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PREDICTIONS OF KEY ENTRY PERFORMANCE USING THE RECONCEPTUALIZED EXPECTANCY MODEL

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Research was conducted to replicate and to extend ~~the earlier~~ development of the reconceptualized expectancy model, which predicts individual performance based on: (1) the individual's valence or value of outcomes; (2) the probability that these outcomes would be obtained through alternative performance levels; and (3) the individual's expectancy that he could perform at these alternative levels. The model was shown in earlier work to have substantial empirical validity. (over)

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A questionnaire was individually administered to 30 data entry operators at the Long Beach Naval Shipyard. The questionnaire, which was designed to estimate the components of the reconceptualized expectancy model, provided for estimates of the expectancies that specific effort levels would result in specified performance alternatives. In addition, the questionnaire was used to construct predictions of individual performance. It was assumed that the best predictions of performance would be obtained by using the expectancy that the performance levels would be reached at maximum effort.

The results of an earlier study were replicated almost in their entirety; however, problems were found with the model. The implications of the replication and the significance of the problems encountered with the reconceptualized model are discussed in some detail.

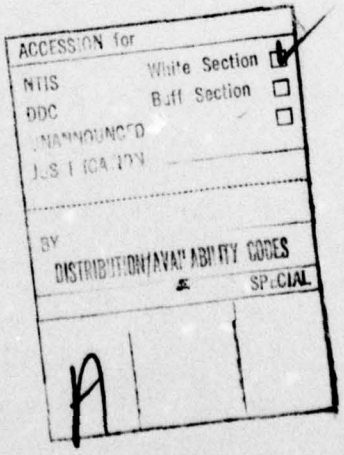
FOREWORD

This research and development was performed in support of Exploratory Development Task Area ZF55.521.018, Expectancy Theory of Work Motivation. The primary purpose was to determine the relationship between employee motivation and work performance. A better understanding of this relationship will eventually enable the management of an organization to determine what is needed to increase productivity and to evaluate proposed policy changes with respect to their probable impact upon productivity.

The initial application of a modified theory of individual productivity was conducted in the operations division of a local bank. The empirical support for this reconceptualized model was sufficiently strong to warrant a replication of the study in another setting with Navy employees. The results of that replication, provided in this report, are primarily intended for use by (1) those following the development of expectancy theory and (2) those affected by the application of the theory to organizations such as the Production and Analysis Staff (NAVMAT 09H3) and Industrial Activity Management Systems (NAVSEA 073). While general support for the model continues to be impressive, some minor problems were detected which require further developmental work on the model. This report, therefore, is one of a series dealing with the continued development and evaluation of the model and with attempts to apply the information gained from the model to the ongoing problems of Navy organizations.

Appreciation is expressed to the many individuals at the Long Beach Naval Shipyard who supported and encouraged this work. Gratitude is also expressed to Thomas T. Trent and K. Roger Williams for their valuable assistance in data collection and analysis.

J. J. CLARKIN
Commanding Officer



SUMMARY

Problem

The need exists to understand the relationship between organizational variables and individual productivity. To the extent that an employee's performance is a function of work motivation, an organization can affect productivity by influencing employee motivation. Currently, the dominant approach to the study of employee motivation and performance is that of expectancy theory. Despite its wide usage, however, expectancy theory has not succeeded in accounting for objective measures of performance to the degree originally hoped.

Purpose

The present study attempts to replicate and extend recent work that dealt with basic criticisms aimed at expectancy theory and that resulted in a reconceptualized expectancy model. The reconceptualized model of expectancy theory maintains that an individual chooses among performance levels instead of effort levels as was previously assumed. The study reported here empirically replicated and extended the model to a Navy production job.

Approach

Thirty key entry operators were individually administered a questionnaire that was designed to estimate the various components of the reconceptualized expectancy model. These components were (1) the probability that the subject will be able to work at particular performance levels, (2) the probability that performance at each of the performance levels will lead to the various outcomes, and (3) the value of specific work outcomes. Using the information thus gathered in the reconceptualized model, the force (or likelihood) to perform at each of seven performance levels was computed for each of the 27 workers whose data were retained in the investigation. The force for each alternative performance level was correlated with the number of hours worked at each level by each subject. The latter was obtained from actual performance records, which were available for each subject. In addition to the within-subject analysis, between-subject analyses were conducted to obtain information about the association of performance predicted for an individual and the individual's actual average performance. These results were then compared to those found in previous work. In addition, tests were conducted to evaluate some potential problems with the model that were not previously recognized.

Results

The results demonstrated that a consistent replication of the previous evaluation of the reconceptualized expectancy model had been performed. However, based upon a reanalysis of previous work and upon the tests conducted in this study, a number of minor problems with the reconceptualized model as currently formulated was identified. These problems limit the model's current ability to accurately project the impact of organisational changes on the productivity of its members

because (1) the model makes conservative estimates of individual performance of both highly productive and unproductive individuals, (2) it appears that some method of including the effects of different effort levels should be developed, and (3) the model is limited in its accuracy when performance feedback is not available to organizational members.

Conclusions

The reconceptualized expectancy model of individual performance has been shown to be a generally valid predictor of performance. In spite of problems with the model in this study, expectancy models appear to hold great promise as organizational diagnostics and as a guide for productivity enhancement.

Recommendations

Based on the results of this study, the following recommendations are made.

1. Continued effort should be directed at refining and developing the expectancy model.

2. Future efforts should attempt to find methods to decrease the conservativeness of the current model; to incorporate levels of effort or individual speed into the projections; to test these modifications in a variety of organizations, both cross-sectionally and longitudinally; and to validate the model by modifying organizations as prescribed by the model.

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INTRODUCTION

Problem

Organizations of all types are concerned with ways to increase individual and group performance. Naturally, the more that is understood about the factors that influence productivity, the better managers will be able to improve organizational performance.

Expectancy theory provides a model of individual behavior in organizations (Vroom, 1964; Porter & Lawler, 1968; & Mitchell, 1974). It offers an explanation of the process by which individuals engage in varying degrees of productive or performance-related behavior. As typically expressed, expectancy theory states that individual effort on the job is a function of the sum of the products of the following variables: the expectancy that effort will lead to performance, the relationship between performance and job-related outcomes, and the personal value or valence of these outcomes.

While the model has generally received wide acceptance, empirical evidence of its validity has been sketchy (Mitchell, 1974). Recently, however, Nebeker and Moy (1976) reported data that demonstrate that a modification of the expectancy theory's conceptual and measurement formulations resulted in substantial improvement in the model's ability to account for objectively measured performance. Using the model to prescribe organizational changes also has been shown to substantially improve the effectiveness of an organization (Bretton, Dockstader, Nebeker, & Shumate, 1978).

