic premises of reinforcement theory is that all behavior is learned. Learning is the acquisition of knowledge, with performance being the translation of this knowledge into practice (Hamner, 1974a). Skinner and his followers assume that learning is a prerequisite for behavior and any set of conditions which favor learning is called "reinforcement." Therefore, according to behaviorists, the highly differentiated behavior among people can only be explained in terms of the history of the reinforcement of that behavior (Morse, 1966).

Operant conditioning is the process by which behavior is modified by manipulation of the contingencies of the behavior. Operant conditioning rests on the assumption that an individual learns mainly by producing changes in his environment and that the consequences of that environmental change influence behavior.



Skinner (1969) suggested that the interaction between an individual and his environment should contain three elements: (1) the setting in which a response occurs (i.e., environment), (2) the response itself (i.e., performance) and (3) the reinforcing consequences (i.e., reinforcement). The interrelationships among these three elements are called "contingencies of reinforcement." Skinner maintained that the consequences determine the likelihood of behavior. Therefore, this theory suggests that to change behavior, the consequences of the behavior must be changed, i.e., the contingencies must be rearranged (Behling, et al., 1974).

Several types of reinforcement and schedules by which reinforcement can be arranged have been suggested. For example, positive reinforcement and avoidance learning are types of reinforcement designed to increase the probability of an operant response. Alternatively, extinction and punishment illustrate types designed to decrease the probability of an operant response.

The effectiveness of these types is dependent upon the manner in which they are scheduled. A reinforcement schedule is a formal specification of the occurrence of a reinforcer in relation to the behavioral sequence to be conditioned (Adam and Scott, 1971) Aldis (1961). suggested two basic types of schedules by which positive reinforcement can be offered: continuous reinforcement schedule (in which reinforcement follows every correct operant response) and partial reinforcement schedule (in which reinforcement does not occur after every correct operant response). This latter category may be classified into two types: variable partial reinforcement schedules and fixed partial reinforcement schedules.



Under fixed interval reinforcement schedules, a reinforcer is administered only when the desired response occurs after the passage of a specified period of time since the previous reinforcement (i.e., fixed interval reinforcement schedule) or a reward is delivered only when a fixed number of desired responses take place (i.e., fixed ratio reinforcement schedule). On the other hand, under variable interval reinforcement schedules, reinforcement is administered at some variable interval time (i.e., variable interval reinforcement schedule) or a reward is delivered only after a number of desired responses with the number of desired responses changing from the occurrence of one reinforcer to the next (i.e., variable ratio reinforcement schedule) (Hamner, 1974a).

The effect of each type of reinforcement and the various methods of arranging contingencies on worker performance as summarized by Behling, et al., (1973) is shown below in Figure 1.

In recent years, several theorists and practitioners have shown considerable interest in the applicability of reinforcement theory to industrial settings. Aldis (1961) examined the implications of various reinforcement schedules on wage payment systems, Christmas bonuses, etc. He suggested new methods of wage payments which rely on more immediate rewards will have impact on both productivity and worker satisfaction. Nord (1969) suggested the possibilities of applying positive reinforcement in areas in industrial organizations such as training and development, compensation, job design, supervision and leadership, etc. For example, positive reinforcement can be applied in the area of compensation and alternative rewards by making rewards

FIGURE 1
OPERANT CONDITIONING SUMMARY

<u>Arrangement of Reinforcement Contingencies</u>	<u>Schedule of Reinforcement Contingencies</u>	<u>Effect on Behavior When Applied to the Individual</u>	<u>Effect on Behavior When Removed from the Individual</u>
	Continuous Reinforcement.	Fastest method to establish a new behavior.	Fastest method to extinguish a new behavior.
	Partial Reinforcement.	Slowest method to establish a new behavior.	Slowest method to extinguish a new behavior.
	Variable Partial Reinforcement.	More consistent response frequencies.	Slower extinction rate.
	Fixed Partial Reinforcement.	Less consistent response frequencies.	Faster extinction rate.
<u>Positive Reinforcement</u>		Increased frequency over pre-conditioning level.	Return to pre-conditioning level.
<u>Avoidance Reinforcement</u>			
<u>Punishment</u>		Decreased frequency over pre-conditioning level.	Return to pre-conditioning level.
<u>Extinction</u>			

Behling, et al., "Present Theories and New Directions in Theories of Work Effort," Journal Supplement and Abstract Service of the American Psychological Corporation, 1973.



contingent upon performance and/or by applying the desired variable ratio schedule of reinforcement. Further, Nord (1969, p. 399) argued that the operant approach, which focuses on the exchange of reinforcers within and between an organization and its environment "may prove to be an invaluable asset to both administrators and students of administration and organization."

Describing the role of the organization in the future in influencing human behavior, Porter (1973) argued that both human behavior and work environments are more adaptable than commonly recognized. Thus, an organization can influence human behavior in the future by making the work environment more rewarding. In other words, Porter (1973, p. 114) suggested, "organizations will need to apply the concept of reward contingencies -- that is, to relate rewards to specific work behavior." He stated, the principles of shaping (operant conditioning) can be powerful tools to help the marginal worker transform his actions into acceptable employment behavior.

Similarly, Scott and Cummings (1973) stated that organizational leaders must resort to environmental changes as a means of influencing the behavior of workers, and reinforcement principles are the most useful method in this regard.

Skinner (1973) also offered his ideas on how operant conditioning can be applied to industrial setting. Some of his suggestions include supervision by positive reinforcement, and a lottery system for portions of compensation and also for reduction of absenteeism.

Several others have argued for a behavioral approach for a selected aspect in the industrial setting. Goldstein and Sorcher (1974)



addressed themselves to supervisory training. Specifically, their attempts have been geared to the change of the work-related attitudes and behavior of supervisors through a procedure which includes the sequence of modeling, role-playing, and reinforcement "aiming directly at behavior change without relying on the diversionary tactics of attitude change." (Goldstein and Sorcher, 1974, p. 41).

Another behavioral approach for training supervisors suggested by Luthans and Lyman (1973) is called organizational behavior modification. Like Goldstein and Sorcher (1974), this training program measures whether an observable job behavior has been changed rather than attempting to measure and change internal states of one's attitudes and values. Since the measures take the form of observable job behavior - such as the units produced, orders filled, etc. - the continuous feedback of performance in behavioral terms is possible and can be used as a learning device and source of reinforcement. Further, Luthans and White (1971) argued that behavior modification can be applied in the areas of compensation, absenteeism, tardiness and motivation of organizational participants. Some other areas in which the behavioral approach has been suggested for potential benefit include organizational development (Beer, 1969), and counseling and guidance (Michael and Meyerson, 1962).

To summarize, the arguments discussed above share at least two points in common. First, they all seem to agree that the procedure and schedules of reinforcement can be applied to change the supervisory and worker behavior in the industrial setting. Second, they suggest abandoning the preoccupation with the inner life of man (i.e.,



attitudes) and concentrating on man's observable behavior and transactions with the environment. The emphasis on observable behavior enables more effective feedback, which can become a source of reinforcement.

Effect of Feedback on Attitudes

It has been generally conceived that feedback is one of the most critical factors in learning, motivating, and enhancing performance level. The reinforcing effect of feedback has been well expressed in terms of stimulus-response by Thorndike (1911). He asserted that, of several responses made to the same situation, those which are accompanied or closely followed by satisfaction will be more likely to recur; those which are accompanied or closely followed by discomfort will be less likely to occur (Thorndike, 1911, p. 244). This is the basis of reinforcement theory which views that all forms of feedback can be regarded as rewarding or punishing and that a rewarding result preserves the behavior which preceded it by a relatively simple mechanism.

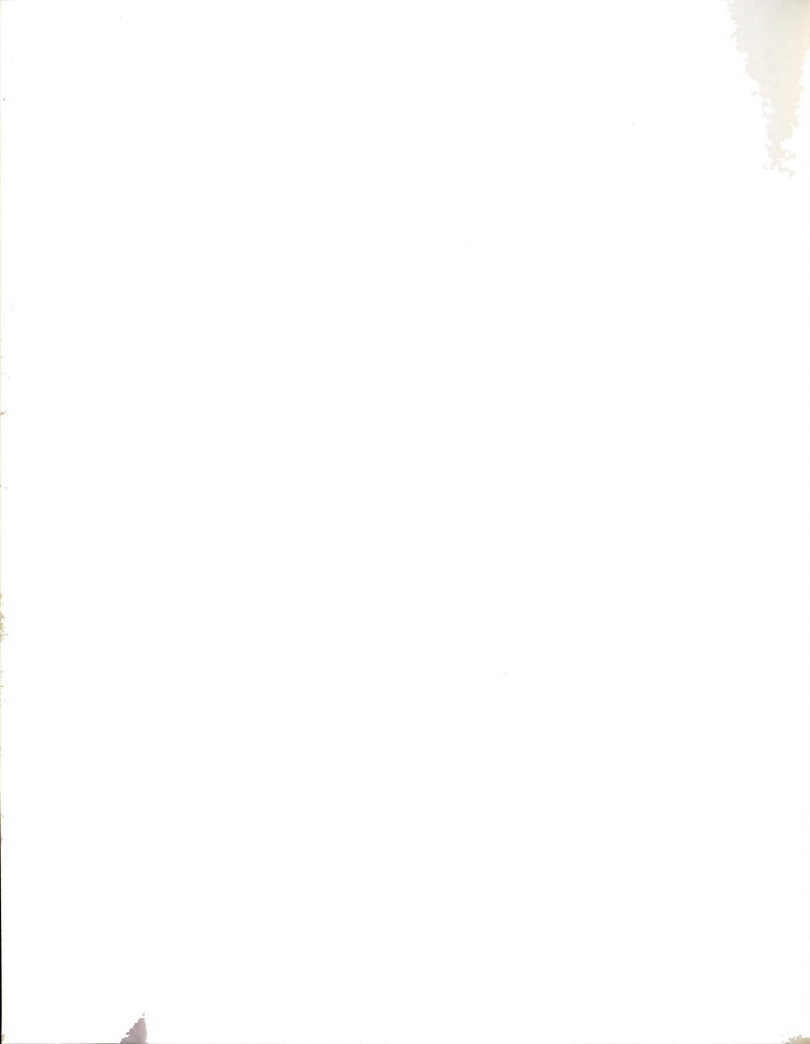
As defined by Dunnette and Kirchner (1965), an attitude is a "relatively stable or enduring syndrome of consistent responses made by an individual with respect to some psychological object -- any symbol, slogan, product, institution, person, group, or issue -- with which he may be confronted." (p. 215) However, only a limited number of researchers have addressed themselves to the effect of feedback on attitude. Watson (1969) found the potential effect of immediate and direct feedback on interpersonal changes in self-awareness, perception of others, acceptance, self-confidence, etc. Another study which tends



to support the findings of Watson was made by Leavitt and Mueller (1951). They found that zero feedback was accompanied by low confidence and hostility, while free feedback was followed by high confidence and friendliness. In an experiment involving the T-group process, Kolb, Winter, and Berlow (1968) found that subjects in groups which received feedback reported higher self-perceived change than did non-feedback subjects.

Several others studies related to the performance appraisal process in organizational settings also demonstrate the effect of feedback on attitude (Mahler, 1957; Meyer and Walker, 1961a; Kay and Meyer, 1962). For example Meyer and Walker (1961b) at General Electric found in a study based on managers and specialists that the participants' attitude toward the merit-pay salary plan was significantly correlated with their views as to how well feedback discussion was handled during the performance appraisal. Similarly, Ivancevich, Donnelly and Lyon (1970) found in their study on Management-By-Objective that the subjects of one company in which a feedback session was employed every three months showed more positive results in perceived need satisfaction than those of another company in which feedback was employed only once a year. Especially, significant improvement was indicated in four of the five need categories for middle managers. Furthermore, they contended that the exact number of feedback sessions for optimum level of need satisfaction must be determined on an individual firm basis.

The preceding literature related to feedback effect on attitude has been primarily concerned with feedback provided by superiors or experimenters; that is, extrinsic feedback. This extrinsic feedback



is often confused with intrinsic feedback which refers to the degree to which employees receive information as they are working which reveals how well they are performing on the job. Hackman and Lawler (1971) found that there was little agreement between employees and researchers in their ratings of jobs as high or low on the feedback dimension, while consensus existed in ratings on the other three job dimensions - variety, autonomy, and task identity. Hackman and Lawler attributed this disagreement to raters' confusion in distinguishing between extrinsic feedback and intrinsic feedback. They suggested that this difficulty partially stems from the fact that some feedback is provided directly by the job as an employee works, while additional feedback may be provided by the supervision. Further, they reported that feedback of task (i.e., intrinsic feedback) was significantly correlated with all job satisfaction items under study, (such as self-esteem obtained from job, independent thought and action, security, pay, feeling of worthwhile accomplishment, promotion, etc.), especially for those employees with high-order need strength.

While the authors reviewed to this point seem to suggest the potentially positive impact of feedback on attitude, several other authors have presented different results. Harrison (1969), using graduate students as subjects, examined the effect of direct formalized feedback on attitude in a group counseling situation. In his study, the experimental group received the direct formalized feedback of the other group members' rating of their behavior, while the control group received no information. One of the key findings of this laboratory study indicated that the use of direct formalized feedback techniques in groups

did not produce attitude change. Another study which tends to concur with this finding was conducted in a large corporation by Smith and Knight (1959) on first level supervisors who participated in a management training program. Smith and Knight reported that the groups receiving personalized feedback and the groups receiving no feedback on their behavior showed no difference on "self insight" which was measured by having each conferee indicate who assumed the leadership role well.

Therefore, evidence pertaining to the impact of feedback on attitude is still tentative and the specific dynamics of feedback on attitude are not fully known at this time. Especially, none of these authors specifically address themselves to the interactive nature of extrinsic and intrinsic feedback on attitude. Further, attitude as the dependent variable employed by these various researchers varies so widely that any inferences drawn from these studies are far from being conclusive.

Effect of Feedback on Behavior

As discussed earlier, numerous theorists and practitioners suggested that the reinforcement-based approach applied in organizational settings can produce changes in behavior (Aldis, 1961; Porter, 1973; Scott and Cummings, 1973). Studies regarding behavioral change focus on the impact of monetary reinforcement and reinforcement schedule on productivity (Yukl, et al., 1972), absenteeism (Gamboa and Pedalino, 1974; Luthans and White, 1971; Adam, 1972). Prior to the discussion of feedback effect on behavior, some of these studies will be reviewed in this section.

