Worker Productivity as a Function of the Percentage of Monetary Incentives to Base Pay

Carol J. Frisch
Western Michigan University

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WORKER PRODUCTIVITY AS A FUNCTION OF THE PERCENTAGE OF MONETARY INCENTIVES TO BASE PAY

by

Carol J. Frisch

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Psychology

Western Michigan University
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Several studies have shown that individuals working under pay conditions with monetary incentives have higher levels of productivity than individuals working for non-incentive pay, such as hourly wages (Abernathy, Duffy, & O'Brien, 1982; Dierks & McNally, 1987; Farr, 1976; Gaetani, Hoxeng, & Austin, 1986; George & Hopkins, 1989; London & Oldham, 1977; Orpen, 1982; Nebeker & Neuberger, 1985; Terborg & Miller, 1978; Yukl, Wexley, & Seymore, 1972). It has also been noted that a minimum of 30% incentive is generally accepted as necessary to affect (employee) motivation (Fein, 1970), and increasing incentives above this level will not result in appreciable increases in employee performance (Fein, 1970; Henderson, 1989).

The purpose of this study was: (a) to investigate the monetary incentive continuum to determine if increases in the percentage of incentives to base pay would result in increases in performance, as well as (b) to evaluate the accuracy of the accepted 30% incentive standard and determine the optimum level of percentage of incentives to base pay.

This study investigated the effects of five levels of % incentive to base pay, i.e., 0% (no-incentive), 10%, 30%, 60%, and 100%, on worker productivity.
Seventy-five undergraduate subjects were randomly assigned to one of five % incentive/base pay conditions, using a between-groups experimental design. Subjects performed a simulated production task for pay as per their assigned condition. Task productivity and the amount of money earned were measured.

The results of this study support prior similar research in showing that pay with incentives resulted in observationally and significantly higher levels of performance (i.e., an average of 21% higher) than pay with no-incentives (e.g., hourly pay). Also, subjects receiving incentives continued to show gradual increases in performance throughout the study while the performance of no-incentive subjects stabilized after an initial level of task proficiency was attained.

These results build on prior research in showing that the different percentages of incentive to base pay did not result in significant differences in subject task performance. This study challenges the generally accepted 30% incentive standard showing that significant performance increases were obtained with as little as 5% incentive to base pay.
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Carol J. Frisch
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CHAPTER I

INTRODUCTION

The use of monetary incentive systems to influence performance “reaches back into our earliest recorded history” with a notable increase in prevalence during the industrial revolution, resulting from the “increased demands for efficiency and performance” (Peach & Wren, 1992, p. 5). Today, with the increasing impact of global competition, all methods of improving organizational productivity are gaining critical importance. As so explicitly stated by Nebeker and Neuberger (1985), “If the United States is to maintain its economic position in the world, its standard of living, and control inflation, it must find ways to increase its rate of productivity improvement” (p. 121).

Multiple factors impact organizational productivity but, as emphasized by Nebeker and Neuberger (1985), no matter what method of organizational productivity improvement is implemented (e.g., improved technology), “all systems .. depend upon a motivated workforce for efficient operation” and “proven strategies for improving productivity need to be developed and documented” (p. 121). O’Dell (1986) reported that, “By 1983, the problems of stagnant productivity and declining competitiveness were so serious that a White House Conference on Productivity was called to gather the best thinking about what needed to be done” (p. 1). One area of recommendations from this conference “focused on the role of reward systems in...
improving competitiveness” with “pay for performance” being one of the five major issues identified. At about the same time, Locke (1982) reported the results of a “meta-outcomes” study comparing existing research on the effectiveness of four employee motivation strategies, i.e., money, goal setting, job enrichment, and participation. The results of this analysis indicated that money emerged “as the most effective motivator” (p. 75). In 1986, in response to the above mentioned White House Conference, the American Compensation Association conducted and published the “National Survey on Non-Traditional Reward and Human Resource Practices.” This survey reported that a tremendous growth in the use of non-traditional reward systems had occurred during the previous five years, and that 75% of all firms surveyed (1,190 out of 1,598) reported using at least one non-traditional employee reward system, most of which were various types of monetary incentive systems (O'Dell, 1986).

With this increasing importance and prevalence of monetary incentive strategies to improve employee productivity comes a need for information on how to implement such strategies effectively. Applied and experimental research, investigating the various parameters of monetary incentives and their effectiveness on improving worker productivity, can contribute greatly to this need for practical knowledge.