Purpose

The purpose of this study was to replicate and extend the Nebeker and Moy (1976) findings in a different setting and on a slightly different task. In addition, a number of questions important to the extension of Nebeker and Moy's findings was empirically tested.

Background and Scope

In their study, Nebeker and Moy (1976) considered criticisms of expectancy theory, suggested specific improvements, and evaluated empirical evidence. The major criticisms discussed in that report fell into two categories: conceptual and measurement.

The conceptual criticisms were generally of two types: First, it was suggested that the appropriate behavior of interest in expectancy research should be productivity or performance rather than effort. This was suggested because productivity or performance is clearly compatible with the theoretical formulations of Vroom (1964) and because most organizations consider productivity to be more important than effort. As a result of this organizational attention, the consequences of performance have a more direct impact on the individual than do the consequences of effort. Individuals, therefore, are more likely to focus on performance.

The second conceptual issue was that most expectancy theory research had obscured the difference between motivation and ability by confounding the two in work with performance expectancies. Motivation is the relative preference for alternative levels of performance, while ability is the likelihood that the behavior or level of performance can be accomplished.

Criticisms of expectancy theory measurement addressed by Nebeker and Moy centered around two issues: First, the lack of within-subject comparisons as a basis for predicting which performance levels will be chosen, and second, the lack of ratio scale measurement on variables used in the model. Both of these problems were dealt with using within-subject analyses and methods of generating predictions.

Based on the above considerations the following was proposed as a reconceptualization of the expectancy force model of work performance (force model):

$$F_i = \sum_{j=1}^{n} [E_i P_{ij} V_j + (1-E_i P_{ij}) \bar{V}_j] \quad (1)$$

where F_i = the force to perform at level i; E_i = the individual's expectancy that he could perform at level i; P_{ij} = the perceived probability that performance at level i will result in outcome j; V_j = the valence of obtaining outcome j; and $\bar{V}_j$ = the valence of not obtaining outcome j.

The model postulates that the observed frequency of a performance level is proportional to the size of the force for that level. Because the postulate allows an empirical test, it was hypothesized that this model would generate performance predictions that would relate significantly to objectively measured performance. That hypothesis was tested on 48 proof machine operators in a bank's operations department. The results provided strong support for the hypothesis; predictions based upon a multiplicative combination of expectancy (ability) and valence of performance (motivation) were significantly better than predictions based upon expectancy or valence of performance separately. It was also found that individual differences in ability were responsible for relative performance differences while motivation x ability was predictive of both an absolute level of performance and relative performance.

While the results of the Nebeker and Moy study are encouraging, it would be premature to accept them without additional evidence. As they point out, "while support for the model shown here is promising, it is imperative that replications be conducted and extensions made which further refine the model and evaluate its usefulness in a variety of settings" (p. 25).

Hypotheses and Related Issues

The validity of the reconceptualized model was tested by attempting to replicate the Nebeker and Moy (1976) results using a different sample performing a very similar task. This replication included both within- and between-subject variables.

Based on the results of the Nebeker and Moy study, the within-subject relationships proposed by the following three hypotheses were tested to determine the replicability of the Nebeker and Moy findings:

Hypothesis 1: There is a positive relationship between the frequency with which an individual performs at a given level and the force model's prediction for that level.

Hypothesis 2: There is a positive relationship between the frequency with which an individual performs at a given level and the expectancy of performance at that level.

Hypothesis 3: The relationship between frequency of performance and force (Hypothesis 1) is stronger than the relationship between frequency of performance and expectancy (Hypothesis 2).

The following six between-subject hypotheses were tested in a replication of the original study:

Hypothesis 4: The average actual performance level of individuals is positively associated with average performance predicted from the force model.

Hypothesis 5: The average performance level of individuals is positively associated with performance predicted from expectancy alone.

Hypothesis 6: The relationship between average performance and performance predicted from the force model (Hypothesis 4) is not significantly different from the relationship between average performance and performance predicted from expectancy alone (Hypothesis 5).

Hypothesis 7: Individual performance is not significantly different from performance predicted from the force model.

Hypothesis 8: Individual performance is significantly less than that predicted from the valences of performance levels alone.

Hypothesis 9: Individual performance is significantly greater than that predicted from expectancies of performance alone.

Along with these first nine hypotheses, the results of other relationships in the Nebeker and Moy report were compared with their equivalent relationships in this study. Consideration was also given to two issues thought to be important to the further refinement and extension of the force model. The first involves an assumption made in the reconceptualized model, while the second deals with methods of evaluating the model.

Nebeker and Moy assumed that the expectancy for each particular level of effort to obtain a specific performance level could be simplified so that only the maximum expectancy would be necessary in the computation of force to perform. For example, if only two levels of effort (high and low) were possible for an individual and had expectancies of 1.00 and .00, respectively, then the maximum of these two expectancies would be used in the computation of force. In this example, the expectancy 1.00 would be used. The argument made for this assumption was that an individual selects performance level based on what he thinks he could do (expectancy) and what he would like to do (motivation) and

then adjusts his level of effort to whatever is required to attain the desired performance level. However, this implies that the maximum level of effort would always be chosen when it was more likely to result in the desired performance level. Thus, effort would almost always be at the maximum. Whether this is, in fact, true is an empirical question. However, it seems unlikely, and it can be argued that this assumption does not consider the cost of effort expended or the possibility that maximum expectancy may not be chosen because an equally acceptable performance level could be obtained through less effort.

If the assumption made in the reconceptualized model is correct, then the use of the maximum expectancy will produce predictions that will come closer to the criteria than the expectations associated with any other effort level.

The Nebeker and Moy methodology did not obtain expectancies that various performance levels could be reached through different effort levels but, rather, asked for the expectancy that was the maximum. Thus, it was not possible to test this assumption on their data. However, these added expectancies were part of the present study, making it possible to test the following hypothesis:

Hypothesis 10: Performance predictions using maximum effort expectancies will be more strongly related to objective performance than will performance predictions based on any other effort expectancies. (If this hypothesis is not supported, then it will be necessary to consider ways in which the expectancies for various levels of effort or some related concept would be integrated into the expectancy model.)

The final issue considered by this research involved the methods used to evaluate the results of the reconceptualized expectancy model. Nebeker and Moy used three methods to evaluate the accuracy of the reconceptualized model: within-subject correlations, between-subject correlations, and the difference between the mean of predicted scores and the mean of criterion scores.