Yukl, Wexley, and Seymore (1972) examined the effectiveness of pay incentives under various schedules of reinforcement. They reported that pay incentives were more effective in motivating increased production when used with a variable ratio schedule than when used with a continuous reinforcement schedule. However, Latham (1974), in conjunction with Yukl, found the opposite results among tree planters of Weyerhaeuser Company. When monetary reward was used as a reinforcer, he reported that the highest increase in performance was shown under continuous reinforcement condition, rather than under two other variable reinforcement schedule conditions. He attributed these results to the difference in sex, leadership, and situational variables of the study.

Adam (1972) investigated in a laboratory setting the effectiveness of operant conditioning procedures in obtaining changes in performance quality over time. One of the key findings was that conditioning procedures, when compared to an absence of conditioning, facilitated higher levels of performance quality.

Gamboa and Pedalino (1974) conducted a field study at a manufacturing-distributive company regarding the effect of a lottery incentive system on absenteeism. They reported a significant decrease in absenteeism after a lottery system was introduced. Further they indicated that stretching the reinforcement schedule from weekly to biweekly could be achieved without resulting in a significant increase in the rate of absenteeism.

As stated earlier, these studies employed primarily monetary reward as a type of reinforcer to induce behavior change. There are



a number of studies which examined the effect of performance feedback as a reinforcer. Ammons (1954) after reviewing studies on the effects of knowledge of results on performance, suggested that knowledge of results universally tended to improve the performance in laboratory settings.

Both the studies of Smith and Knight (1959) and Harrison (1969), which were previously discussed, showed the effect of feedback on behavior. For example, the study of Harrison indicated that feedback produced behavioral changes but not attitude change in a group counseling situation. Similarly, Smith and Knight reported that groups receiving personalized feedback consistently improved group problem solving efficiency as compared to groups receiving no feedback. This finding is consistent with the findings of Pryer and Bass (1950) which showed groups receiving feedback solved their problems more accurately than control groups.

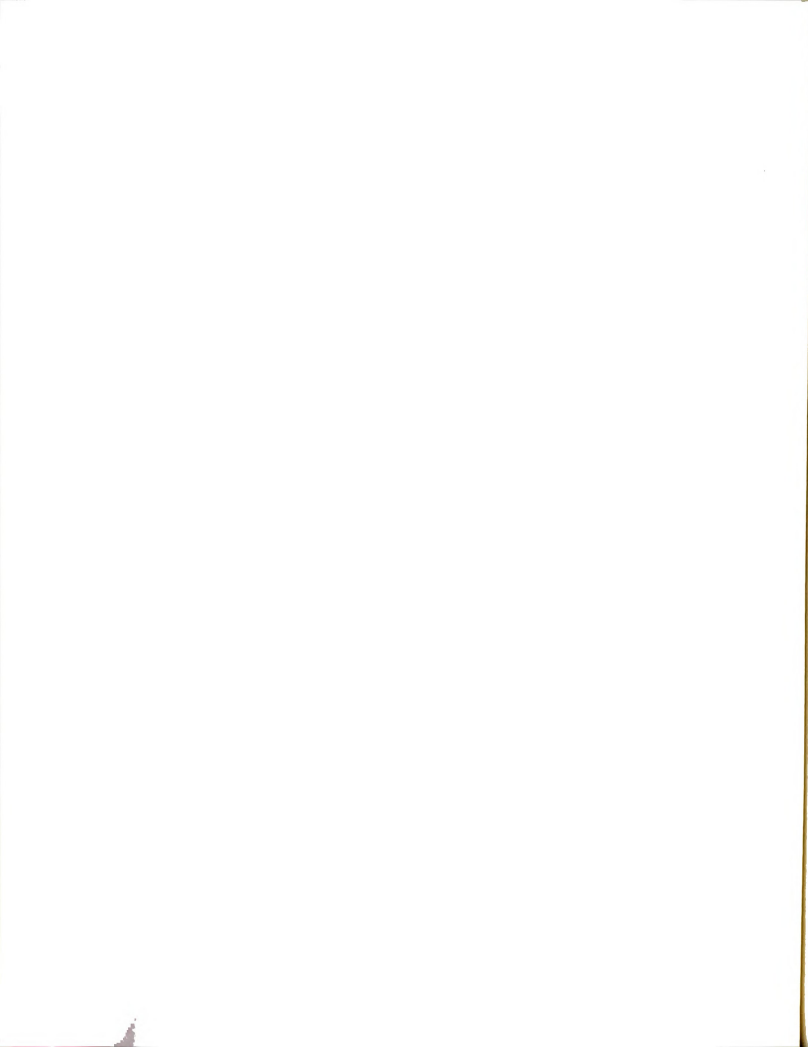
A field experiment conducted by Hundal (1969) indicated that the performance of subjects in a repetitive industrial task increased in direct relation to the degree of awareness of their performance. Additionally he reported statistically significant differences in performance between the pre-experimental and the post-experimental periods for the subjects who were given accurate information about their performance. Another field experiment on life insurance agents reported by Weitz, et al. (1954) indicated that the experimental group (those with whom the home office maintained contact by means of production bulletins and personal letters) showed better performance than did the control group (which had no home office contact). Miller (1965) at

General Electric reported that increasing the amount of feedback from foremen to workers improved the performance of the workers. He also provided evidence showing that the effects of feedback were related to performance quality.

Partially contradicting the findings of Smith and Knight (1959) and Harrison (1969), Cook (1968) found positive impact of feedback on performance as well as on attitude of the participants. She reported that the attitude and performance of the participants were directly related to the frequency of feedback.

Several industrial organizations have attempted to apply the reinforcement principles through "positive reinforcement programs." Some efforts of the most publicized companies include the work of E. J. Feeney at Emery Air Freight (Business Week, December 18, 1971, December 2, 1972), E. D. Grady of Michigan Bell Telephone Company (Business Week, December 2, 1972; International Management, October, 1973), Clifford Mrazek of Belden Corporation, J. LeCheminant of Sun Life of Canada, among many others (Hamner, 1974b). While these companies emphasize different aspects of reinforcement theory, they generally follow the work done by Mager (1962, 1970) and Rummeler (1972) as guidelines. Both Mager and Rummeler focus on operationally defined goals and feedback on worker's performance as critical elements for the success of the program.

Following this argument, Feeney stated that most performance problems in industry are execution problems; that is, low performance may result from lack of feedback, task interference or punishment but rarely from lack of motivation (Laird, 1971). Further, Feeney stated:



I see feedback and reinforcement as basic organizational activities; operating at different levels with different behaviors for reinforcement at each level. (Laird, 1971, p. 55)

Feeney's claims include the increased profits of about \$2 million annually, the immediate improvement of performance sustained for four years, and beneficial side effects in terms of worker-management relations.

Part of the empirical evidence derived from the program implemented by Feeney in Emery Air Freight and Grady in Michigan Bell were reported by Brethower (1973) and by Grady and Hamner (in preparation), respectively. Brethower (1973), inquiring about the extent to which feedback can be used by managers in business organizations, investigated whether self-recording of performance information and subsequent positive reinforcement increase the number of callbacks completed on schedule to customers by customer service employees in Emery Air Freight. Results showed performance improvement from a group mean percentage of 25% during base line period to a group mean percentage of 94% during the feedback period of 21 weeks. Further, this improvement of performance over baseline was maintained over 15 months. Based on the results of this and other studies, Brethower concluded that (1) managers can use performance indicators as feedback, (2) feedback significantly improves performance, and (3) effects of feedback can be maintained over time. One of the limitations of her studies, however, lies in the absence of control or comparison groups, which may weaken the degree of internal validity of the findings.

Therefore, research evidence tends to suggest that feedback can improve performance of various tasks, and feedback can be employed



effectively in industrial organizations for the improvement of performance. Again, as has been the case for studies on attitude, the question regarding different effects on performance resulting from different modes of feedback remains unanswered. For example, does intrinsic feedback have a different degree of impact compared to extrinsic feedback on performance or vice versa? Studies dealing with extrinsic versus intrinsic reinforcement in general and feedback in specific are discussed in the following section.

Effect of Extrinsic and Intrinsic Feedback on Performance

The cognitive theorists, notably expectancy theorists, tend to emphasize intrinsic reward, while reinforcement theorists place more emphasis on extrinsic reinforcement (Brethower, 1972). Yet, both expectancy theory and reinforcement theory of task motivation make a common assumption that the effects of intrinsic and extrinsic reinforcement are additive; i.e., a worker will be more motivated (or responsive) to complete a task when both kinds of rewards (or reinforcement) are present. Bandura and Perloff (1967) have suggested that self-reinforcement (which seems implicit to the concept of intrinsic motivation) directly parallels the effects of external reinforcement. O'Leary, Poulos and Devine (1972) maintained that the use of tangible reinforcers is valuable in building "intrinsic" reinforcers. Aronfreed (1968) suggested that emphasis on the intrinsic by some and emphasis on the extrinsic by other theorists is unwarranted since one without the other is relatively ineffective and inefficient.

Deci (1972a, 1972b) has suggested that extrinsic rewards and intrinsic task motivation can be conflicting in nature. Engaging



college students as subjects in a puzzle game under three different conditions (rewarded with money, rewarded with positive feedback, and no reward), Deci used the amount of time they worked on the puzzles during the free-choice time as the dependent measure of motivation. Based on this measure, he interprets that, when money was contingently paid to subjects for performing intrinsically motivating tasks, their intrinsic motivation decreases, with the exception of positive verbal reinforcement. However, several authors (Hamner, 1974b Yukl, 1974) have suggested that the cognitive evaluation theory of Deci is subjected to a number of methodological problems that raise doubts about the data upon which Deci's theory is based. Erskine (1974) conducted a laboratory experiment designed to test the effects of task characteristics and monetary payments on the persistence of behavior. His data suggested that money can add to the reinforcing characteristics of task as an additional source of reinforcement.

Similarly, Hamner and Foster (in press) tested cognitive evaluation theory in a laboratory setting using college students as subjects. They found support for a reinforcement based prediction that task characteristics and money payments when appropriately arranged and scheduled increase task performance and/or self-reports of task attractiveness and interest. Thus, they indicated support for a reinforcement and expectancy theory explanation that the effect of intrinsic and contingent extrinsic rewards on task motivation and performance are additive in nature.

Several researchers (Bandura, 1969; Kanfer, 1971) have shown intrinsic feedback (i.e., self-generated evaluation) can serve as a



basis for self-rewards and self-criticisms. Further, intrinsic feedback has reinforcing properties (Bandura and Perloff, 1967; Montgomery and Parton, 1970). Warm et al., (1972) investigated the relative efficiency of two forms of feedback (experimenter controlled feedback and subject controlled feedback) in enhancing vigilance performance. They found that both feedback groups had faster response time than control group receiving no feedback. However, results did not show a significant difference between feedback groups, although subjects with extrinsic feedback performed better than did the intrinsic feedback subjects.

Therefore, as Nord (1969) argued, it is reasonable to assume that intrinsic rewards may have the same consequences as extrinsic rewards if they are given on the same reinforcement schedule. Under this premise, it seems possible to explain the "intrinsically motivated" behavior within a framework of reinforcement. Further, if these two types of reinforcement are in fact closely associated with each other, it can be possible that an interactive effect of intrinsic and extrinsic feedback may empirically exist in a given situation.

Yet, Baron and Ganz (1972) found in an experiment using elementary school children that intrinsic feedback, extrinsic feedback and the combined feedback of both failed to produce significant difference in performing a simple form discrimination task.

To summarize, evidence arguing for the positive impact of feedback on performance seems to be stronger than evidence showing the positive impact of feedback on attitude. What seems unclear at this time is whether there is a differential and/or interactive effect of extrinsic and intrinsic feedback on performance. This issue of the effect of

extrinsic-intrinsic feedback on work performance and/or job satisfaction within a reinforcement based framework has not been examined in real industrial settings.

Summary of Literature Review

As the preceding review illustrated, the arguments surrounding reinforcement theory and its potential value in application to industrial organizations are, by and large, testimonial and generally lack supportive, empirical evidence. Most of the empirical studies related to this issue, having been conducted in laboratory situations, provide little comparability and offer conflicting evidence.

While several researchers and practitioners seem to suggest the potential effect of feedback on attitude and/or performance, evidence is still tentative with the specific nature of feedback on attitude and/or performance not being fully known. Especially lacking is research focusing on the effect of different types of feedback on attitude and/or performance. Presently no study has attempted to investigate the impact of extrinsic and intrinsic feedback on attitude and/or performance and its interrelationship in the industrial organization.

Therefore, several questions regarding feedback in industrial setting may be summarized as follows:

1. Can feedback enhance the degree of job satisfaction of workers in an industrial setting?
2. Can feedback as a reinforcer be effectively built into an organization setting to increase performance?

3. Can extrinsic and intrinsic reinforcement produce differential effects on performance?

4. Are extrinsic and intrinsic feedback interactive or offsetting in nature?

Hypotheses

The following hypotheses are primarily derived from the existing research evidence pertaining to the effect of feedback on attitude and behavior. They provide empirical tests for the relationships between different modes of feedback as the manipulated independent variable and the observed effects on the job satisfaction and the performance measure as the dependent variables.

Hypothesis 1-a. Workers receiving feedback will have a greater increase in job satisfaction than workers receiving no feedback.

Research findings on this issue show conflicting results. Smith and Knight (1959) and Hundal (1969) suggested the degree of attitude change resulting from feedback is not significant. On the other hand, several authors (Watson, 1969; Leavitt and Mueller, 1951; Kolb et al., 1968; Ivancevich et al., 1970) suggested positive impact of feedback (i.e., extrinsic feedback) on attitude. Similarly Hackman and Lawler (1971) showed that feedback of task, which is intrinsic in nature, is positively related to job satisfaction. This hypothesis, therefore, is derived from the findings of the latter group of research studies.

Hypothesis 1-b. After the feedback intervention, the degree of job satisfaction for workers receiving extrinsic feedback will be higher than for those receiving intrinsic feedback.

No specific studies are available at this time to argue that the effect, if any, of extrinsic feedback on attitude is significantly

greater than that of intrinsic feedback. However, it is generally assumed that individuals who receive frequent reports on performance (which is extrinsic feedback in nature) tend to have better attitude (Cook, 1968) and higher need satisfaction of participants (Ivancevich, et al., 1970), although neither studies made a deliberate attempt to provide intrinsic feedback to the subjects.