A fairly sizable body of research currently exists evaluating the impact of incentives on worker productivity. This research has occurred in both applied and laboratory experimental settings and has examined the performance of different types
of workers, in various settings, performing a variety of types of tasks. Subjects and settings investigated include: proofing operators in a bank (Abernathy, Duffy, & O'Brien, 1982; Dierks & McNally, 1987); tellers in a bank (Dierks & McNally, 1987); assembly workers in a factory in South Africa (Orphen, 1982); waitpersons in restaurants (George & Hopkins, 1989); machinists in an auto machine shop (Gaetani, Hoxeng, & Austin, 1986); small purchase buyers & supply clerks in the purchase division of a naval shipyard (Nebeker & Neuberger, 1985); and college students in laboratory analog work settings (Farr, 1976; London & Oldham, 1977; Terborg & Miller, 1978; Yukl, Wexley, & Seymore, 1972). Work performance tasks or outcomes measured include: check proofing data entry (Abernathy et al., 1982; Dierks & McNally, 1987); bank teller transactions (Dierks & McNally, 1987); restaurant sales (George & Hopkins, 1989); quality control checks (Orphen, 1982); auto service customer sales (Gaetani et al., 1986); multiple purchasing and supply clerk tasks (Nebeker & Neuberger, 1985); a card sorting task (Farr, 1976; London & Oldham, 1977); scoring of exam cards (Yukl, et al., 1972); and tinker toy model assembling (Terborg & Miller, 1978).

The quality of the above research varies from case studies to well controlled between-groups and within-subjects experimental designs. The noteworthy case studies are briefly mentioned below followed by more specific descriptions of the research using more controlled experimental designs. Studies conducted in applied settings are discussed first, followed by studies conducted in laboratory analog work settings.
One of the earliest case studies was initiated at Union National Bank in Little Rock, Arkansas during 1978 (Abernathy et al., 1982). First feedback and then monetary incentives were applied to improve the performance of check proofing operators. This study reports a mean baseline rate of performance at 1,064 checks per hour, which increased to 2,200 checks/hour under feedback, and to 2,700 checks/hour under feedback and incentive conditions. Later in 1987, a subsequent publication (Dierks & McNally, 1987) reported that when production had increased to 2,800 checks/hour, which was the maximum rate for which incentives were paid, the maximum rate was raised to 3,000. Production quickly increased to that level, so the maximum was eliminated, and performance rose even further to an average of 3,500 checks/hour, “more than three times baseline levels.” The authors report several organizational benefits as a result of these performance improvements, most importantly a $100,000 per year savings from processing checks faster and the related interest savings from reduced “float”, the hiatus between the time the checks are proofed and entered into the bank’s computer.

A second significant case study displaying the dramatic effects of monetary incentives was reported by Nebeker and Neuberger (1985). In this study, the effects of the “Performance Contingent Reward System” (PCRS) were evaluated on the work performance of purchase buyers and supply clerks in the purchase division of a naval shipyard. The PCRS was a comprehensive system that specified multiple job tasks and standards, and provided a computerized measurement, feedback, and monetary incentives calculation system. An example reported in this study described a
monetary incentives earning of 3% of total earnings for one week. After a 17 week trial implementation period, significant improvements in productivity were obtained on almost every one of the multiple performance measures. This study also reports an extensive analysis evaluating the costs and benefits of the PCRS program. The authors state that "based purely on the reduction in production costs, savings exceeded $14,000" (p. 130) for the trial period.

Three applied studies have investigated the effects of monetary incentives using the following experimental designs: (a) a between-groups experimental design (Orpen, 1982), (b) a within-subject reversal design (Gaetani et al., 1986), and (c) a within-subject multiple-baseline design across settings (George & Hopkins, 1989). Each of these studies is described below.

In the first applied study, Orpen (1982) reports examining the effects of three different "incentive pay schemes" on the quality control checking performances of 63 assembly workers in a large auto components manufacturing company. Workers were randomly assigned to one of three incentive conditions using a between-groups experimental design. The incentive pay schemes were conveyed through instructions to the three groups of workers at a special meeting on a Friday. The following week, and for only one week, all groups performed their tasks under the incentive conditions described. The quality control task consisted of checking batches of 10 components each and certifying the batches as "error-free" or defective. All error-free batches were subsequently checked to determine whether the workers' quality control checks were accurate. The "index" of task performance was the number of "error-free"
batches of ten components passed by workers per week. The three incentive pay schemes included: (1) the HI (high-incentive) group, who received 25 cents for every batch of 10 components passed which were error-free; (2) the LI (low-incentive) group who had a 25% chance of receiving 100 cents for every error-free batch of components passed (i.e., when completed with checking a batch of 10 components the worker guessed the flip of 2 coins and if correct, would receive 100 cents); and (3) the NI (nonincentive) group who received 25 cents for every batch of 10 components checked and passed regardless of whether or not the batch was actually error-free. The amount of pay received was compared across the three groups and it was determined that these amounts did not differ significantly between groups, thus the results could not be attributed to differences in pay amounts. Due to the fact that the three groups were measured to have different performance levels during the pre-incentive week, task performance “gain scores” were used as the unit of measurement and analysis between experimental conditions. Gain scores were calculated by subtracting the subjects’ “error-free output” during the no-incentive week from their error-free output during the incentive week. The analysis of the mean gain scores for the three groups revealed that the performance of the workers in the HI group was significantly greater than that of the workers in the LI group, whose performance was significantly greater than that of the NI group. The author concludes that “This finding is consistent with the prediction derived from the operant conditioning literature ... in order to influence task performance significantly, pay must be made contingent upon performance” (p. 148).
Unfortunately, the total amount in incentives earned by workers in this study is not reported, nor is the work amount or type of base pay. Thus it is not possible to determine what percent of the workers' total pay was earned in incentives and how this relates to work performance during this study. An educated guess would indicate that the proportion of incentives to total pay was probably very small. The major problem with this study is that it occurred for only one week which greatly limits the generality of the findings.