These three methods are represented by Hypotheses 1 to 9 in this report. One additional method, overlooked in the Nebeker and Moy report, was a test to see if the variance of the predicted scores was significantly different from that of the criterion scores. It was claimed that the reconceptualized model accounted for relative differences between levels of individual performance and the absolute level of individual performance. For this statement to be accurate, it would be necessary to have a high between-subject correlation, the same means between predictor and criterion, and the same variance in the predictors as the criterion. If the first two conditions were met but the variances were unequal, then predicted performance would be either an increasing over- or underestimate of actual individual performance scores as the tails of the predictor distribution are approached.

When the data from the Nebeker and Moy report were analyzed using a test of the significance between differences of correlated variances, it was found that the criterion distribution had a significantly larger ($t(46) = 2.59$, $p < .02$) variance than the predictor distribution ($S^2 = 308.70$ vs. $S^2 = 158.00$). This indicates that the predictions were underestimating the actual performance of the highest performers and overestimating the actual performance of the lowest performers.

This fact is not typically of great concern in the use of general regression models because these models are attempting to solve for parameters which, when entered in the functional equation, give the greatest prediction. The difference is important in the test of the force model, however, because that model attempts to predict actual performance from a computational equation without additional parameters. Thus, a difference in variance between predictors and criteria weakens the validity of the reconceptualized model. If the model is going to be evaluated appropriately, then any replication or extension attempt should also test whether the variances of the predictor and criterion distributions are different. Assuming a valid model, the following and final hypothesis is stated:

Hypothesis 11: The variance of the predictor distribution will not be significantly different from the variance of the criterion distribution. (If this hypothesis is rejected, some additional conceptual work must be done to make the model more compatible with observed performance, and additional methods of analysis may be required to evaluate the model's accuracy.)

With the above hypotheses in mind, a study was designed to evaluate the validity of the reconceptualized model.

METHOD

Sample and Experimental Design

Thirty key entry operators in the data processing department of the Long Beach Naval Shipyard (LBNSY) were administered a questionnaire designed to estimate the various components of the reconceptualized expectancy model. Because some data were lost, the actual number of operators used in the analyses varied between 23 and 27. All of them were female civil service employees and had been key entry operators at LBNSY for periods ranging from 1 month to 22 years. Generally, 1 year on the job is regarded as necessary to be fully qualified, and 69 percent of the operators had been there for at least that length of time.

The components of the model that the questionnaire was designed to estimate were (1) the probability that the subject will be able to work at particular performance levels, (2) the probability that performance at each of these levels will lead to the various outcomes, and (3) the value of specific work outcomes.

Task

The key entry operator's job is similar to key punching but, instead of producing a physical card, the machine makes an electromagnetic record of each key entry directly on computer disk storage. This process is faster and easier to use than the old card punch system.

This particular task has several characteristics that make it very useful as a research task: First, the key entry function is centralized in this organization, providing a common work environment for all individuals doing the same standardized activity. This environmental and task homogeneity is important in controlling the potentially confounding effects often associated with field research. Second, because key entries are counted electronically, very accurate records of each individual's performance could be used in data analysis. Third, the task is performed in an actual work environment and, while allowing for more control than is available in most natural settings, it provides the advantages of increased generalizability made more likely by field research of this type. Finally, the task is also very similar to that of the Nebeker and Moy study, making it easier to compare the results of this study with that one.

Data Sources and Measures

The measures used in this study came from two independent sources: department records and a questionnaire administered in the form of a highly structured interview. These sources and the specific measures obtained from them are detailed below.

Department Records

The department provided the research team with performance records that are routinely recorded by their equipment but that had not been provided to the operators as performance feedback. (However, if an operator wished to check

on her performance, she could do so through a fairly simple inquiry of the computer which recorded and controlled the key entry process.) Performance was measured and recorded in key strokes per hour (KS/Hr), a measure of the rate of productivity.

To test the within-subject aspects of the model, it was necessary to divide performance rates (KS/Hr) into levels. The following seven levels were chosen for this study:

1. 17,000 and above.
2. 13,000 to 16,999.
3. 11,000 to 12,999.
4. 9,000 to 10,999.
5. 7,000 to 8,999.
6. 3,000 to 6,999.
7. 0 to 2,999.

These rates were chosen as the performance levels of interest because they covered the observed range of past performance with enough observations at each level to sufficiently differentiate individual performance for both within-subject and between-subject analyses.

Along with other personnel information, department records were used to construct the following variables:

1. Hours at performance levels ($Perf_i$). Since the number of key strokes and the time spent on a task were recorded for each job, it was possible to tally the number of hours each individual worked at each of the seven performance levels. The scores could then be used for within-subject analysis. $Perf_i$ were computed for each operator for the month following questionnaire administration.

2. Average performance (AvePerf). Each individual's average performance, expressed in KS/Hr, was calculated from the proportion of time spent at each performance level during the month immediately following questionnaire administration.

3. Previous performance (PrePerf). Average KS/Hr performance scores were obtained for each individual for a period 3 months prior to the month the study was conducted.

4. Pay. The monthly pay of each individual was calculated from their rating and step using the federal government's General Schedule.

Each of these variables was computed using the Nebeker-Moy method. Unfortunately, one variable that was available in that study--aptitude as measured by a selection instrument--was not available for this sample. Because the department had no testing program for selection purposes, no such data had been collected.

Questionnaire

The questionnaire was designed to estimate the various components of the force model (see Equation 1) and related variables. Before any specific questionnaire items were written, it was necessary to define the behavior of interest and the outcomes that might be or should be associated with it. In this department, it was clear that performance was the primary behavior of interest.

The outcomes to be included in the questionnaire were determined through interviews with most of the operators who were asked to identify all of the possible consequences of performing at various rates.

These interviews produced the following nine outcomes regarded as relevant to performance: (1) a monetary bonus, (2) promotion or advancement, (3) cross training for other jobs, (4) dismissal, (5) praise from management, (6) coworker disapproval, (7) a sense of accomplishment, (8) the exertion of maximum effort, and (9) recognition of accomplishment.

A questionnaire (see appendix) was then constructed that obtained (1) the expectancies of the selected performance levels (p. A-4), (2) the probabilities of outcomes given these performance levels (p. A-8), and (3) the valence of outcomes (p. A-7). In addition, other variables (see below) that were relevant to establishing the model's validity were also collected from the subjects. The actual questions used were essentially the same as those in the Nebeker and Moy study but, instead of asking for just the maximum expectancy for each of the performance levels, the subjects were asked to give expectancies for three effort levels: maximum effort, three-quarters effort, and half effort. This was necessary to test Hypothesis 10.