Hypothesis 1-c. After feedback intervention, the degree of increase in job satisfaction for those receiving the combined feedback (i.e., extrinsic/intrinsic feedback) will be higher than that of all other groups.

It has been suggested that intrinsic and extrinsic reinforcement are closely associated with each other (Bandura and Perloff, 1967; O'Leary, et al., 1972; Aronfreed, 1968). Extending from this argument, it is hypothesized that there is a combined effect of self and supervisory feedback on job satisfaction.

In addition to these hypotheses related to all dimensions of job satisfaction, a following prediction is made regarding a specific dimension of job satisfaction.

Hypothesis 1-d. After feedback intervention, the degree of job satisfaction on supervision will increase to a higher degree for those who receive the extrinsic feedback than for those who receive the intrinsic feedback.

This hypothesis on a specific dimension of job satisfaction, supervision, is derived from the finding of Cook (1968) and Ivancevich et al., (1970) cited earlier. While Cook and Ivancevich, et al., did not deal specifically with "supervision," it can be argued that periodic feedback on performance and positive verbal reinforcement given by supervisors will affect the worker's perception of his satisfaction with his superior.

In addition to the hypotheses pertaining to the effect of feedback on job satisfaction, the following hypotheses are made regarding the effect of feedback on behavior.

Hypothesis 2-a. There will be a significant degree of increase in job performance for those receiving feedback, after the feedback intervention (i.e., pre-post difference for experimental groups).

Hypothesis 2-b. Workers in groups receiving feedback will have a greater increase in degree of job performance than workers in groups receiving no feedback.

It has been shown that groups receiving feedback increased performance in problem solving tasks (Smith and Knight, 1959) and in repetitive grinding tasks (Hundal, 1969), and that individuals receiving feedback improved performance (Brethower, 1973; Weitz, et al., 1954), performance quality (Miller, 1965), cost performance (Laird, 1971). It is hypothesized, therefore, that these findings are generalizeable to tasks which are service type in nature.

Hypothesis 2-c. There will be no significant difference in performance between those receiving extrinsic feedback and those receiving intrinsic feedback, after feedback intervention.

This hypothesis was derived from the findings of Warm et al., (1972) which indicated that external feedback and self feedback made no significant difference in enhancing vigilance performance. It is hypothesized that this finding is generalizeable to tasks which are service type in nature.

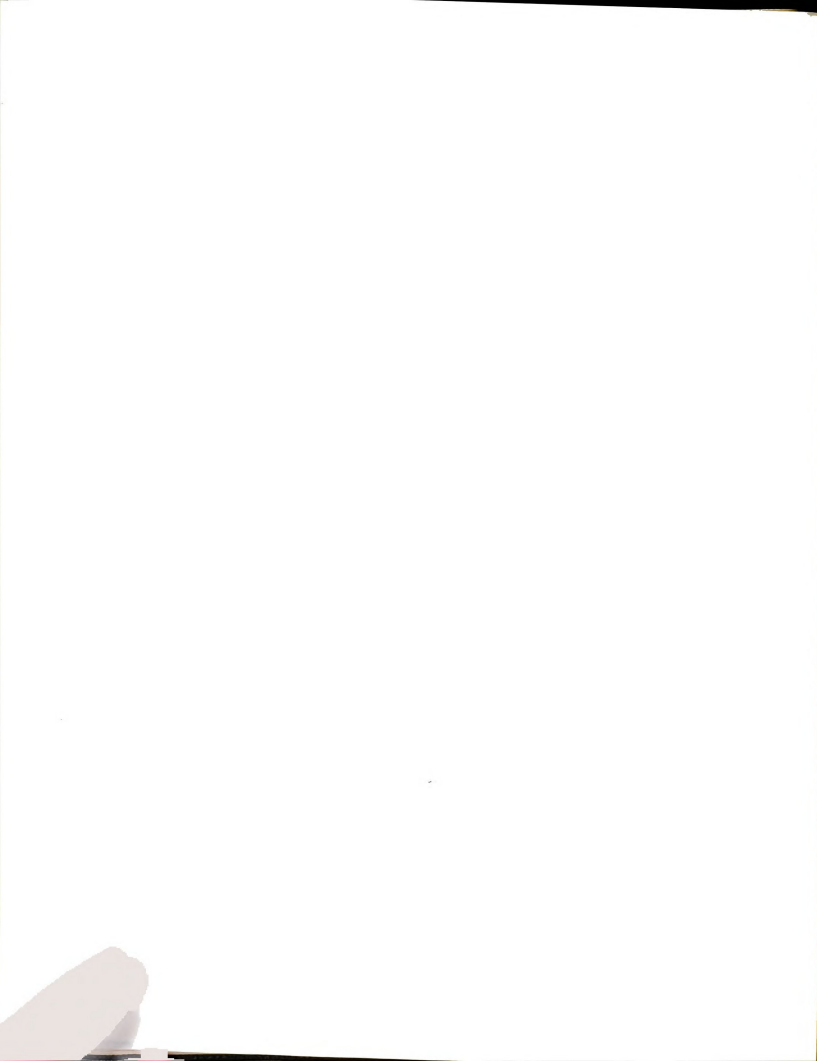
Hypothesis 2-d. After feedback intervention, the degree of increase in performance for those receiving the combined feedback (i.e., extrinsic and intrinsic feedback) will be higher than that of all other groups.

While Baron and Ganz (1972) suggested no significant impact of the combined feedback effect on performance among elementary school students, Hamner and Foster (in press) found that the effect of intrinsic and contingent extrinsic rewards on performance are additive. Additionally, Aronfreed (1968) argued that one without the other is relatively ineffective and inefficient.

Hypothesis 3-a. Absenteeism among workers receiving feedback will decrease after feedback intervention.

Hypothesis 3-b. After the feedback intervention the degree of decrease in absenteeism for those receiving the combined feedback will be higher than that of all other groups.

A number of studies have shown that absenteeism is related to job satisfaction (Vroom, 1964; Talacchi, 1960; Waters and Roach, 1971). Thus, it can be argued that to the extent that feedback affects job satisfaction, absenteeism will be affected, although the feedback to be provided is related to job performance rather than to absenteeism.



CHAPTER II

METHODOLOGY

Introduction

In the preceding chapter, literature dealing with reinforcement theory, application of reinforcement theory, effect of feedback on attitude and performance, and hypotheses derived from the literature were presented. This chapter will begin with a brief description of the research design employed in this study followed by a discussion of (1) the independent variables, (2) the dependent variables, (3) the subjects and procedure, (4) the measures used, data collection, and scoring, and (5) analysis of data.

Experimental Design

The nonequivalent control group design (Campbell and Stanley, 1963) was employed in this study. This experimental design was modified to include a time-series by adding three monthly posttest measures related to performance. This quasi-experimental design, as opposed to a "true" experimental design, typically involves applied settings where it is not possible to control all the relevant variables but only some of them (Isaac, 1974).

This study employed this design because random assignment of subjects to the experimental groups and the control group was not feasible

in the research site. Therefore, this design is different from the "pretest-posttest control group design" in which experimental subjects are assigned randomly from a common population to the experimental and the control group. Yet, Campbell and Stanley (1963) have regarded this design as controlling effects which can weaken internal validity, such as history, maturation, testing, and instrumentation, since a control group insures against mistaking these effects for the treatment effects.

Since this design lacks complete randomization of subjects, group differences undetected by pretest measures may possibly exist, thereby contaminating posttest data (i.e., selection-maturation interaction, selection testing interaction, etc.). As Stanley and Beeman (1958) and Thorndike (1942) suggest, analysis of covariance techniques can be used to increase internal validity when randomization is not possible. Although the selection of the control group in this study was influenced by its apparent higher performance, pretest data did not reflect control group superiority on the two objective task performance measures. Therefore, problems of regression in this design should be minimized in this study.

As for external validity, a possible problem with this design is interaction of pretesting and treatment; that is, administration of a pretest may influence subjects' awareness of treatment, reducing their representativeness of the unpretested population. Precautions were taken to avoid this effect, as described in the procedure section of this chapter.

The experimental design for the study of the feedback effect on job satisfaction is shown in Figure 2.

FIGURE 2
EXPERIMENTAL DESIGN FOR THE STUDY OF THE EFFECT
OF FEEDBACK ON JOB SATISFACTION

<u>Group</u>	<u>Period</u>	
	<u>Pretest</u>	<u>Posttest*</u>
Extrinsic Feedback	X_{11}	X_{14}
Intrinsic Feedback	X_{21}	X_{24}
Extrinsic and Intrinsic Feedback	X_{31}	X_{34}
No Feedback	X_{41}	X_{44}

*The posttest measures correspond to the 90 days measures; see Figure 3.

For performance variables, three consecutive posttest measures were obtained to detect the experimental effect. Further, where these repeated measures for posttest periods were obtained, the mean of the preceding year served as a pretest measure of these dependent variables for both control group and experimental groups. The experimental design for the study of feedback effect on performance variables is shown in Figure 3.

Independent Variable

In this study, the different modes of feedback given to three experimental groups and a control group constituted the four levels of the independent variable, feedback. The modes of feedback (i.e., treatments) included: (1) extrinsic feedback, (2) intrinsic feedback, (3) extrinsic and intrinsic feedback, and (4) no feedback.

FIGURE 3
EXPERIMENTAL DESIGN FOR THE STUDY OF THE EFFECT
OF FEEDBACK ON PERFORMANCE

Group	Pretest	Posttest		
		30-Days	60-Days	90-Days
Extrinsic Feedback	X_{11}	X_{12}	X_{13}	X_{14}
Intrinsic Feedback	X_{21}	X_{22}	X_{23}	X_{24}
Extrinsic and Intrinsic Feedback	X_{31}	X_{32}	X_{33}	X_{34}
No Feedback	X_{41}	X_{42}	X_{43}	X_{44}

Extrinsic feedback was operationally defined as having work groups receive information from their foremen as to how many workers in the work group had met the previously determined weekly objective. That is, using the rating forms (see Appendix A), foremen rated their worker's performance in behavioral terms on a daily basis. They provided feedback weekly on worker's performance against the weekly objective. The form used for the feedback is shown in Figure 4. Further, each foreman praised workers on the performance categories which displayed good performance. This group served as an experimental group with externally reinforced treatment without receiving additional judgment.

Intrinsic feedback was operationally defined as having workers rate themselves as to how well they performed on a daily basis, using the same rating forms (see Appendix A). At the beginning of each week, the supervisor set the goal for each work group without providing any

FIGURE 4
GROUP FEEDBACK SHEET

Date _____

Department _____

Week _____

SAFETY		SERVICE		COST	
Objective	Actual	Objective	Actual	Objective	Actual
_____ Excellent _____		_____ Excellent _____		_____ Excellent _____	
_____ Good _____		_____ Good _____		_____ Good _____	
_____ Fair _____		_____ Fair _____		_____ Fair _____	
_____ Poor _____		_____ Poor _____		_____ Poor _____	

ATTENDANCE		WORKER COOPERATION		SUPERVISOR COOPERATION	
Objective	Actual	Objective	Actual	Objective	Actual
_____ Excellent _____		_____ Excellent _____		_____ Excellent _____	
_____ Good _____		_____ Good _____		_____ Good _____	
_____ Fair _____		_____ Fair _____		_____ Fair _____	
_____ Poor _____		_____ Poor _____		_____ Poor _____	

other feedback on their performance. This procedure allowed the workers to keep a record of his or her own work. (i.e., self-feedback), permitting the worker to gain intrinsic feedback from the task itself (Hamner, 1974b). Thus, this group served as an experimental group with intrinsically reinforced treatment without external judgment.

Extrinsic and intrinsic feedback was operationally defined as having workers obtain both extrinsic feedback from their foremen and intrinsic feedback from themselves as described above. Thus, at the beginning of each week, each foreman pointed out the discrepancy between self-rating and supervisory rating on performance, and then praised the worker groups on those performance categories which demonstrated good performance. This procedure was repeated on a weekly basis using the same feedback form (see Figure 4).

No feedback was defined as having workers under the current practice without introducing any change. Some feedback may have been already provided to workers through regular supervisory practices. The current practice will be described in detail in the procedure section of this chapter.

Dependent Variables

Two categories of dependent variables were measured in this study: job satisfaction and performance. Job satisfaction was measured by the Job Description Index (Smith, et al., 1969) and the five single item scale of job satisfaction questionnaire constructed for this study. The Job Description Index (JDI) includes the five dimensions of job satisfaction: work on present assignment, present pay, opportunity for promotion, supervision on present assignment, and people

on present assignment. The remaining five single item scale of job satisfaction covers such dimensions as opportunity for independent thought, sense of accomplishment, job security, recognition of good performance and physical conditions in the work place (see Appendix B).

Another dependent variable category deals with performance of the work group. One subjective performance measure on "service" was observed. Service, defined as a performance measure, was obtained by the superior's subjective rating on the quality of building service, maintenance, motor vehicle, and supply services. The actual score ranges from 1 to 100 and was obtained by inspection on specifically described inspection categories on a periodic basis. The 1974 service objective for the work groups under this study was 83 points. (More detailed description of "service" and other performance variables are given in Appendix C).

In addition, three objective measures of performance were investigated in this study: "cost," "safety," and "absenteeism." The "cost objective" was computed based on two basic categories: (1) actual dollar expenditures per approved budget assigned to departments, (2) actual dollar expenditures per approved hourly budget assigned to specific labor classes. The actual cost performance for this study was obtained by computing the ratio of forecasted over actual cost. The measure of "safety" was obtained by adding the actual points for such categories as job disability accidents, professional care and restrictions, duty accidents, motor vehicle accidents, and accident prevention plan. For example, the point for job disability accidents for a given period is a function of the number of lost time injury cases and the

total days of absence due to accidents adjusted by the total number of employees for the work group. The 1974 net safety objective for the work groups under this study was 87 points.

These three dependent variables - service, cost ratio, and safety - are the major performance measures which are directly related to the tasks involved in the job situation. Finally, the absenteeism objective is obtained by allowing .7 percent for the incidental absenteeism and 4.0 percent for the disability absenteeism for the total working hours for the work group. Therefore, the actual measures of these variables reflects the rate of absenteeism of the workers.