Created Variables

Two groups of variables were created using the questionnaire data. The first is appropriate for within-subject analysis; and the second, for between-subject analysis.

Within-subject Variables

Following Nebeker and Moy, three separate frequency of performance choices were predicted:

1. Force to perform at each level (F_i). F_i's were computed from equation 1. For each subject, seven forces were calculated, one for each of the seven levels of performance based upon the maximum expectancy.

2. Expectancy of being able to perform at each level (E_i). These were estimated directly by each subject on the questionnaire. E_i's were included separately to test the multiplicative aspects of the model.

3. The valence of performance at each level (VAL_i). Valences were computed the same as force except the E_i's were eliminated from the equations. Valence, as defined here, is equivalent to the motivation associated with performance at each level but does not include the expectancy of success. A VAL_i was computed for each performance level.

To test whether or not the maximum expectancy assumption is valid, two additional variables were also created:

4. Force to perform at each level using three-quarters effort (FT_i). FT_i's were computed the same as F_i's, except that expectancies for three-quarters effort were used.

5. Force to perform at each level using half effort (FH_i). FH_i's were computed the same as F_i's, except that expectancies for half effort were used.

Between-subject Variables

Based upon the relative forces to perform at each alternative level, a single prediction of average performance could be derived. This was done with each of the following measures:

1. Predicted performance based on the reconceptualized force model (PPFORCE). This variable was derived by averaging the actual performance alternatives, expressed as KS/Hr, weighted by the force to perform each alternative.

2. Predicted performance based on valence alone (PPVAL). The procedure for calculating this variable was the same as PPFORCE, except that the E_i was deleted from the computation of force prior to the weighting. PPVAL provides an estimate of predicted performance based on motivation independent of the effects of expectancy.

3. Predicted performance based on expectancy alone (PPEXP). It should be recalled that E_i provided an individual's subjective estimate of ability. This estimated ability, as defined here, includes the effects of training, experience, and technology (including job design) in addition to individual aptitude. Predicted performance, in this case, was the average performance alternative weighted by the expectancy of success at each performance level. This represents a prediction of performance based on expectancy independent of the valence of performance levels.

4. Predicted performance based on the force model using three-quarters effort (PPTFORCE). This variable was calculated in the same manner as PPFORCE, except that expectancies of three-quarters effort were used.

5. Predicted performance based on the force model using half effort (PPHFORCE). Half effort expectancies were used in calculation of this variable rather than maximum effort expectancies.

6. Experience (EXPER). Experience was simply the number of months on the job.

7. Self-reported performance (SRPERF). This variable was the individual's reported average performance. While SRPERF was not reported by Nebeker and Moy, it was collected. It is used here because it provides a comparison between actual and self-reported performance.

Because there was no aptitude score available for these subjects, it was not possible to create an effort score comparable to the one used by Nebeker and Moy.

Procedure

Using the information gathered in the questionnaire, the force to perform at each of several performance levels was computed for each of the workers whose data were retained. The force for each alternative performance level was correlated with the number of hours worked at each level by each subject. In addition to the within-subject analyses, between-subject analyses were conducted to obtain information about the association of performance predicted for an individual and that individual's actual average performance. These results were then compared to those found in previous work. In addition, tests were conducted to evaluate some potential problems with the model that were not previously recognized.

RESULTS

This study was directed toward answering two general questions: First, could the reconceptualized expectancy model described by Nebeker and Moy (1976) be replicated using another sample of workers performing a similar task in a Navy organization? Second, what modifications to the model, if any, are necessary to more accurately account for individual and group performance?

The basic analyses performed to answer these two questions, and the specific hypotheses associated with each, can be divided into three categories: (1) replications of within-subject analyses, (2) replications of between-subject analyses, and (3) additional analyses. Each of these separate types of analysis was used to test the research hypotheses.

Within-subject Analyses

The fit between the performance predicted by the reconceptualized model and actual performance was tested by correlating each individual's force at each performance alternative with the length of time the individual actually performed at that level. A high positive correlation indicates a good fit between predictions and observations. In addition, as was done by Nebeker and Moy (1976), the components of force were correlated with performance separately and with one another to test components' interactions in improving the predictions of the model. Because each subject had a different set of correlations, Hypotheses 1, 2, and 3 were tested by transforming the correlation of each subject to Fisher's z and then averaging them. Fisher's z was developed so that the correlation coefficient could be treated as a standard normal variable, thus allowing it to be averaged (Hays, 1963). The results of this analysis are shown in Table 1.

Table 1

Average Within-subjects Intercorrelations
Between Objective Performance, Force Model, and Components

Item	$Perf_i$	$Force_i$	E_i
$Force_i$	.49* (.50)		
E_i	.41* (.36)	.62* (.66)	
Val_i	-.20 (.05)	.24 (-.02)	-.80* (-.75)

Note. As an aid in comparing these results with those of Nebeker and Moy, the comparable average correlations from that study are presented in parentheses.

*$p < .01$ (Probability based upon combined probability of independent events), $N = 25$.

Hypothesis 1 stated that there would be a positive relationship between the frequency with which a person performed at a given level ($Force_i$) and the model's prediction for that level ($Perf_i$). This hypothesis is supported by results nearly identical to those of the Nebeker and Moy study.

Hypothesis 2 postulated that performance at a given level ($Perf_i$) would be positively associated with the performance expectations at the level (E_i). Table 1 also supports this hypothesis; again, the results are very similar to those of the Nebeker and Moy study. Finally, Nebeker and Moy's results indicated that the force model correlations would be stronger than the expectancy correlations with performance, as stated in Hypothesis 3. While the force model correlations appear to be stronger, the actual difference was not significant ($t(24) = .96$, N. S.). Tests of the differences between these average correlations and Nebeker and Moy's findings further complicate the interpretability of the present results because they are not significantly different from those found by Nebeker and Moy, who did find a difference. Thus, because the results are not clear-cut, support for Hypothesis 3 is questionable.

Overall, then, it appears that the findings of the within-subject analyses in the Nebeker and Moy study are replicable and generalizable to a different organization performing a slightly different task.

Between-subject Analyses

Based on the reconceptualized model and on the findings of Nebeker and Moy, six hypotheses (4-9) were proposed for the between-subject analyses. Table 2 presents the means, standard deviations, and correlations relevant to these hypotheses.