"Worker cooperation" and "supervisory cooperation" are two measures created in this study. Therefore, since only posttest data were available, these measures are not included in the findings.

Subjects and Procedure

The research was conducted in four separate plants within a large midwestern telephone company. The plants are located in a suburban area of a midwestern city. There are approximately 220 workers employed in these plants working on service type jobs. Approximately 25% of employees in these plants are white-collar workers involved in managerial and clerical types of work. The remaining employees, who were direct participants in this study, were 37 workers in the extrinsic feedback group, 26 workers in the intrinsic feedback group, 26 workers in the extrinsic and intrinsic feedback group, and 24 workers in the no feedback group (control group). These workers hold one of these five job titles: building equipment mechanic, motor mechanic, building



serviceman, cleaner, or stockman. The description of each of these five jobs is summarized in Figure 5.

These participants are blue-collar unionized employees with a high school education on the average. About 60 percent of these employees are in the age category between 40 and 60. Approximately 40 percent of these employees are women. The number of foremen who supervise the work group in each plant varies only slightly; 6 for the three experimental groups and 7 for the control group. The number of workers in each work group, however, ranges from 2 to 13.

Prior to this experiment, workers were rated by their supervisors in six categories, such as productivity, quality of workmanship, dependability, safety, job knowledge, and customer-employee relations. In each work group, each foreman rated his subordinate on a scale ranging from 1 to 5 either by direct observation or by job inspection. The frequency of rating by each foreman varied for individual workers. If workers were rated "below average" (i.e., lower than an average of 3 in a composite score of six performance categories), they were more frequently observed and rated. Conversely, if workers were rated "above average," the frequency of observation on these workers for the rating purpose was subsequently decreased. Therefore the frequency of feedback given to workers varied by their performance.

Currently, three measures of performance are available at the plant level: cost, service, and safety. These measures served as the indicators of the relative efficiency in each plant.

Of four plants, three served as experimental groups, and the fourth served as the control group. Before any feedback intervention

FIGURE 5
JOB DESCRIPTIONS OF THE SUBJECTS

BUILDING MECHANIC - Inspects, maintains, makes repairs, and installs electrical and mechanical equipment including plumbing, ventilating, heating and refrigeration equipment on Company and customer's premises. Makes repairs and alterations to buildings on customer or Company premises including carpentry, plumbing, masonry, plastering, painting, and electrical work. May install, maintain and repair building and equipment hardware. May repair fixtures, furniture, and furnishings including cabinet work and finishing. May do other related assigned work.

BUILDING SERVICEMAN - Cleans buildings and central office equipment; services and inspects fire equipment; receives and disposes of supplies; operates the heating plant; maintains building grounds and performs other house service work.

GARAGE MECHANIC - Maintains motor vehicles and motor driven tools, including inspections, adjustments, repairs and overhauls. Performs other work such as disbursing gasoline and cleaning, lubricating and painting motor vehicles.

CLEANER - Does general cleaning work, such as wet and dry mopping; washing and polishing furniture; washing walls; scrubbing stairs; vacuuming rugs; dusting; and picking up waste papers.

STOCKMAN - Receives, stores and disburses telephone apparatus and supplies. Performs other duties incident to maintaining stockrooms and pole yards such as reconditioning some equipment, disbursing gasoline and taking inventories.



took place, a pre-intervention attitude survey was administered to all blue collar workers in the four groups to measure the degree of job satisfaction. This step was introduced in order to detect the experimental effect of feedback intervention once it had taken place. To avoid potential contamination (i.e., interaction of pretest and treatment), the employees were told only that the attitude survey was part of an independent survey which the Department of Management at Michigan State University was conducting.

Prior to the experimental treatment, the jobs in each experimental group were described in concrete behavioral terms. (See Appendix A). For example, the task of building equipment mechanic has been broken down into the number of cards reviewed, the number of items incorrectly loaded, the ratio of purchases to inward movement, etc., which constitute the "service" category of performance. A composite group score appeared in frequency terms on the weekly feedback form, which is shown in Figure 4.

As described earlier, the feedback intervention for the experimental groups occurred for three consecutive months. For the extrinsic feedback groups, each supervisor rated each worker using a rating form (see Appendix A) at the end of each work day. This information was compiled on a weekly basis showing the number of workers who met the weekly objective on the performance categories. At the beginning of each week, the supervisor provided the feedback by announcing the number of workers who had met the weekly objective and then praised workers on those categories which showed good performance.

For the intrinsic feedback groups, each employee was given a rating form at the end of each work day (see Appendix A). All employees

were required to rate themselves and put the form in a prepared box. At the beginning of each week, the supervisor set the goal for each work group without giving any other feedback on their performance.

For the extrinsic and intrinsic feedback groups each supervisor pointed out the difference between the self rating and supervisory rating at the beginning of each week, and then praised workers on those performance categories which showed good performance. No positive or negative reinforcements were given to those who failed to meet the weekly performance objective. Again, this procedure was repeated on a weekly basis.

At the end of the three months of experimental intervention, a second attitude survey identical to the one administered prior to the experiment was taken to obtain the posttreatment measures on job satisfaction. During the experimental period of three months, two employee resignations, three retirements, and eight intra-company transfers took place.

The Measures, Data Collection, and Scoring

It has been stated that job satisfaction as a dependent variable was obtained through the questionnaire which includes Job Description Index (JDI) and the five single item scale of job satisfaction constructed for this study. Each of the five dimensions of job satisfaction in the JDI actually includes 12 response categories, 6 of which were randomly selected in questionnaire construction. In scoring, each of the item responses for each job satisfaction dimension in the JDI was assigned either a 1, 2, or 4; the higher the score, the higher the degree of job satisfaction reflected by that item. The score of the

respondent for each dimension was obtained by computing the mean; that is, the sum of item scores divided by the number of items responded. This procedure was necessary since some respondents failed to complete all 6 items under each dimension.

In the other 5 single item scale, each item rated by the individual workers received a score ranging from 1 to 5, a higher score indicating a higher degree of job satisfaction. In addition, a composite job satisfaction measure was obtained by adding the standardized Z scores of both the JDI and the remaining 5 items. This procedure was necessary because different scoring ranges existed in the two job satisfaction measures employed in this study.

The individual job satisfaction measures for the pretest period were then matched with the posttest measures after the 90 day experimental period, with the exception of those subjects who had been transferred, had retired or resigned.

Table 1 presents the test-retest reliabilities of all ten dimensions of job satisfaction scores and the internal reliabilities of the JDI scores. The internal reliabilities were computed by using Cronbach's Coefficient Alpha (Cronbach, 1951).

While an individual worker is the unit of analysis for investigating job satisfaction, a work group is used as the unit of analysis for performance variables. Thus, the performance variables (i.e., cost, safety, service, and absenteeism) which have served as the indicators of the relative efficiency at the plant level were broken down for each work group of each plant on a monthly basis for three consecutive periods.

TABLE 1
TEST-RETEST RELIABILITY AND INTERNAL CONSISTENCY
OF JOB SATISFACTION SCORES

Job Satisfaction Dimensions	Test-retest Rel.	Internal Rel.*
Wor k on Present Assignment	.26	.76
Pr esent Pay	.41	.81
Op pportunity for Promotion	.34	.83
Su pervision of Present Assignment	.47	.61
Pe ople on Present Assignment	.53	.77
O p pportunity for Independent Thought	.43	
S e nse of Accomplishment	.39	
J o b Security	.26	
Re cognition of Good Performance	.39	
P h y s i c a l Conditions of Work Place	.29	

* Internal reliability measures were computed based on the pretreatment data.

Analysis of Data

Basically two different statistical techniques will be used in the analysis of data; analysis of variance with repeated measures and covariance analysis. Analysis of variance with repeated measures is an experimental design which allows the variance due to subjects to be reduced by using each subject as his own control (Gaito, 1970). This type of design is also called a split-plot (Kirk, 1968) or mixed design (Lindquist, 1953), since a subject receives all levels of some treatments but only one level of other treatments (Kirk, 1968). In this

study, this design was utilized primarily to detect the effect of feedback on job satisfaction between the pretreatment period and the post-treatment period.

On the other hand, for investigating the differential effect by different modes of feedback on job satisfaction and performance, covariance analysis will be used. Analysis of covariance is an experimental design which enables an experimenter to remove potential sources of bias which are difficult to eliminate by experimental control. In this design, one or more covariates which represent a source of variation that had not been controlled in the experiment, are measured in addition to the dependent variate. Through analysis of covariance, the dependent variate can be adjusted by the group's pretreatment differences weighted by the regression coefficient between covariate and dependent variate. Thus, by combining the advantages of regression analysis with analysis of variance, this design can reduce experimental error and obtain unbiased estimates of treatment effects (Kirk, 1968).

The adjusted means are obtained by the linear model for the analysis of covariance as follows (Kirk, 1968):

$$Y_{ij} \text{ (adj)} = Y_{ij} - \beta_w (X_{ij} - \bar{X}_{..})$$

where

$Y_{ij} \text{ (adj)}$ = the adjusted score for subject i in treatment j

Y_{ij} = the actual score for subject i in treatment j

β_w = the within-group regression coefficient

$\bar{X}_{..}$ = the grand mean of the covariates

This design is particularly appropriate for this study since random assignment of subjects to different treatments was not obtained (Campbell and Stanley, 1963). This study will use the pretreatment measure as a single covariate in the analysis of data on job satisfaction and performance, respectively.

Summary

In this chapter, the methodology of this study was discussed. While the nonequivalent control group design includes some potential contamination which may weaken the external validity of the findings, it was suggested that the necessary precautions in the research procedure and data analysis were adapted to minimize such problems. Further, the operational definitions of variables, subjects and measures used, and scoring procedure were outlined. Chapter III presents the detailed results of the data analysis.

CHAPTER III

RESULTS

Introduction

As stated in the preceding chapter, analysis of variance with repeated measures was used to detect the difference between pretreatment measures and measures of posttreatment periods, with covariance analysis being employed to investigate the differential effects among the different treatment groups. This chapter first presents the findings on performance variables, followed by those on job satisfaction, which have resulted from this field experiment. A brief summary of overall findings is also presented.

Performance

As discussed previously, performance variables were measured at four different time periods: once prior to the experimental treatment and three times during the experimental period at thirty day intervals. The presentation of the findings on performance resulting from feedback intervention starts with the three objective performance measures, cost performance, safety, and absenteeism, which are followed by the findings on the subjective performance measure, service.

Cost Performance

Cost performance in this study was defined as the ratio of forecasted over actual cost. A ratio which exceeds the value of one would indicate that the actual cost is lower than the forecasted cost for a work group. On the other hand, a ratio which is less than the value of one would indicate that the actual cost is greater than the forecasted cost.

It was predicted that there would be a significant difference between the cost performance of the pretreatment period and that of the posttreatment periods, such that the cost performance after feedback intervention would be significantly better than the cost performance of the pre-treatment period. Table 2 presents the means and standard deviations of cost performance of each group for the four different periods, and the adjusted means for the combined posttreatments.

During the pretreatment period, there was a statistically significant difference in cost performance among the four groups ($F = 10.62$, $p \leq .001$), showing a lower performance in cost for the extrinsic and intrinsic feedback group as compared to the other groups. Yet, at the end of the experimental period, the no feedback group, with a mean ratio of .984, was the only group which failed to meet the cost objective.

The analysis of variance with repeated measures is presented in Table 3. Both a significant main effect of time and an interaction effect of mode of feedback and time on cost performance were observed. The examination of Table 2 and Table 3 reveals that the effectiveness of the three experimental groups receiving feedback had increased during the experimental period, when cost was used as the dependent

TABLE 2

Actual Means, Standard Deviations and
the Adjusted Means of "Cost Performance"

Mode of Feedback	Periods				Adjusted Means*	
	Pretreatment	30-days	60-days	90-days		
Extrinsic Feedback	M	1.12	1.145	1.192	1.128	1.090
	SD	.17	.101	.151	.119	
Intrinsic Feedback	M	1.11	1.149	1.133	1.122	1.076
	SD	.12	.124	.227	.256	
Extrinsic and Intrinsic Feedback	M	.72	1.294	.836	1.081	1.252
	SD	.03	.284	.147	.351	
No Feedback	M	1.10	1.045	.984	.984	.95
	SD	.18	.141	.136	.153	

*The mean for the three posttreatment periods adjusted by the covariance analysis.

measure, while the no feedback group became less effective as measured by the cost performance measure. Further, the difference between the cost performance for all four groups during the pretreatment period (mean value of 1.016) and the mean cost performance of the three post-treatment periods combined (1.087) was statistically significant ($F = 5.6692$, $p \leq .03$), showing a significant improvement in cost performance after feedback intervention occurred. These findings support the stated hypothesis that there would be a significant increase in cost performance for those receiving feedback about their performance.

TABLE 3

Analysis of Variance with Repeated Measures
Table on "Cost Performance"
For Mode of Feedback and Period

Source of Variance	df	MS	F	$p \leq$
<u>Between</u>				
Mode of Feedback (A)	3	.148	1.76	ns
Error	21	.084		
<u>Within</u>				
Period (B)	3	.090	5.29	.01
A X B	9	.110	6.47	.01
Error	63	.017		

In the analysis of the differential effect of mode of feedback on cost performance, analysis of covariance was employed. However, since the stated hypotheses make specific predictions about groups, planned comparisons rather than the overall F test were employed. As stated

previously, the pretreatment measure was used as a covariate in the analysis of covariance. That is, for a given group, the mean ratio of cost performance for the three posttreatment periods combined was adjusted by the pretreatment difference and the overall regression coefficient between the measures of the pre-treatment and posttreatment.

It was hypothesized that there would be a significant differential effect on cost performance resulting from the different modes of feedback. Specifically, it was predicted that the increase in cost performance in the combined feedback group would be significantly higher than that of any other group, and that there would be no significant difference in cost performance between the extrinsic feedback group and the intrinsic feedback group. The adjusted mean ratios of cost performance for the posttreatment periods are shown in Table 2.

As Table 2 shows, cost performance was the highest in the extrinsic and intrinsic feedback group (the adjusted mean value of 1.252), followed by the extrinsic feedback group (1.090) and then the intrinsic feedback group (1.076). It also indicates that the no feedback group showed inferior cost performance.