Hypothesis 4 stated that the average predicted performance for an individual (PPFORCE) would be significantly correlated with average actual performance (AVEPERF). In the Nebeker and Moy study, this correlation was .47. In the current study, the correlation decreased to .40 but was still significant and supports the validity of the reconceptualized model.

Hypothesis 5 indicated that average performance predicted from expectancy alone (PPEXP) would be positively correlated with average performance (AVEPERF). Table 2 also supports this hypothesis, although its correlation was also somewhat smaller (.43) than that found by Nebeker and Moy.

Hypothesis 6 stated that there would be no significant difference between the correlation of AVEPERF with PPFORCE and AVEPERF with PPEXP. Since these correlations were not different from each other in the Nebeker and Moy report, replication would require that they not be different here. Although it would be difficult to prove the null hypothesis, evidence for it would be provided by the absence of differences. A test of the significance of these two correlations supports Hypothesis 6; that is, the correlations are not significantly different ($t(22) = -.27$, $p > .05$). As in the within-subject analyses, the results of this study replicate the findings of the Nebeker and Moy report for these hypotheses.

Table 2

Intercorrelations Among Between-subject Variables

Variable	Units	Mean	SD	1	2	3	4	5	6	7
1. AVEPERF	KS/Hr	8178	2372	---						
2. PPFORCE	KS/Hr	9759	796	.40* (25)	---					
3. PPVAL	KS/Hr	11243	686	-.20 (25)	.29 (27)	---				
4. PPEXP	KS/Hr	7181	1369	.43* (25)	.83*** (27)	.10 (27)	---			
5. PREPERF	KS/Hr	8332	2267	.69*** (24)	.53** (26)	-.11 (26)	.49** (26)	---		
6. PAY	$/Yr	8906	1357	.16[a] (24)	-.12 (26)	-.08 (26)	.01 (26)	-.01[a] (25)	---	
7. EXPER	Months	64	71	-.04 (25)	-.07 (27)	-.05 (27)	-.10 (27)	-.13[a] (26)	.82*** (26)	---
8. SRPERF	KS/Hr	9354	3252	.49** (23)	.41* (25)	.10 (25)	.62*** (25)	.58** (24)	-.03 (24)	-.22 (25)

Note. The number of cases is shown in parentheses.

*p < .05
**p < .01
***p < .001

[a]Difference from Nebeker and Moy (1976), p < .01.

Hypotheses 7, 8, and 9 all dealt with the differences between the mean of AVEPERF and the means of the predictor variables. Hypothesis 7 said that the mean of AVEPERF would not be significantly different from the mean of PPFORCE. This is to be expected, since the model should predict actual as well as relative performance. It was found, however, that the mean of PPFORCE was significantly larger than the mean of AVEPERF ($t(24) = 3.63$, $p < .01$). This indicates that, although relative differences between the performance of individuals could be accounted for by the model, actual performance was significantly overestimated. Why do the results of this study differ from the Nebeker and Moy study? While there may be other explanations, the two most likely are (1) that the reconceptualized model, as constructed, is not generalizable and, therefore, is useful in explaining relative differences in performance but not absolute performance, and (2) that there is something unique or different about this setting which produces estimates of performance that are greater than would be expected. The first explanation may be true, but it would be challenged if evidence for the second were found. One organizational characteristic that may be critical to the accuracy of the model is the extent to which feedback is available to the operators. Recall that, although accurate performance data on each individual were available, such information was not routinely provided to the operators and most did not seek it out. Because the force model is cognitive, any discrepancies between operators' perceptions or assumptions concerning their performance and actual performance could affect the model's accuracy.

Whether inaccuracies of this type were a problem can be tested by comparing the relationships among self-report performance, predicted performance, and actual performance in this study with these same relationships in the Nebeker and Moy study.

It is reasonable to expect that, the better the feedback in an organization, the higher the correlation between self-report and actual performance. For the data reported here, the correlation between SRPERF and AVEPERF was $r = .49$ ($df = 21$; $p < .01$). By comparison, the correlation between these same variables in the Nebeker and Moy study was $r = .89$ ($df = 44$; $p < .001$). Obviously, the feedback to the subjects in the Nebeker and Moy study was either more accurate or more readily available than the feedback in the present study. Further evidence that the lack of adequate feedback was a major contributor to the model's consistent overprediction of performance can be found by comparing the means of PPFORCE and SRPERF. As shown by Table 2, this difference is much smaller than the difference between the means of PPFORCE and AVEPERF. In fact, this difference is not significantly different from zero ($t(22) = .67$, N. S.). So it is possible that, when the model does not adequately predict actual performance, it may be because of poor feedback in the organization. In such cases, relative differences in, and absolute units of SRPERF should be accounted for substantially better than they are for AVEPERF.

Hypothesis 8 predicted that AVEPERF would be significantly less than PPVAL; Hypothesis 9 that AVEPERF would be significantly greater than PPEXP. Table 2 also presents the means and standard deviations for these variables. The differences were significant and in the predicted direction, thus supporting both hypotheses: the test for the difference between AVEPERF and PPVAL was $t(24) = -5.89$ ($p < .001$); for the difference between AVEPERF and PPEXP,

$t(24) = 2.29$ ($p < .05$). In both cases, the results of the Nebeker and Moy study were replicated. The predictions of performance based on valence consistently overestimated performance by a large margin, while predictions based on expectancies alone underestimated performance.

In addition to the specific hypotheses tested above, the correlations in Table 2 were compared with their equivalents in the Nebeker and Moy report to see if there were any substantial differences in the relationships. It is interesting to note that only two correlations departed from the Nebeker and Moy findings: those between previous performance (PREPERF) and pay, and between PREPERF and experience were significantly lower than originally found. Because the present study involved Civil Service employees who were paid a salary determined by seniority and not by performance, the absence of a relationship between pay and PREPERF is easily understood when contrasted to the subjects in the Nebeker and Moy study, whose pay was strongly influenced by performance. However, the lack of a relationship between PREPERF and experience (EXPER) is less obvious. Since the average experience in this organization is significantly longer than in the Nebeker and Moy study (64 months vs. 28; $t(23) = 2.53$, $p < .01$), the operators' skill levels may have reached asympote. Thus, differences in experience did not reflect differences in skill and, consequently, did not relate to differences in performance. A possible explanation may be that, since rewards were tied to performance in the Nebeker and Moy study, those poor-performing and unrewarded operators were more likely to leave the organization. Performance thus acted as a selection for experience.

Additional Analyses

One of the assumptions of the force model (Hypothesis 10) was that actual performance could be predicted best by using the maximum expectancies for each of the performance levels. To test this assumption, the performance predictions based on forces for maximum effort (PPFORCE), three-quarters effort (PPTFORCE), and half effort (PPHFORCE) were correlated with AVEPERF. For PPFORCE, the correlation was .40; for PPTFORCE, .48; and for PPHFORCE, .45 ($N = 25$). The differences between these correlations are not significant at the .05 level, but they approach it. The mean performance predicted by these three force estimates did not differ significantly from each other although the PPTFORCE and PPHFORCE were closer to AVEPERF than was PPFORCE. While the information gained by using the additional effort levels was not substantial here, it suggests that there may be some value to considering them in future work. This may be particularly appropriate in light of the results of testing the final hypothesis.

Hypothesis 11 concerned the variability of the distribution of predicted performance (PPFORCE) compared to the variability of the actual performance (AVEPERF). Accurate performance predictions require a high positive correlation, as well as similar means and variances. It was shown, in a reanalysis of the Nebeker and Moy data, that the variability of PPFORCE was considerably less than AVEPERF, so the model's accuracy on this dimension is suspect. It was found that, for the current data, the variance of AVEPERF was significantly greater than PPFORCE ($t(23 = 10.09$, $p < .01$). As in the Nebeker and Moy study, the force model underestimates the performance of high performers and overestimates the performance of low performers.

CONCLUSIONS

This study was designed as: (1) a replication of the reconceptualized expectancy model of performance as presented in Nebeker and Moy (1976) and (2) an examination of issues that could lead to refinement and extension of the model. Since the results have demonstrated only slight deviation from the findings of Nebeker and Moy, a great deal of confidence can be placed in the ability of the model to account for relative performance differences. It does appear, however, that there are three problems with the model that need attention:

1. The model as currently defined assumes that the fit between predictions and actual performance can be achieved without considering the expectations that less than maximum effort will lead to the performance levels. While the data presented here are not conclusive, they do suggest that some consideration ought to be given to methods that could incorporate expectancies for lower effort levels into performance predictions. If effort is unsuitable, then some related concept should be considered. Specifying the detailed methods by which these additional expectancies could be incorporated into the model is beyond the scope of this report. However, efforts toward this end are presently underway and will be presented in a separate report. It would seem clear, however, that a method needs to be developed that calculates predicted performance based on the expected use of the various levels of effort or individual speed.

2. The second problem involves the finding that the present reconceptualized model consistently underestimates the variance of actual performance. The model does not predict the absolute level of performance of high and low performers as well as mid-level performers. This problem can be traced directly to the variability in forces (F_i) for each individual across the performance levels. PPFORCE is computed by finding the weighted average of the numerical values for seven performance levels; consequently, the variability of this average is dependent upon the extent to which large F_i's for both high and low performance levels are found.

For example, suppose there were three performance levels: (a) 10 units/hr., (b) 20 units/hr., and (c) 30 units/hr. Also assume that the forces associated with these levels were computed to be 20, 22, and 28, respectively. The extremity of the average units predicted is dependent upon the proportionality of the forces associated with each level. In this case, the proportional differences among the forces is small; consequently, the average performance predicted is only slightly different from the midpoint of the performance scale; for example, $(\frac{20}{70} \times 10) + (\frac{22}{70} \times 20) + (\frac{28}{70} \times 30) = 21.14$. However, when the F_i's differ by the same magnitude but provide a different proportional distribution--for example, (a) 0, (b) 2, and (c) 8, predicted performance takes on more extreme performance values; for example, $(\frac{0}{10} \times 10) + (\frac{2}{10} \times 20) + (\frac{8}{10} \times 30) = 28$. Thus, it appears that, while the force at each individual performance level is correlated with the frequency of performance at the level, there is much less variability in the forces across levels than there is in the frequency of performing at those levels. The expectancy estimates are the single greatest contributor to the differences in forces (see Table 1); thus, these expectancy estimates are likely to be less variable than they should be if the variability in performance is to be accurately predicted.

3. The final problem concerns what have been called boundary conditions of expectancy theory. Graen (1969) and Dachler and Mobley (1973) have attributed some of the weak support of previous expectancy studies to conditions in the organization that, they suggest, limit the ability of the model to be predictive. One of the proposed conditions which could conceivably inhibit the model's predictiveness is a lack of behavioral control on the part of the subject. For instance, if workers were operating machinery that worked at a fixed pace, then it would not be possible for individual motivation to have an impact upon productivity and the model would not be predictive. However, while the machinery's pace would limit individuals' ability to vary performance, it should not be seen as a boundary condition limiting the model's ability to predict actual performance unless the individuals involved mistakenly thought that they could vary their work pace. The individuals' expectancies normally would reflect an awareness that work pace was fixed and, therefore, that productivity was set. Consequently, productivity should be highly predictable from the model.

Likewise, Dachler and Mobley (1973) suggested that the lack of a contingent environment acts as a boundary condition limiting the ability of the model to predict behavior. Proposing this as a boundary condition is also highly questionable. The model predicts that individuals behave in ways that are consistent with the degree of performance "contingentness" of important outcomes. A lack of contingency would generally mean that individuals would generally perform at some baseline rate that, although substantially below their ability level, would be predictable.

What does appear, however, to be a boundary condition and, therefore, a problem for the model concerns the knowledge the subject has of his actual behavior (feedback availability). Our data suggest that, if feedback is limited or distorted, then the ability to predict the actual performance of individuals will be similarly restricted. Self-reported performance, however, will still be predicted relatively well. Consequently, any attempts to use the model should consider the feedback characteristics of the situation before anticipating results.

The reconceptualized expectancy model of individual performance has shown itself to be a generally valid predictor of performance. With few exceptions, the model held up in an attempt to replicate it.

Nebeker and Moy suggested that the model is potentially useful in diagnosing organizational problems and in projecting the impact on performance of organizational interventions. They also suggested that these projections could be the basis of making cost-benefit comparisons of different methods of changing performance in organizations; that is, the model could be used to project the performance improvement of a training program, a financial incentive system, etc. For example, if the effects of the training program on expectancies and the effects of the incentive system on probability of rewards could be anticipated, then the model could be used to estimate the amount of performance improvement expected for each intervention separately or all of them together. These estimates could then be used to decide which intervention or combination is most effective. In addition, if the costs of the various plans are known, then the best cost-benefit ratio can also be determined.

The value to managerial decision making of a model with this ability is obvious. However, before the model can be effectively put to such use, the aforementioned problems with the current model need to be satisfactorily resolved. Future exploratory development needs to have this as a primary objective in its attempt to extend and refine the reconceptualized expectancy model. In addition, methods for establishing the estimated costs of various change plans need to be explored if cost-benefit analyses are going to produce reliable estimates of costs as well as of benefits.