Table 4 presents the summary of the planned comparisons of covariance analysis on cost performance for the posttreatment periods. Comparison 1 in Table 4 contrasts the adjusted cost performance for the three experimental groups receiving feedback with that of the no feedback group (i.e., control group vs. three feedback groups combined). Comparison 2 represents the comparison of the combined feedback group with two feedback groups, extrinsic and intrinsic feedback. Finally, comparison 3 shows the contrast between the cost performance of the



extrinsic feedback group and that of the intrinsic feedback group.

TABLE 4
Planned Comparisons Summary of
Covariance Analysis on "Cost Performance"
for the Posttreatment Periods

Source of Variance	df	MS	F	p≤
Between Groups	3			
Comparisons:				
1	1	.1562	8.222	.009
2	1	.0480	2.526	ns
3	1	.0006	.0315	ns
Within Groups (Error)	20	.0190		

As shown in Table 4, the difference in cost performance between the experimental groups and the control group was statistically significant, thus supporting the stated hypothesis that the work groups receiving feedback would show a significant improvement in performance as compared to the work groups receiving no feedback. Additionally, as predicted, no significant difference existed between the cost performance of the intrinsic feedback group and the extrinsic feedback group. Although the adjusted cost performance of the extrinsic and intrinsic feedback group showed the highest value (See Table 2), it was not statistically superior to the adjusted mean cost performance of the intrinsic feedback and the extrinsic feedback groups combined, as shown in Comparison 2 of Table 4. This finding was not as predicted in that the degree of increase in performance for those receiving the combined

feedback was not higher than that of the other two feedback groups.

Safety

Another measure of the effectiveness of feedback can be obtained by looking at safety as a performance measure. This measure was obtained by adding the points based on job disability accidents, duty accidents, motor vehicle accidents, etc. Points allowed for each accident category, which represent the safety objective, add up to 100, a perfect performance. As stated earlier, the 1974 objective was 87 points.

As was the case with cost performance, it was predicted that there would be a pre-post difference and group differences in "safety" after feedback intervention had taken place. Table 5 represents the actual means, standard deviations of "safety" for both the pretreatment and three posttreatment periods, along with the adjusted means for the combined posttreatments.

While the safety performance of the no feedback group for the pre-treatment period (the mean value of 74.57) was the lowest among the four groups, this pretreatment difference was not statistically significant at .05 level ($F = .77, p \leq .52$). As shown in Table 5, at the end of the 90-days feedback period, the highest level of safety performance was observed in the combined feedback group, although all four groups met the safety objective of 1974. Yet, when pretreatment differences were adjusted, the no feedback group was the only group which failed to meet the 1974 safety objective during the three post-treatment periods combined.

TABLE 5

Actual Means, Standard Deviations and
the Adjusted Means of "Safety"*

Mode of Feedback		Periods			Adjusted Means**
		Pretreatment	30-days	60-days	90-days
Extrinsic Feedback	M	77.23	91.50	92.15	91.93
	SD	2.04	5.75	6.49	11.17
Intrinsic Feedback	M	78.70	90.00	91.85	91.70
	SD	5.95	4.69	4.68	5.16
Extrinsic and Intrinsic Feedback	M	76.98	87.86	90.33	94.16
	SD	7.27	6.30	7.96	5.38
No Feedback	M	74.57	85.57	85.57	87.25
	SD	3.17	3.77	3.77	.68

*The higher the score, the better the safety performance.

**The means for the three posttreatment periods adjusted by the covariance analysis.

The summary of the analysis of variance with repeated measures on safety performance is presented in Table 6. As this table shows, a significant main effect of time period was observed. Further analysis reveals that an increase in safety performance between the pretreatment and the three posttreatment measures combined (88.61) was statistically significant ($F = 100.98$, $p \leq .001$). These findings support the stated hypothesis that there would be a significant increase in safety performance for those receiving feedback about their performance.

TABLE 6
Analysis of Variance with Repeated
Measures Table on "Safety" for
Mode of Feedback and Period

Source of Variance	df	MS	F	p \leq
<u>Between</u>				
Mode of Feedback (A)	3	147.21	2.15	ns
Error	21	68.33		
<u>Within</u>				
Period (B)	3	1091.56	53.90	.001
A X B	9	10.78	.53	
Error	63	20.25		

For the differential effect of mode of feedback on safety performance, planned comparisons of covariance analysis are shown in Table 7. As described earlier, of the four groups, the no feedback group (with adjusted mean value of 86.38) was the only group which failed to meet

the 1974 safety objective during the three posttreatment periods combined.

TABLE 7
Planned Comparisons Summary of
Covariance Analysis on "Safety"
for the Posttreatment Periods

Source of Variance	df	MS	F	p ≤
Between Groups				
Comparisons:				
1	1	83.963	3.445	.078
2	1	1.445	.0593	ns
3	1	2.251	.0924	ns
Within Groups (Error)	20	24.370		

This difference (control group vs. three experimental groups) was statistically significant at .07 level, as revealed in Table 7. This finding tends to support the stated hypothesis that groups receiving feedback would perform better than groups receiving no feedback. Further, as predicted, there was no significant difference in "safety" between the extrinsic feedback group and the intrinsic feedback group.

Although the actual safety performance of the extrinsic and intrinsic feedback group was significantly higher than the other groups at the end of the experimental period, the adjusted mean of the same group (90.18) was not significantly different from the adjusted mean of the other two feedback groups combined (91.32) (See Comparison 2 of

Table 7). This finding was not as predicted in that the degree of increase in performance for those receiving the combined feedback was not higher than that of the other two feedback groups.

Absenteeism

In addition to the two objective task performance measures presented above, the absenteeism measure was obtained by recording the incidental and disability absenteeism for the workers. The absenteeism objective was 4.7 percent of the total working hours for the work group. The hypotheses tested for absenteeism follow the same pattern as cost and safety.

Table 8 presents the means and standard deviations of absenteeism. It shows that, at the end of the treatment period, all four groups had met the attendance objective. However, it also reveals that each cell mean is accompanied by a relatively high standard deviation, indicating the presence of wide variation within each cell. Examination of the original data shows that the data are positively skewed, indicating that most of the absenteeism figures are zero or near zero, with a few very high values in each cell.

In analyzing these positive skewed data, the logarithmic transformation is particularly effective in normalizing distributions which have positive skewness (Winer, 1971). Therefore, analysis of variance with repeated measures was made on logarithmic transformed values of absenteeism. Since some of the measurements on absenteeism are equal to zero, an alternative transformation was used as follows:

$$x' = \log(x+1)$$

TABLE 8
Means and Standard Deviations of "Absenteeism"*

Mode of Feedback	Periods			
	Pretreatment	30-days	60-days	90-days
Extrinsic Feedback	M 4.18	3.05	3.18	2.55
	SD 6.11	3.07	4.93	3.66
Intrinsic Feedback	M 2.25	4.78	4.06	3.96
	SD 2.19	6.60	6.25	6.32
Extrinsic and Intrinsic Feedback	M 3.86	1.86	2.30	2.91
	SD 6.09	2.65	4.76	5.52
No Feedback	M 1.61	1.11	.80	2.05
	SD 2.43	1.47	2.11	5.44

*The lower the score, the better the attendance.

Table 9 presents the summary of analysis of variance with repeated measures on the logarithmic value of absenteeism. There was no main effect or interaction effect of feedback and time period. Thus, the hypothesis that absenteeism among workers receiving feedback would decrease after feedback intervention was not supported.

TABLE 9

Analysis of Variance with Repeated
Measures Table on the Logarithmic
Transformed Absenteeism for
Mode of Feedback and Period

Source of Variance	df	MS	F	p ≤
<u>Between</u>				
Mode of Feedback (A)	3	1.553	.6349	ns
Error	21	2.450		
<u>Within</u>				
Period (B)	3	.589	1.1436	ns
A X B	9	.073	.1424	ns
Error	63	.515		

In regard to the hypothesis predicting the differential effect of feedback modes on absenteeism, two types of planned comparisons were made: planned comparisons of analysis of variance with repeated measures on logarithmic transformed value (Table 10) and planned comparisons of covariance analysis for the posttreatment periods (Table 11).

Table 10

Planned Comparisons Summary of Analysis
of Variance with Repeated Measures
on Logarithmic Transformed Absenteeism

Source of Variance	df	MS	F	p ≤
Between Groups				
Comparisons:				
1	1	4.089	1.668	ns
2	1	.555	.226	ns
3	1	.022	.009	ns
Within Groups (Error)	20	2.450		

TABLE 11

Planned Comparisons Summary of
Covariance Analysis on Absenteeism
for the Posttreatment Periods

Source of Variance	df	MS	F	p ≤
Between Groups				
Comparisons:				
1	1	15.442	.8713	ns
2	1	6.398	.3611	ns
3	1	5.970	.3369	ns
Within Groups (Error)	20	17.722		

Table 10 and Table 11 reveal that there was no statistical difference in absenteeism among the groups. These findings indicate that the stated hypothesis predicting a significant decrease in absenteeism for those receiving the combined feedback as compared to all other groups can not be accepted. However, since a considerable increase in absenteeism among workers often occurs immediately preceding contract negotiations, no increase in absenteeism as seen in this study can be considered a positive sign.

Service

A fourth measure of job performance used in this study was service. Service is a measure of performance obtained by the superior's subjective rating on the quality of services on building, maintenance, motor vehicle, and supply. The 1974 service objective was 83 out of 100 points.

Again, the same types of predictions on "service" were made as had been with prior performance variables. Specifically, it was predicted that there would be a pre-post difference in service performance between the control group (with no feedback) and the three experimental groups combined. It was further hypothesized that the combined feedback group (the extrinsic and intrinsic feedback group) would show the best performance and that there would be no significant difference between the extrinsic feedback group and the intrinsic feedback group in service performance.

Table 12 presents the means and standard deviations of "service" and the adjusted means for the combined posttreatment periods for each feedback group. During the pretreatment period, the service performance

TABLE 12

Actual Means, Standard Deviations and
the Adjusted Means of "Service"*

Mode of Feedback	Periods				Adjusted Means**
	Pretreatment	30-days	60-days	90-days	
Extrinsic Feedback	M 74.66	87.55	85.05	87.90	87.68
	SD 10.42	4.91	4.42	4.65	
Intrinsic Feedback	M 74.05	80.16	82.16	82.50	81.87
	SD 3.96	4.66	3.65	3.72	
Extrinsic and Intrinsic Feedback	M 76.13	82.43	83.83	83.67	83.30
	SD 4.14	4.18	6.64	8.64	
No Feedback	M 81.14	85.22	90.72	91.64	88.54
	SD 3.67	4.02	2.91	2.46	

*The higher the score, the better the service performance.

**The means for the three posttreatment periods adjusted by the covariance analysis.

scores for all four groups were below the 1974 service objective. While the no feedback group showed better performance in service than the other three groups, there was no statistical difference between the groups ($F = 1.83$, $p \leq .17$). At the end of the experimental periods, service performance of the intrinsic feedback group as perceived by superiors was still below the service objective for 1974, while the no feedback group showed a considerable improvement in the same category.

Table 13 presents the summary of the analysis of variance with repeated measures on service. It reveals that there were significant main effects of both mode of feedback and time period. Additional analysis on the effect of time period indicates that the difference in "service" between the pretreatment measures and the three posttreatment measures combined was statistically significant ($F = 45.78$, $p \leq .001$). This finding supports the stated hypothesis that there would be a significant increase in job performance for those receiving feedback.

For the differential effect of feedback mode on service the planned comparisons summary of covariance analysis are presented in Table 14. When the posttreatment measures (i.e., the three posttreatment measures combined) were adjusted by the procedure of covariance analysis, it was found that the control group was significantly higher in service performance than the three experimental groups combined as seen in comparison 1 in Table 14. This finding is contrary to the prediction.

TABLE 13

Analysis of Variance with Repeated Measures Table
on Service for Mode of Feedback and Period

Source of Variance	df	MS	F	p \leq
<u>Between</u>				
Mode of Feedback (A)	3	276.66	5.32	.007
Error	21	51.98		
<u>Within</u>				
Period (B)	3	527.47	29.27	.001
A X B	9	20.60	1.14	ns
Error	63	18.02		

TABLE 14

Planned Comparisons Summary of
Covariance Analysis of Service
for the Posttreatment Periods

Source of Variance	df	MS	F	p \leq
Between Groups				
Comparisons:				
1	1	73.483	4.726	.041
2	1	8.657	.556	ns
3	1	100.985	6.495	.019
Within Groups (Error)	20	15.548		

Further, there was no difference in service performance between the combined feedback group and the two other feedback groups (extrinsic and intrinsic feedback) combined. Yet, there was a significant difference in service between the extrinsic feedback group and the intrinsic feedback group, indicating inferior service ratings by superiors on their subordinates in the intrinsic feedback group. These findings are not in the predicted direction.

To summarize the above findings and the related discussions of the four performance measures, a summary table showing the overall results on the performance data is presented in Table 15. In general, two objective performance measures (cost performance and safety) and one subjective performance measure (service) indicated significant improvement after feedback was introduced. Also, those worker groups receiving feedback as compared to the control group showed significantly better performance in "cost" and "safety". However, there were no significant differences in performance among the groups receiving different types of feedback. Further, "absenteeism" seemed to be unaffected by the feedback on worker's performance, although the findings can be regarded as a relative improvement.

Job Satisfaction

In analyzing the data on each job satisfaction dimension, the same statistical techniques were used as had been for the performance measures; that is, the analysis of variance with repeated measures for the pre-post difference and covariance analysis for the group differences. As discussed previously, job satisfaction was measured at two different time periods: prior to the experimental treatment

TABLE 15

Summary of Findings on Performance Measures by Analysis
of Variance with Repeated Measures and Covariance Analysis

<u>Performance Measures</u>	<u>Pre-Post Difference (Repeated Measure)</u>	<u>Group Differences* (Covariance Analysis)</u>
Cost Performance	p < .01	1 p < .009
		2 ns
		3 ns
Safety	p < .001	1 p < .078
		2 ns
		3 ns
Absenteeism	ns	1 ns
		2 ns
		3 ns
Service	p < .001	1 p < .041
		2 ns
		3 p < .019

- * 1: the control group versus the three experimental groups combined
 2: the combined feedback group versus the extrinsic feedback group and the intrinsic feedback combined
 3: the intrinsic feedback group versus the extrinsic feedback group

and at the end of the treatment period (90 days after the treatment started).

It was predicted that there would be a significant increase in job satisfaction after feedback intervention occurred, as compared to the pretreatment measures. It was further predicted that there would be a differential effect of feedback on job satisfaction, hypothesizing that the combined feedback group would show higher increase in job satisfaction than other groups. Additionally, it was hypothesized that the extrinsic feedback group would show higher job satisfaction than that of the intrinsic feedback group.

Table 16 presents the summary of findings on each of the ten job satisfaction dimensions investigated in this study. As this table shows, in six out of the ten dimensions of job satisfaction, no statistically significant difference existed between the pretreatment and the post-treatment score of job satisfaction. Further, when the pretreatment differences were adjusted, no significant differences in job satisfaction between different groups were shown in any dimensions except "job security," which was decreased after feedback intervention. Of the remaining four dimensions of job satisfaction which showed significant pre-post difference, "present pay" and "job security" were decreased, while "people on present assignment" and "supervision of present assignment" were increased after feedback intervention.

In addition, Table 16 revealed that feedback on worker's performance produced no impact on job satisfaction dimensions that were directly related to work content (i.e., intrinsic job satisfaction) such as "work on present assignment," "opportunity for independent thought",

TABLE 16

Summary of Findings on Job Satisfaction by Analysis of
Variance with Repeated Measures and Covariance Analysis

<u>Job Satisfaction Dimensions</u>	<u>Pre-Past Difference (Repeated Measure)</u>	<u>Group Difference (Covariance Analysis)</u>
Work on Present Assignment	ns	ns
Opportunity for Independent Thought	ns	ns
Sense of Accomplishment	ns	ns
Recognition for Good Performance	ns	ns
Physical Conditions of Work Place	ns	ns
Opportunity for Promotion	ns	ns
Present Pay	$p \leq .08$	ns
Job Security	$p \leq .04$	$p \leq .01^*$
People on Present Assignment	$p \leq .08$	ns
Supervision of Present Assignment	$p \leq .08$	ns

*The control group versus the three experimental groups combined.

"sense of accomplishment," and "recognition for good performance", and two of the remaining six job satisfaction dimensions related to work context (i.e., extrinsic job satisfaction) such as "physical conditions of work place" and "opportunity for promotion". Tables of means and standard deviations, analysis of variance with repeated measures, and the planned comparison of covariance analysis for each of the above six job satisfaction dimensions are presented in Appendix D.

Job Security

While the six dimensions of job satisfaction described above show no significant difference in job satisfaction after feedback intervention, worker's job satisfaction with "job security" shows a different result. Table 17 indicates that while workers in the group receiving no feedback showed an increase in job satisfaction with job security, all other groups receiving feedback showed a decrease in job security. For example, the mean score of "job security" for the no feedback group increased from 3.73 for the pretreatment period to 4.20 for the posttreatment period, whereas the mean score of "job security" for the intrinsic feedback group decreased from 4.15 for the pretreatment period to 3.50 for the posttreatment period.

As shown in Table 18, there was a significant interaction effect between the mode of feedback (A) and time period (B) for worker's perceived satisfaction with "job security". The test of simple effect revealed that the worker's job satisfaction with job security in the intrinsic feedback group was significantly less than that found in the other groups ($F = 8.564, p \leq .01$).



TABLE 17
Means, Standard Deviations and Adjusted
Means of Job Satisfaction on "Job Security"*

<u>Mode of Feedback</u>	<u>Treatment Period</u>			<u>Adjusted Means**</u>
		<u>Pretreatment</u>	<u>90-days</u>	
Extrinsic Feedback	M	4.24	3.97	3.920
	SD	.89	1.04	
Intrinsic Feedback	M	4.15	3.50	3.480
	SD	.73	1.30	
Extrinsic and Intrinsic Feedback	M	4.07	3.80	3.806
	SD	.89	.84	
No Feedback	M	3.83	4.20	4.285
	SD	1.09	.65	

*The higher the score, the better the job satisfaction

**The mean for the 90-days period adjusted by the covariance analysis.

TABLE 18
Analysis of Variance with Repeated
Measures Table for "Job Security"

Source of Variance	df	MS	F	p _≤
<u>Between</u>				
Mode of Feedback (A)	3	.8586	.7264	ns
Error	109	1.1820		
<u>Within</u>				
Period (B)	1	2.7647	4.3086	.04
A X B	3	2.2571	3.5177	.01
Error	109	.6416		

Table 19 presents the planned comparisons summary of covariance analysis on job security for the posttreatment period. As in the analysis of the performance variables, the pretreatment measures were used as the covariate. Comparison 1 represents the control group versus the three experimental groups combined; comparison 2 represents the combined feedback group versus the extrinsic feedback group and the intrinsic feedback group combined; and finally comparison 3 represents the intrinsic feedback group versus the extrinsic feedback group.

TABLE 19
Planned Comparisons Summary of
Covariance Analysis on "Job Security"
for the Posttreatment Period

Source of Variance	df	MS	F	p ≤
Between Groups				
Comparisons:				
1	1	5.2319	5.664	.019
2	1	.0966	.1046	ns
3	1	2.999	3.247	.074
Within Groups (Error)	20	.9236		

The adjusted job satisfaction score on "job security" for the no feedback group (4.285) was significantly different from the combined mean score of the remaining three experimental groups (3.735) at the .02 level. Further, the adjusted "job security" score of the intrinsic feedback group was significantly different from that of the extrinsic feedback (3.920) at .07 level. Therefore, the stated hypotheses related to job satisfaction can not be accepted in the "job security" dimension. Instead, it seems that feedback had a negative impact on worker's job satisfaction with job security, this impact being most prevalent in the intrinsic feedback group.

Present Pay

Another job satisfaction dimension which presents different results is "present pay". As shown in Table 20, a decrease in worker's job satisfaction with "present pay" resulted after the feedback

intervention took place for all groups including the control group. This decrease from 2.253 for pretreatment to 2.033 for posttreatment period approaches statistical significance ($p \leq .08$) as shown in Table 21.

TABLE 20
Means and Standard Deviations of Job
Satisfaction for "Present Pay"*

<u>Mode of Feedback</u>	<u>Treatment Period</u>	
	<u>Pretreatment</u>	<u>90-Days</u>
Extrinsic Feedback	M	2.29
	SD	1.37
Intrinsic Feedback	M	2.47
	SD	1.18
Extrinsic and Intrinsic Feedback	M	2.10
	SD	1.31
No Feedback	M	2.13
	SD	1.14

*The higher the score, the better the job satisfaction

TABLE 21
Analysis of Variance with Repeated
Measures Table for "Present Pay"

Source of Variance	df	MS	F	p [≤]
<u>Between</u>				
Mode of Feedback (A)	3	1.0028	.4810	ns
Error	109	2.0847		
<u>Within</u>				
Period (B)	1	2.7426	3.1077	.08
A X B	3	.0799	.905	ns
Error	109	.8825		

These findings are contrary to the stated hypothesis that there would be a significant degree of increase in job satisfaction for those receiving feedback after feedback intervention. In addition, as Table 22 shows, there was no significant difference of adjusted scores in worker's job satisfaction with "present pay" among groups designated by the three comparisons. Therefore, the findings suggest that a decrease in job satisfaction with "present pay" was a phenomenon commonly shared by all four groups.

TABLE 22
Planned Comparisons Summary of
Covariance Analysis on "Present Pay"
for the Posttreatment Period

Source of Variance	df	MS	F	p [≤]
Betewen Groups				
Comparisons:				
1	1	.0252	.0222	ns
2	1	.2447	.2156	ns
3	1	.0157	.0138	ns
Within Groups (Error)	20	1.1352		

People on Present Assignment

Another dimension of job satisfaction investigated relative to feedback effect in this study is worker's job satisfaction with "people on present assignment." Table 23 presents the means and standard deviations of job satisfaction with "people on Present assignment".

TABLE 23
Means and Standard Deviations
of Job Satisfaction for
"People on Present Assignment"*

<u>Mode of Feedback</u>	<u>Treatment Period</u>		
		<u>Pretreatment</u>	<u>90-Days</u>
Extrinsic Feedback	M	3.30	3.39
	SD	1.08	1.00
Intrinsic Feedback	M	3.38	3.29
	SD	.92	1.03
Extrinsic and Intrinsic Feedback	M	2.87	3.29
	SD	1.29	1.17
No Feedback	M	3.06	3.38
	SD	1.16	.92

*The higher the score, the better the job satisfaction

As Table 23 shows, worker's job satisfaction with "people on present assignment" tended to increase after feedback intervention, although a slight decrease was shown in the intrinsic feedback group. Table 24 reveals that the difference between the pretreatment and the posttreatment for all groups (3.168 vs. 3.341) approached a statistical significance ($F = 3.102$, $p \leq .08$). This statistical finding may be regarded as significant in this study which involved small sample size. Therefore, these findings tend to support the stated hypothesis that there would be a significant degree of increase in job satisfaction for those receiving feedback after feedback intervention.

TABLE 24
Analysis of Variance with Repeated Measures
Table for "People on Present Assignment"

Source of Variance	df	MS	F	p ^{<}
<u>Between</u>				
Mode of Feedback (A)	3	.8355	.4664	ns
Error	109	1.7913		
<u>Within</u>				
Period (B)	1	1.6648	3.1021	.08
A X B	3	.6934	1.2920	ns
Error	109	.5366		

However, when the pretreatment difference between the four groups was adjusted, no significant difference between groups designated by the three comparisons was observed, as shown in Table 25. These findings revealed in Table 25 were not as predicted in that there was no significant differential of different feedback modes on worker's job satisfaction among groups.

Supervision on Present Assignment

In regards to worker's job satisfaction with "supervision", it was predicted that the degree of job satisfaction on supervision would increase to a higher degree for the extrinsic feedback than for the intrinsic feedback group, after feedback intervention. Table 26 shows the means and standard deviations of job satisfaction with "supervision of present assignment." This table revealed that the highest increase in job satisfaction with "supervision" was shown in the

combined feedback group, followed by the extrinsic feedback group.

Additionally, as Table 27 shows, a significant main effect of time period (B) was observed, supporting the stated hypothesis which predicted an increase in job satisfaction for those receiving feedback after feedback intervention. Yet, no significant difference among groups at the end of the treatment period existed when adjustment was made for the pretreatment differences, as shown in Table 28.

TABLE 25

Planned Comparisons Summary of
Covariance Analysis on "People on Present
Assignment" for the Posttreatment Period

Source of Variance	df	MS	F	p \leq
Between Groups				
Comparisons:				
1	1	.2556	.3324	ns
2	1	.5520	.7179	ns
3	1	.3017	.3924	ns
Within Groups (Error)	20	.7688		

TABLE 26
Means and Standard Deviations
of Job Satisfaction for
"Supervision of Present Assignment"*

<u>Mode of Feedback</u>	<u>Treatment Period</u>		
		<u>Pretreatment</u>	<u>90-Days</u>
Extrinsic Feedback	M	3.38	3.48
	SD	.93	.82
Intrinsic Feedback	M	3.17	3.19
	SD	1.03	.98
Extrinsic and Intrinsic Feedback	M	3.15	3.70
	SD	1.10	.64
No Feedback	M	2.88	3.29
	SD	1.18	.98

*The higher the score, the better the job satisfaction



TABLE 27

Analysis of Variance With Repeated Measures
Table for "Supervision of Present Assignment"

Source of Variance	df	MS	F	p \leq
<u>Between</u>				
Mode of Feedback (A)	3	1.6602	1.2147	ns
Error	109	1.3667		
<u>Within</u>				
Period (B)	1	3.5678	7.2831	.008
A X B	3	.8594	1.7543	ns
Error	109	.4898		

TABLE 28

Planned Comparisons Summary of
Covariance Analysis on "Supervision on
Present Assignment" for the Posttreatment Period

Source of Variance	df	MS	F	p \leq
Between Groups				
Comparisons:				
1	1	.0145	.0249	ns
2	1	2.8756	4.9474	ns
3	1	.6598	1.1351	ns
Within Groups (Error)	20	.5812		

These findings partially supported the stated hypotheses. That is, there was no significant difference among groups receiving different types of feedback, but a significant increase in job satisfaction with supervision after feedback intervention was observed.

Composite Job Satisfaction

In addition to each dimension of job satisfaction, the "composite job satisfaction score" was obtained to investigate the effect of feedback on overall job satisfaction of the workers. As stated previously, the composite job satisfaction score was obtained in terms of standardized Z scores for the ten dimensions of job satisfaction combined. Table 29 and Table 30 present the summary of findings on the composite job satisfaction score. No difference between the scores of pre-treatment and the posttreatment was observed. Additionally, no overall difference among groups receiving different types of feedback was observed.

Job Satisfaction - Performance Relationship

Additional analysis was made to investigate the degree and nature of the relationship between job satisfaction and performance at the end of the experimental period. Job satisfaction measures of individual workers were combined together into a work group measure so that the unit of analysis for both job satisfaction and performance became the same. Table 31 presents the Kendall tau coefficients between job satisfaction and performance. The Kendall tau coefficient, rather than the Spearman correlation coefficient, was used since Kendall tau can be more readily employed when a fairly large number of cases are classified into a relatively small number of categories.

TABLE 29
Summary of Analysis of Variance for
"Composite Job Satisfaction Score"

Source of Variance	df	MS	F	p ≤
<u>Between</u>				
Mode of Feedback (A)	3	16.973	.304	ns
Error	109	55.797		
<u>Within</u>				
Period (B)	1	.303	.019	ns
A X B	3	28.414	1.818	ns
Error	109	15.625		

Table 30
Analysis of Covariance Table for
the "Composite Job Satisfaction"

Source of Variance	df	MS	F	p ≤
Between Groups	3	21.308	.979	ns
Within Groups	108	21.754		

TABLE 31
Kendall Tau Coefficients Between Job
Satisfaction and Performance at the
End of Experimental Period

Job Satisfaction	Performance			
	Cost	Safety	Absenteeism	Service
Work on Present Assignment	-.1294	-.0420	-.1805	.0787
Opportunity for Independent Thought	.1006	-.0280	-.2643*	-.0744
Sense of Accomplishment	-.1275	-.1810	-.1410	.2502*
Recognition of Good Performance	.0727	.0474	-.4065**	.2482*
Physical Conditions of Work Place	.0385	.0915	-.1564	.1444
Opportunity for Promotion	-.0037	.0910	-.1353	.1274
Present Pay	-.2519*	-.1415	-.3164**	.1689
Job Security	-.0670	-.1628	-.3559**	.2954*
People on Present Work Assignment	.1972	.2236	-.2360*	-.0235
Supervision of Present Assignment	-.1782	-.1957	-.0324	.0192

*Significant at .05 level

**Significant at .01 level

In general, cost performance and safety, the two objective performance measures, were not significantly correlated with job satisfaction. One exception was a significant negative correlation between cost and present pay, indicating that the better the cost performance, the lower the satisfaction with present pay. It was also found that absenteeism was negatively correlated with all ten dimensions of job satisfaction of which five dimensions were statistically significant. Thus, the lower the job satisfaction, the higher the absenteeism. In addition, three job satisfaction dimensions, sense of accomplishment, recognition for good performance and job security, were significantly correlated with the quality of service perceived by the superiors.