RECOMMENDATIONS

Based upon the findings of this study, the following recommendations are made:

1. Continued effort should be directed at refining and developing the expectancy model.

2. Future efforts should attempt to find methods to decrease the conservativeness of the current model; to incorporate levels of effort or individual speed into the projections; to test these modifications in a variety of organizations, both cross-sectionally and longitudinally; and to validate the model by modifying organizations as prescribed by the model.

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APPENDIX

QUESTIONNAIRE

1. Introduction.

The Navy Personnel Research and Development Center (NPRDC) is conducting research on the nature and structure of individual performance and expectations in various work situations. As key punch operators at the Long Beach Naval Shipyard (LBNSY) we are interested in how you view your job.

2. Privacy Act Statement.

The information obtained in this study will help us to understand how to improve jobs. Your individual comments will be kept in strict confidence by NPRDC and will not be reported to any LBNSY source except in the form of grouped statistical summaries which maintain your individual anonymity. We are requesting your identity through your operator number only to allow us to make comparisons over the course of the study (about ten months). Your participation in this study is voluntary and if you decide not to participate it will not be held against you. You are encouraged to participate, however, because we feel that the study will be more accurate and have greater impact upon possible changes if more people participate.

Thank you for your help.

PART I

In this part of the questionnaire, we would like some general information on how you feel about your job as a key puncher, and about some of the different jobs that you could have.

Section A

Using the scale below, rate how satisfied you are or think you would be in the jobs listed below. Write the value which best describes your satisfaction in the blank next to the job that is presented.

Totally Dissatisfied — Completely Satisfied

0 10 20 30 40 50 60 70 80 90 100

1. All in all, how do you rate your job as a key punch operator at LBNSY? _____

All in all, how would you rate being:

2. A key punch operator for another organization? _____
3. An EAM (tab) operator? _____
4. A bookkeeper or an accountant? _____
5. Clerical worker (file clerk, clerk typist, secretary, etc.)? _____
6. A homemaker? _____
7. Unemployed? _____

Section B

Using the scale below, we would like you to estimate how likely it is that if you wanted to you could get the following jobs at this time.

I could never get this job. — I have an offer right now.

0 10 20 30 40 50 60 70 80 90 100

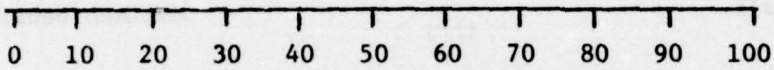
1. A key punch operator for some other organization. _____
2. An EAM (tab) operator. _____
3. A bookkeeper or an accountant. _____
4. A clerical worker. _____
5. A homemaker. _____
6. Unemployed. _____

PART II

Section A

Most people are unable to operate consistently at their highest rate for a number of reasons. How often do the following problems prevent you from working as fast as you could?

Never Sometimes Always

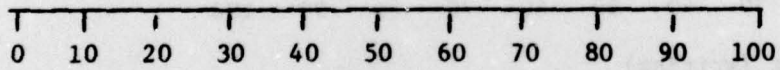


1. Supervision. _____
2. Documents are poorly written. _____
3. Physically tired or not feeling well. _____
4. Workload pressure. _____
5. Pressure from management. _____
6. Interruptions by people around me. _____
7. Procedures are not current. _____
8. New procedures are not available to all operators. _____
9. Bored with work. _____
10. Other. _____

Section B

The next three questions concern how often you can run at certain rates and should be answered using the table below. In making your estimates please assume that you would have the normal amount of the problems like those above.

I can't do it. I can do it every time.



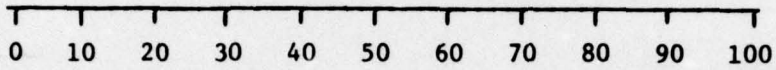
1. When you are operating at maximum effort, how often can you run at the following rates?
2. When you are operating at about 3/4 effort, how often can you run at the following rates?
3. When you operate at 1/2 effort how often can you run at these rates?

Keystrokes per hour (writing)	Maximum Effort	3/4 Effort	1/2 Effort
a. 17,000 or above			
b. 13,000 to 16,999			
c. 11,000 to 12,999			
d. 9,000 to 10,999			
e. 7,000 to 8,999			
f. 3,000 to 6,999			
g. less than 3,000			

Section C

If you were consistently operating at the following rates, how much would you benefit from and feel good about your performance? (Rates are in terms of keystrokes per hour while writing.)

No benefit at all. Maximum benefit

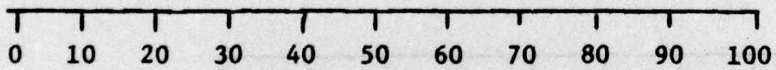


Keystrokes per hour	Rating
1. 17,000 or above.	_____
2. 13,000 to 16,999.	_____
3. 11,000 to 12,999.	_____
4. 9,000 to 10,999.	_____
5. 7,000 to 8,999.	_____
6. 3,000 to 6,999.	_____
7. less than 3,000.	_____

Section D

Using the scale below, we would like you to estimate how difficult it would be for you to consistently run at the following rates.

It would be simple. It would be impossible.



Keystrokes/Hour (writing)	
1. 17,000 or above.	_____
2. 13,000 to 16,999.	_____
3. 11,000 to 12,999.	_____
4. 9,000 to 10,999.	_____
5. 7,000 to 8,999.	_____
6. 3,000 to 6,999.	_____
7. less than 3,000.	_____

PART III

Section A

Different people like different things about jobs. In this section of the questionnaire we would like you to tell us how valuable it would be to you for a job to have certain characteristics. Using the scale below, please estimate the value to you of having the characteristics that are listed. Please consider each of these characteristics separate from the others, as though each one were the only thing that you were considering for a job.

I would quit any job in order to avoid it. — I would take any job just to get it.

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

How is it, or would it be to:

1. Receive good pay and benefits. _____
2. Have opportunity for advancement. _____
3. Work with pleasant people. _____
4. Work for good supervisors. _____
5. Have job security. _____
6. Be treated with respect. _____
7. Have work that is tedious or repetitive. _____
8. Have a job with lots of pressure. _____

Now, using the same scale (-10 to 10), we would like to know the importance of <u>not</u> obtaining these characteristics.

How is it, or would it be to:

1. Not receive good pay benefits. _____
2. Not have opportunity for advancement. _____
3. Not have pleasant people working with you. _____
4. Not have good supervisors. _____
5. Not have job security. _____
6. Not to be treated with respect. _____
7. Not to have work that is tedious and repetitive. _____
8. Not to have a job with lots of pressure. _____

Section B

In this section we would like you to tell us how likely you think it is or think it would be to have the characteristics below in each of the listed jobs. Please use the following scale to make your estimates, then write the number in the spaces provided.

Never happen — Absolutely Certain

0 10 20 30 40 50 60 70 80 90 100

1. How likely is it that you would receive <u>good pay and benefits</u> if you worked as a:

Key Punch Op at LBNSY	K. P. Op. Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

2. How likely is it that you would have <u>opportunity for advancement</u> as:

Key Punch Op at LBNSY	K. P. Op. Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

3. How likely is it that you would be able to <u>work with pleasant people</u> as a:

Key Punch Op at LBNSY	K. P. Op Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

4. How likely is it that you would <u>work for good supervisors</u> as a:

Key Punch Op at LBNSY	K. P. Op Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

5. How likely is it that you would <u>have job security</u> as a:

Key Punch Op. at LBNSY	K. P. Op Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

6. How likely is it that you would be <u>treated with respect</u> as a:

Key Punch Op at LBNSY	K. P. Op Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

Section B (Continued)

7. How likely is it that things would be tedious and repetitive as a:

Key Punch Op at LBNSY	K. P. Oper Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

8. How likely is it that you would feel lots of pressure as a:

Key Punch Op at LBNSY	K. P. Op Elsewhere	EAM Operator	Bookkeeper/ Accountant	Clerical Worker	Homemaker	Unemployed
_____	_____	_____	_____	_____	_____	_____

PART IV

In the preceeding section we asked you about different jobs. We would like to know how you feel about what you do on your job and things that may affect you.

Section A

In this section we would like you to tell us your value for some things you may receive or would like for the work you do as a key punch operator. Using the following scale please determine the importance of the outcomes listed below, and then write them in the spaces provided.

I would do anything just to avoid it — I would do anything just to get it

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

How is it (or would it be) to:

1. Receive a monetary bonus? _____
2. Be able to get a promotion or advancement? _____
3. Have an opportunity to cross train for another job? _____
4. Receive praise from management for good work? _____
5. To lose your job? _____
6. Have my coworkers disapprove of my work? _____
7. Feel a sense of accomplishment in my work? _____
8. Work at your maximum level of effort? _____
9. Get recognition for you accomplishments? (For instance, a letter of appreciation in your file.) _____

PART IV--Section A (Continued)

Now, using the same scale as above (-10 to +10), we would like to know the importance of not obtaining these same outcomes.

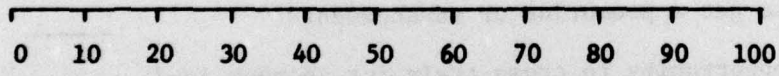
How is it (or would it be) to:

1. Not receive a monetary bonus? ____
2. Not be able to get promotion or advancement? ____
3. Not be able to receive cross training? ____
4. Not lose your job? ____
5. Not be praised by management for good work? ____
6. Not have my coworkers disapprove of my work? ____
7. Not be able to feel a sense of accomplishment? ____
8. Not work at maximum effort? ____
9. Not get recognition for your accomplishments? ____

Section B

In this section, we would like you to tell us how likely you think it is that you would receive each of the listed outcomes by working at the rates listed below. Using the scale, please make your estimates and then write them in each of the spaces provided below the question.

Never happen — Absolutely certain



If you were to consistently perform at the following rates, how likely is it that you would:

1. Receive a monetary bonus?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

2. Be able to get a promotion or advancement?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

PART IV—Section B (Continued)

3. Have an opportunity to cross train for another job?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

4. Be able to keep your job?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

5. Be praised by management for good work?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

6. Receive disapproval from your coworkers concerning your work?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

7. Feel a sense of accomplishment in your work?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

8. Be working at maximum effort?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

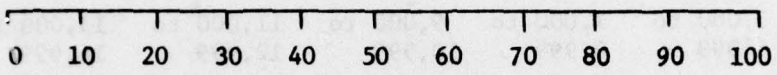
9. Get recognition for your accomplishments?

less than 3,000 KS/Hr	3,000 to 6,999	7,000 to 8,999	9,000 to 10,999	11,000 to 12,999	13,000 to 16,999	17,000 or above
_____	_____	_____	_____	_____	_____	_____

Section C

Suppose that management established some performance requirement for obtaining a monetary award (say $25 per month). For each of the following requirements, indicate how valuable such an award would be if you had to work at the rate specified to obtain the award. Select your response from some point along the following scale and fill in the blank provided.

Of no value — Extremely valuable



1. If you were required to work at more than 17,000 KS/Hr. _____
2. If you were required to work at 13,000 to 17,000 KS/Hr. _____
3. If you were required to work at 11,000 to 13,000 KS/Hr. _____
4. If you were required to work at 9,000 to 11,000 KS/Hr. _____
5. If you were required to work at 7,000 to 9,000 KS/Hr. _____
6. If you were required to work at 3,000 to 7,000 KS/Hr. _____
7. If you were required to work at less than 3,000 KS/Hr. _____

Section D

Please indicate your degree of agreement with each of the statements below by using the following scale.

Strongly Disagree — Disagree — Agree — Strongly Agree

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

1. Aside from the paycheck, my work here is not very fulfilling or rewarding. _____
2. I don't feel that I have much influence on how things are done around here. _____
3. In general, I don't feel that I have much control over today's problems and the way my life is going. _____
4. I don't really understand the world today; I'm not sure what the meaning and purpose of my life is. _____
5. In order to be successful today, a person needs to be a little aggressive and break some of the rules. _____
6. I frequently feel alone and apart from the rest of society. _____

PART IV

1. Operator Number: _____

2. AGE: _____

3. GS level: _____ Step: _____

4. Education: (Check each appropriate space.)

   less than 9 yrs.: _____ 9-12 yrs.: _____ H.S. graduate: _____

   Coursework beyond H.S.: _____ 1-2 yrs college: _____

   2-4 yrs college: _____ College graduate: _____

5. Shift: Day _____ Swing _____ Graveyard _____

6. How long have you been a key punch operator at LBNSY? _____yrs. _____mos.

7. How long had you been a key punch operator prior to work at LBNSY?

   _____yrs. _____mos.

8. How long do you plan to work at LBNSY? _____yrs. _____mos.

9. Do you know your (overall) average strokes per hour (writing on the CMC)?

   _____yes _____approximately _____no idea

10. What is your best estimate of your current strokes per hour? _____

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