CHAPTER IV

DISCUSSION AND CONCLUSION

This chapter reviews the major results of this study. Findings on dependent variables as they related to the stated hypotheses and the existing research evidence are discussed. Theoretical and practical implications of these findings, limitations of the present study and directions for future research are suggested.

The results of this study support one of the basic premises of research based on reinforcement theory, that behavior can be changed directly without going through the process of attitude change. Feedback given to workers in this study has focused on the observable task performance, not on the workers' job satisfaction. The findings showed that job satisfaction of workers was less affected by feedback while job performance was improved as a result of feedback.

Effect of Feedback on Performance

Four general hypotheses were formulated regarding performance:

1. There would be a significant increase in job performance for those receiving feedback after feedback intervention.
2. Workers receiving feedback would have a greater increase in job performance than workers receiving no feedback.
3. There would be no significant difference in performance between those receiving extrinsic feedback and those receiving intrinsic feedback.



4. The degree of increase in performance for those receiving the combined feedback would be higher than that of all other groups.

The results tended to support the general hypotheses that feedback would have a positive impact on performance. On three out of four performance measures investigated in this study, findings indicated superior performance after the feedback procedure was introduced. These results are consistent with the findings of Hundal (1969) which showed significant improvement in performance of a repetitive industrial task between the pre-experimental and the post-experimental periods of feedback. On the other hand, absenteeism was not affected after feedback in this study.

Further, on cost performance and safety, two objective measures which are directly related to task performance, findings indicated superior performance of the experimental groups (i.e., feedback groups) as compared to the control group (i.e., no feedback group). Again, no significant improvement was observed in attendance, whereas superior performance on service for the control group as compared to the three experimental groups combined was found. Additionally the combined feedback group demonstrated better performance than the other groups, although a statistical difference was not observed. This lack of statistical significance would be partially attributed to the small sample size of this study. These results indicating better performance for workers who received the combined feedback are similar to the findings of Hamner and Foster (in press) which showed that the effect of intrinsic and extrinsic reinforcement on performance are additive.

As predicted, no significant differences in task performance were observed between the extrinsic feedback group and the intrinsic feedback group. This finding was consistent with findings of Warm et al. (1972) on vigilance performance. Therefore, while the combined feedback has greater impact on task performance than did intrinsic feedback or extrinsic feedback, that difference did not produce as significant an effect as the presence or absence of feedback in the organization.

Surprisingly, the supervisor's ratings on the quality of service were not significantly affected by the feedback intervention. Workers in the intrinsic feedback group were rated lower than workers in the other groups and the no feedback group showed the highest mean ratings among the four groups. It seems to indicate that the feedback procedure as introduced in this study forced supervisors to rate workers in more realistic terms. Contrary to the prior practice, workers became aware of each behavioral category of service on which they were being rated. This argument implies that feedback has impact on behavior of supervisors as well as behavior of workers. However, as discussed earlier, workers' job satisfaction with supervision was not significantly affected by feedback. One possible explanation on these findings is that, when the supervisors' ratings on workers' performance became more realistic, workers' job satisfaction with supervision was not necessarily enhanced.

As discussed earlier, absenteeism was not affected after feedback and there were no significant differences between the experimental and the control group in absenteeism. It was found that absenteeism was negatively correlated with job satisfaction, and that the degree of job satisfaction was relatively constant after the feedback

intervention. However, as argued previously, the lack of improvement in absenteeism observed in this study can be regarded as a positive sign for the period immediately preceding the new contract negotiation. Another possible explanation is that feedback on task performance specifically elicited only the behavior related to task performance. In fact, Grady and Hamner (in preparation) found in Michigan Bell that feedback and positive reinforcement on the attendance behavior had an impact on absenteeism.

Effect of Feedback on Job Satisfaction

The hypotheses pertaining to job satisfaction generally followed the same pattern as those of the performance measures. It was predicted that there would be a pre-post difference in job satisfaction for those receiving feedback. Further, it was hypothesized that the feedback groups would have a greater increase in job performance as compared to the no feedback group, and that the combined feedback group would perform better than all other groups. However, unlike the corresponding hypothesis on performance, it was predicted that workers' job satisfaction for those receiving extrinsic feedback would be greater than that of those receiving intrinsic feedback.

The findings regarding the pre-post difference in job satisfaction showed conflicting results. Workers' job satisfaction with "supervision with present assignment" and "people on present assignment" increased after feedback. These results were consistent with the findings of Leavitt and Mueller (1951) and Watson (1969) which showed that feedback had a positive impact on attitude related to interpersonal dimensions.

In contrast to the above findings, significant decreases in job satisfaction with "present pay" and "job security" were found. A plausible explanation of these findings is that workers may have perceived the feedback intervention and a close monitoring on task performance as a potential threat. That is, workers might have misunderstood feedback intervention, viewing it as a tool of justification for future layoffs, especially since performance monitoring prior to this study had been more frequent for the marginal workers whose performance was below average. Another possible explanation of these findings is that workers in the intrinsic feedback group and the combined feedback group might have perceived the self-rating as an additional responsibility. In fact, a grievance complaining that supervisors were shifting their responsibility to workers was filed in the intrinsic feedback group during the experimental period. Therefore, to the extent that workers perceived the self-feedback procedure as additional responsibility, workers' job satisfaction with "present pay" may have decreased as a result of feedback intervention. Also, an increasing worker awareness of performance improvement which was not appropriately rewarded by additional pay could have encouraged the workers' perception on equity imbalance. When rewards from the job performance were not perceived as equitable, workers' job satisfaction would have been negatively affected. Low correlations between performance and job satisfaction found in this study tend to support this argument.

The results on the remaining six dimensions of job satisfaction tended to reject the stated hypotheses derived from the findings of Meyer and Walker (1961b) and Ivancevich, *et al.* (1970), which showed that feedback had an impact on workers' attitude and perceived need

satisfaction. No statistical differences between the pretreatment and the posttreatment periods were observed on job satisfaction with "work on present assignment," "opportunity for independent thought", "sense of accomplishment", "recognition for good performance", "physical conditions of work place", and "opportunity for promotion". These findings tend to agree with the findings of Harrison (1969) and Smith and Knight (1959), which demonstrated no change in attitude after the use of feedback.

One interesting pattern observed from the findings was that the job satisfaction dimensions which were not affected by feedback were those predominantly related to the task itself. In fact, on all four intrinsic job satisfaction dimensions investigated in this study, no pre-post differences were observed.

Another set of hypotheses concerning the differential effect of feedback on job satisfaction were not supported in this study. When initial differences among the four groups were adjusted, nine out of ten dimensions of job satisfaction showed sufficient evidence to reject the stated predictions pertaining to the differential effect of mode of feedback. On the remaining one dimension, "job security", a significant decrease in score among the three experimental groups as compared to that of the control group was observed. This finding was the opposite of the stated prediction. Similarly, the hypotheses pertaining to "supervision" were not supported in this study. As suggested earlier, lack of reciprocated rewards on improved performance, workers' possible misunderstandings on feedback as a potential threat, and anticipation of the impending contract negotiation may have caused these results.

Implications of the Findings

Several managerial implications can be made from the findings of this study. First, the results of this study implied that appropriate rewards following the improvement of performance may be necessary for the increase in workers' job satisfaction. The apparent lack of significant correlations between performance and job satisfaction in this study may be attributed to the lack of appropriate rewards following performance improvement. Cherrington, Reitz and Scott (1971) reported similar findings from their laboratory study. Especially, caution should be taken in implementing feedback systems in which workers are given better opportunity for self-feedback without getting supervisory feedback. It seems essential that workers understand the feedback is intended to be helpful to the workers, and workers accept that they are able to utilize this feedback in some applicable way. Therefore, it seems possible that self-feedback in itself may not serve as an effective positive reinforcer under certain conditions. As Leavitt and Mueller (1951) pointed out, it may be possible to cause potentially detrimental impact on attitude.

Further, the results suggest that when there are no specific attempts to redesign the task, feedback has little effect on intrinsic job satisfaction of workers. Perhaps, a careful examination of the intrinsic feedback dimensions of the task itself may aid the effectiveness of self-feedback. The utility of intrinsic feedback may be enhanced by providing additional reinforcement regarding performance directly from the task itself. These arguments can be made in light of the finding that combined feedback tends to produce greater positive

impact on task performance than the intrinsic feedback or the extrinsic feedback alone.

Another implication of this study is that the feedback system to be implemented should be tailor-made to reinforce the specific behavior which the company wants to elicit. As shown in this study, the feedback on task performance was less effective on attendance behavior. Further it was found in this study that, while actual performance in cost and safety increased for the three feedback groups during the experimental periods, the performance ratings on "service" for the same groups were lower than the control group. This implies that there is a potential danger that workers may perceive their performance as being underrated by their superiors, especially those workers who showed better performance (i.e., workers in the feedback groups). In order to minimize the discrepancy between the actual performance and performance ratings on the workers, the objective behavioral terms for feedback should also serve as criteria for performance evaluation of the workers.

Limitations of the Present Study and Directions for Future Research

The preceding findings provide some clarification as to the effect of feedback on job satisfaction and performance in the industrial setting. Yet, as in any field study, this study does not escape from the potential limitations on findings. The first of these limitations deals with the environmental factors under which this study was conducted. Economically, the United States was experiencing a shortage of resources, especially fuel, during the period in which this study was conducted. While it is not feasible to assess the impact of this

economic situation on workers' job behavior, it is conceivable that workers' primary interests may have focused on job security and wages rather than the intrinsic aspect of the job itself. Therefore, these findings could have been partially influenced by the environment especially since workers realized that contract negotiations would be started within the next 30 days after the second attitudinal survey was made.

Further, all four plants were located in suburban areas: this fact may represent different work values among workers which cannot be generalized to other areas. Similarly, Turner and Lawrence (1965) and Blood and Hulin (1967) suggested caution in generalizing the findings from urban blue-collar workers to all blue collar workers.

Another set of limitations deals with the definition of and experimental control on variables in this study. This study used mode of feedback as the independent variable. However, different modes of feedback do not account for the difference in feedback schedule which existed in this study. For example, workers in the intrinsic feedback may have operated under the fixed interval schedule (i.e., once a day) or under the variable interval schedule depending on how the individual utilized this self-generated feedback; while workers in the extrinsic feedback group may have operated under the fixed interval schedule (i.e., once a week). Workers in the combined feedback group may have operated under the combination of both. On the other hand, workers in the control group operated under a random variable schedule, depending upon workers' level of performance as perceived by the superior.

An additional problem occurring during the experiment was that, due to grievances filed by workers in the intrinsic feedback group, the

management of the company agreed to provide monthly feedback (i.e., extrinsic feedback in nature) by superiors which took place at the end of the 60 days period and the 90 days period.

Finally, another limitation of this study deals with the lack of control on leadership style for experimental groups. It can be argued that the improvement of performance can be attributed to the different leadership style which may exist in different experimental groups. However, this argument loses its merit in view of the fact that there were no differences in workers' job satisfaction with "supervision" between different experimental groups.

Some of the findings and the limitations of this study suggest the direction of future research. First of all, future study should take urban-rural difference into account in the design to investigate the effect of feedback on job satisfaction. Further, the different modes of feedback as well as the various feedback schedules should be considered to detect whether any different impact of feedback is observed. This kind of research study replicated in different industrial settings involving different tasks can provide a more clear understanding as to how human beings react under different contingencies of reinforcement in a variety of situations. As noted earlier, the application of reinforcement theory and feedback in industrial organizations is in its infancy. Much more research is needed to gain theoretical and practical knowledge for effective implementation of the feedback system in organizations.

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APPENDICES

APPENDIX A
RATING SUMMARY SHEETS

BUILDING SERVICE INSPECTION RATING SUMMARY SHEET

Quality Inspection Schedule																	
Bldg Mtce Foreman 1 bldg/wk Supv Frmn B.S. & M.E. 1 bldg/mo/1st line Frmn Div Supt B.S. & M.E. 1 bldg/qrt/2nd line Frmn	Inspection Categories	Poor	Fair	Good	Excellent	Ratings											
		January	February	March	April	May	June	July	August	September	October	November	December	Average Points	Year to Date		
	Floors	8	12	16	20												
	Walls, Doors, Part	8	12	16	20												
	Washrooms	6	9	12	15												
	Furn. Lockers & File	4	6	8	10												
	Exterior & Ground	4	6	8	10												
	Windows, Shades & Venetian Blinds	2	3	4	5												
	Light Fix. & Fans	2	3	4	5												
	Supplies & Tools	2	3	4	5												
Service Quarters	2	3	4	5													
Miscellaneous	2	3	4	5													
Total Value																	
Adjusted Value																	
Quality Index																	
No. of Inspections This Month																	
D I V . O B J																	

BUILDING MAINTENANCE INSPECTION RATING SUMMARY SHEET

[illegible]

MOTOR VEHICLE INSPECTION RATING SUMMARY SHEET

[illegible]

MOTOR VEHICLE INSPECTION
RATING SUMMARY SHEET

[illegible]

SUPPLY SERVICE AND QUALITY INSPECTION RATING SUMMARY SHEET

[illegible]

APPENDIX B
ATTITUDE SURVEY

APPENDIX B

ATTITUDE SURVEY

This is part of a survey which the Department of Management at Michigan State University is currently conducting. Primarily, the purpose of this survey is to investigate the attitude of industrial workers in the Detroit area to their present job.

This questionnaire has been approved by the management of Michigan Bell. Information obtained from you will be completely confidential. Please do not put your name on the questionnaire. Once you have completed your questionnaire, place it in the self-addressed envelope and place it in the prepared box. Thank you for your cooperation.

1. Age _____ 2. Sex _____

3. Education: Elementary School () Middle School ()
High School () Community College ()
Technical Training () 4 Year College ()
Others ()

4. Number of years with Michigan Bell _____ yr(s).

5. Job Title _____

6. District: Trinity-Townsend () Royal Oak-Pontiac ()
Supply System () Southfield-Birmingham ()

Place a check in the space that reflects your degree of satisfaction on the following items most closely.

7. The opportunity for independent thought in doing your job.

____ Very Satisfied	____ Satisfied	____ Neither Satisfied Nor Dissatisfied	____ Dissatisfied	____ Very Dissatisfied
------------------------	----------------	--	-------------------	---------------------------

8. The feeling of worthwhile accomplishment at work.

<u> </u> Very	<u> </u> Satisfied	<u> </u> Neither Satisfied	<u> </u> Dissatisfied	<u> </u> Very
Satisfied		Nor Dissatisfied		Dissatisfied

9. The degree of job security of your current position.

<u> </u> Very	<u> </u> Satisfied	<u> </u> Neither Satisfied	<u> </u> Dissatisfied	<u> </u> Very
Satisfied		Nor Dissatisfied		Dissatisfied

10. The awareness that others have of your performance when you perform well.

<u> </u> Very	<u> </u> Satisfied	<u> </u> Neither Satisfied	<u> </u> Dissatisfied	<u> </u> Very
Satisfied		Nor Dissatisfied		Dissatisfied

11. The physical conditions of your working location.

<u> </u> Very	<u> </u> Satisfied	<u> </u> Neither Satisfied	<u> </u> Dissatisfied	<u> </u> Very
Satisfied		Nor Dissatisfied		Dissatisfied

Think of your present work. What is it like most of the time? In the blank beside each word given below write:

 Y for "Yes" if it describes your work

 N for "No" if it does NOT describe it

 ? if you cannot decide

12. WORK ON PRESENT ASSIGNMENT

<u> </u> Boring	<u> </u> Useful
<u> </u> Pleasant	<u> </u> Tiresome
<u> </u> Challenging	<u> </u> Routine

13. PRESENT PAY

<u> </u> Income adequate for	<u> </u> Less than I deserve
<u> </u> normal expenses	<u> </u> Highly paid
<u> </u> Barely live on income	<u> </u> Under paid
<u> </u> Bad	

14. OPPORTUNITIES FOR PROMOTION

☐ Good opportunity for advancement
☐ Promotion on ability
☐ Dead-end assignment

☐ Unfair promotion policy
☐ Infrequent promotion
☐ Opportunity somewhat limited

15. SUPERVISION ON PRESENT ASSIGNMENT

☐ Asks my advice
☐ Praises good work
☐ Doesn't supervise enough

☐ Tells me where I stand
☐ Impolite
☐ Around when needed

16. PEOPLE ON YOUR PRESENT ASSIGNMENT

☐ Boring
☐ Ambitious
☐ Responsible

☐ Talks too much
☐ Lazy
☐ Unpleasant

APPENDIX C
DESCRIPTIONS ON PERFORMANCE OBJECTIVES

APPENDIX C
DESCRIPTIONS ON PERFORMANCE OBJECTIVES

COST

The cost objectives have been established in two basic categories:

1. Actual dollar expenditures, per the approved budget, are computed and assigned to specific departmental codes. This computation is made daily and summarized on a weekly, monthly, quarterly and yearly basis for the following departments:
 1. Building Service
 2. Building Maintenance
 3. Motor Vehicle
 4. Supply Service
2. Actual hour expenditures, per the approved hour budget are computed and assigned to specific labor classes. This computation is also made daily and summarized weekly, monthly, quarterly and annually for the following worker groups:
 1. Cleaner
 2. Building Serviceman
 3. Building Mechanic
 4. Motor Vehicle Mechanic
 5. Stockman

SAFETY

The safety objective is to minimize the accidental injuries to employees by identifying a lack of safety knowledge and employee awareness of environmental hazards.

To measure performance trends, several formulas have been established in four major categories:

1. Job Disability accidents: 24 points

a) Points for No. of Cases =

$$16 - \frac{\text{No. of Lost Time Injury Cases} \times 320}{\text{Total No. of Employees}}$$

b) Points for Days of Absence =

$$8 - \frac{\text{Total Days of Absence} \times 16}{\text{Total No. of Employees}}$$

1974 objective: 22 points out of maximum
24 points

2. Professional Care and Restrictions Duty Accidents:

10 points

Points for No. of Cases =

$$10 - \frac{\text{No. of Injuries} \times 40}{\text{Total No. of Employees}}$$

1974 objectives: 7.5 points out of maximum 10 points.

3. Motor Vehicle Accidents: 24 points

a) Points for No. of Vehicles =

$$12 - \frac{\text{No. of Accidents} \times 3}{\text{Total No. of Vehicles}}$$

b) Points for Miles Driven =

$$12 - \frac{\text{No. of Accidents} \times 25,000}{\text{Total No. of Miles Driven}}$$

1974 objective: 17.0 points out of the maximum 24 points.

4. Accident Prevention Plan: 42 points

The 42 points allotted for this category is computed by utilizing the AT&T minimum objective of 96% (per the 100% scale) in the following formula:

Points = 1.4 (Avg. Score per the AT&T plan -67)

1974 objective: 40.5 points

The 1974 Safety Objective is 87 points out of a possible perfect score of 100 points.

ATTENDANCE

The attendance objective is to improve, through the process of identification, action, and follow-ups, our overall attendance results per worker, per Foreman group:

Formula: Incidental

of employees X total work days X 0.7 = objective

Disability

of employees X total work days X 4.0 = objective

Total

Incidental + Disability = objective

SERVICE

The service objective is to maintain the quality of building service (housekeeping), building maintenance, motor vehicle and supply services at a specified objective level. Actual manager and/or worker inspections are utilized to gain the necessary data on a periodic basis.

<u>Service Category</u>	<u>Quantitative Objective</u>
Building Services	83
Building Maintenance	83
Motor Vehicle	83
Supply Services	83

Thus, by computing the average score, in the categories for which each manager or foreman is responsible, the service rating for any given period can be determined.

Building Service Foremen, Building Maintenance Foremen, Motor Vehicle Foremen and Supply Foremen utilize the appropriate inspection

form (See Appendix A) to compute their service ratings as follows:

Each manager observes worker's performance or
inspects jobs which have been completed, and:

1. Enters the total point value in the appropriate column of categories or classifications of items inspected.
2. Summarizes the maximum value points for the items inspected.
3. Divides the total point value of the inspection by the maximum point value of the items inspected. This equates to the adjusted point value index.
4. Enters the adjusted point value index in the appropriate box on the inspection sheets. This now becomes the quality rating.
5. The total point value inspected divided by the summarized maximum point value of the items inspected equals the adjusted quality results rating index.

When summarizing inspections for the week or month, on the rating summary sheet, the managers followed the same procedures and formula as outlined above.

APPENDIX D
FINDINGS ON SIX JOB SATISFACTION DIMENSIONS

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WORK ON PRESENT ASSIGNMENT

TABLE D1
MEANS AND STANDARD DEVIATIONS SUMMARY TABLE OF JOB
SATISFACTION WITH "WORK ON PRESENT ASSIGNMENT" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	2.90
		S.D.	1.22
	Intrinsic Feedback	M	2.81
		S.D.	1.26
	Extrinsic and Intrinsic Feedback	M	2.89
		S.D.	1.24
	No Feedback	M	2.97
		S.D.	1.23

*The higher the value, the better the job satisfaction; the maximum of 4 points.

TABLE D2

ANALYSIS OF VARIANCE WITH REPEATED MEASURES
TABLE FOR "WORK ON PRESENT ASSIGNMENT"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	.7728	.4031	ns
Error	109	1.9174		
<u>Within</u>				
Period (B)	1	1.2935	1.1475	ns
A X B	3	.4679	.4151	ns
Error	109	1.1271		

TABLE D3

PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS ON
"WORK ON PRESENT ASSIGNMENT" FOR THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	2.152	1.524	ns
2	1	.1174	.0832	ns
3	1	.9025	.6394	ns
Within Groups (Error)	20	1.4115		

"OPPORTUNITY FOR INDEPENDENT THOUGHT"

TABLE D4

MEANS AND STANDARD DEVIATIONS SUMMARY TABLE OF JOB SATISFACTION
WITH "OPPORTUNITY FOR INDEPENDENT THOUGHT" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	3.91
		S.D.	.98
	Intrinsic Feedback	M	4.15
		S.D.	.88
	Extrinsic and Intrinsic Feedback	M	3.69
		S.D.	1.15
	No Feedback	M	3.75
		S.D.	.89

*The higher the value, the better the job satisfaction; the maximum of 5 points.

TABLE D5

ANALYSIS OF VARIANCE WITH REPEATED MEASURES TABLE
FOR "OPPORTUNITY FOR INDEPENDENT THOUGHT"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	.8029	.6048	ns
Error	109	1.3275		
<u>Within</u>				
Period (B)	1	.0398	.0748	ns
A X B	3	.4636	.8704	ns
Error	109	.5325		

TABLE D6

PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS ON
"OPPORTUNITY FOR INDEPENDENT THOUGHT" FOR
THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	.3149	.4307	ns
2	1	.2265	.3098	ns
3	1	.0665	.0910	ns
Within Groups (Error)	20	.7310		



"SENSE OF ACCOMPLISHMENT"

TABLE D7

MEANS AND STANDARD DEVIATIONS SUMMARY TABLE OF
JOB SATISFACTION WITH "SENSE OF ACCOMPLISHMENT" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	3.75
		S.D.	1.21
	Intrinsic Feedback	M	3.73
		S.D.	.91
	Extrinsic and Intrinsic Feedback	M	3.61
		S.D.	1.13
	No Feedback	M	3.87
		S.D.	.94

*The higher the value, the better the job satisfaction; the maximum of 5 points.

TABLE D8
ANALYSIS OF VARIANCE WITH REPEATED MEASURES
TABLE FOR "SENSE OF ACCOMPLISHMENT"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	.3037	.2233	ns
Error	109	1.3599		
<u>Within</u>				
Period (B)	1	1.1324	1.8792	ns
A X B	3	.0543	.0902	ns
Error	109	.6026		

TABLE D9
PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS
ON "SENSE OF ACCOMPLISHMENT" FOR THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	.0038	.0056	ns
2	1	.0545	.0798	ns
3	1	.0102	.0149	ns
Within Groups (Error)	20	.6835		

"RECOGNITION OF GOOD PERFORMANCE"

TABLE D10

MEANS AND STANDARD DEVIATIONS SUMMARY TABLE OF JOB
SATISFACTION WITH "RECOGNITION OF GOOD PERFORMANCE" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	4.00
		S.D.	1.02
	Intrinsic Feedback	M	3.73
		S.D.	.91
	Extrinsic and Intrinsic Feedback	M	3.76
		S.D.	.90
	No Feedback	M	3.54
		S.D.	1.14

*The higher the value, the better the job satisfaction; the maximum of 5 points.

TABLE D11

ANALYSIS OF VARIANCE WITH REPEATED MEASURES TABLE
FOR "RECOGNITION OF GOOD PERFORMANCE"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	1.7380	1.2352	ns
Error	109	1.4071		
<u>Within</u>				
Period (B)	1	.0177	.0279	ns
A X B	3	.2766	.4361	ns
Error	109	.6342		

TABLE D12

PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS ON
"RECOGNITION OF GOOD PERFORMANCE"
FOR THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	.0460	.0513	ns
2	1	.0147	.0164	ns
3	1	1.5447	1.7252	ns
Within Groups (Error)	20	.8953		

"PHYSICAL CONDITIONS IN WORK PLACE"

TABLE D13

MEANS AND STANDARD DEVIATIONS SUMMARY TABLE
OF JOB SATISFACTION WITH "PHYSICAL CONDITIONS
IN WORK PLACE" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	3.91
		S.D.	.75
	Intrinsic Feedback	M	3.80
		S.D.	.80
	Extrinsic and Intrinsic Feedback	M	3.69
		S.D.	1.08
	No Feedback	M	3.50
		S.D.	.97

*The higher the value, the better the job satisfaction; the maximum of 5 points.

TABLE D14

ANALYSIS OF VARIANCE WITH REPEATED MEASURES TABLE
FOR "PHYSICAL CONDITIONS IN WORK PLACE"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	1.0063	.8014	ns
Error	109	1.2557		
<u>Within</u>				
Period (B)	1	.2167	.3117	ns
A X B	3	.4895	.7040	ns
Error	109	.6953		

TABLE D15

PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS
ON "PHYSICAL CONDITION" FOR THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	.1207	.1146	ns
2	1	.0581	.0552	ns
3	1	1.3655	1.2956	ns
Within Groups (Error)	20	1.0539		

"OPPORTUNITY FOR PROMOTION"

TABLE D16

MEANS AND STANDARD DEVIATIONS SUMMARY TABLE OF JOB
SATISFACTION WITH "OPPORTUNITY FOR PROMOTION" (N=113)*

		Treatment Periods	
		Pretreatment	90-days
Mode of Feedback	Extrinsic Feedback	M	2.16
		S.D.	1.25
	Intrinsic Feedback	M	2.46
		S.D.	1.21
	Extrinsic and Intrinsic Feedback	M	2.09
		S.D.	1.22
	No Feedback	M	1.99
		S.D.	1.12

*The higher the value, the better the job satisfaction; the maximum of 4 points.

TABLE D17

ANALYSIS OF VARIANCE WITH REPEATED MEASURES
TABLE FOR "OPPORTUNITY FOR PROMOTION"

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
<u>Between</u>				
Mode of Feedback (A)	3	1.6300	.8357	ns
Error	109	1.9503		
<u>Within</u>				
Period (B)	1	.6370	.6536	ns
A X B	3	.1765	.1811	ns
Error	109	.9745		

TABLE D18

PLANNED COMPARISONS SUMMARY OF COVARIANCE ANALYSIS ON
"OPPORTUNITY FOR PROMOTION" FOR THE POSTTREATMENT PERIOD

<u>Source of Variance</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p≤</u>
Between Groups Comparisons:				
1	1	.0095	.0073	ns
2	1	.0005	.0004	ns
3	1	1.1905	.9108	ns
Within Groups (Error)	3	1.3070		



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