In the second applied study, Gaetani et al. (1986) implemented and evaluated the effects of a feedback and commissioned payment intervention on the performance of two machinists in an auto machining shop, who were traditionally paid with hourly wages. This intervention was implemented in four phases using an ABAC within-subjects design. The daily dollar amount charged to customers for work performed by the machinists was the dependent variable. Phase one served as a 30 day baseline period in which the machinists were paid with their traditional hourly pay. During phase two a feedback procedure was implemented for 13 days in which the machinists self-generated a daily report of dollars charged for the day. Phase three was a reversal of the feedback procedure for seven days, i.e., a return to baseline conditions, with the owner of the shop refusing to continue this phase any longer. In phase four, which occurred for 40 days, the commissioned compensation contingency plus feedback was implemented in which the machinists earned a five percent commission on the daily dollar value of the amount charged to customers that exceeded a pre-set standard. This standard was based on the machinists' customer
charges for the six week period prior to phase four. More specifically, during this phase: (a) if the machinists' performance equaled the standard, they earned their regular hourly wages; (b) if their performance was below standard, the ratio of actual to standard performance was determined and they received an equivalent lesser proportion of their regular wages using this ratio; and (c) if their performance was above standard they earned the five percent commission on the dollar value over standard. Quality of performance was addressed in two ways: (1) the owner made periodic quality control inspections, and (2) work could be rejected by customers. If work did not meet quality standards, the responsible machinist was required to redo the work with no commission for the time spent doing rework. The results of this intervention, measured as average dollars per day charged to customers by each machinist, were as follows: (a) phase one baseline, $77.10 and $98.23; (b) phase two feedback, $152.00 and $186.00; (c) phase three return to baseline, $152.00 and $147.30; and (d) phase four feedback plus commission compensation, $238.00 and $269.00, respectively. The percentage increases over baseline reported for the commission compensation condition were reported as 209% and 174% for the two machinists. The investigators also measured the increase in dollars realized by the business as a result of implementing the commission compensation, which was calculated to be approximately $14,400, while only a total of $660 were paid out in commissions.

The authors did not determine a percent incentive earned by the workers but that can be easily calculated from the data reported in this study. A total of $660 in
commission was paid to the two machinists over a 40 day period for an average of $16.50 commission per day for both workers combined. In comparing this amount of performance incentive to the regular daily wages also earned by the two machinists, which were reported to be a total of $96 combined for both machinists, this would be equivalent to a 17.2% average incentive to base pay. Unfortunately there is not enough information available in this study to determine if the incentive levels were similar or different for both machinists (The study reports differing amounts of regular or base pay for each machinist and the performance data reveals different amounts of earning, but it is not clear which amounts are to be correlated with each other.).

In the third applied study, George and Hopkins (1989) investigated the effects of daily feedback combined with a pay system which paid seven percent of gross sales on the performance of 29 waitpersons in three different restaurants. The researchers implemented a multiple-baseline design across settings with 10 waitpersons in restaurant A, 9 in restaurant B, and 10 in restaurant C. Baseline began at week 1 for all restaurants with the intervention beginning at week 7 for restaurant A, week 9 for restaurant B, and week 11 for restaurant C. During baseline conditions, waitpersons worked for hourly wages. Most waitpersons earned $1.90 per hour with a few earning above this amount, the highest paid earning $3.50 per hour. During the intervention conditions, the hourly wage was discontinued and the waitpersons were paid seven percent of the daily total dollars they sold. Data was aggregated for all waitpersons by restaurant using the following measures: (a) mean dollars (sales) per
hour worked, (b) number of customers served per labor hour, (c) sales per labor hour (or labor costs per dollar of sales), and (d) labor costs for waitpersons as a percentage of gross sales. Mean dollars earned per hour worked increased from $2.10, $2.08, and $2.17 during baseline to $2.72, $2.50, and $2.70 during the incentive intervention, for 30%, 20%, and 24% increases, in restaurants A, B, and C, respectively. The number of customers served per labor hour increased from 14.2, 11.9, and 12.9 during baseline to 17.6, 14.1, and 16.2, for 24%, 19%, and 26% increases, in the three restaurants. Sales per labor hour were measured as a percentage of historical data collected one year earlier in each restaurant. Sales per labor hour, as compared to the same from the prior year, were 118%, 116%, and 113% during baseline and 161%, 137%, and 154% during the intervention, for the three restaurants. The authors noted that the majority of the sales per labor hour increases were due to increases in the numbers of customers served per labor hour rather than increases in purchases by customers in each restaurant. Lastly, the labor costs for waitpersons as a percentage of gross sales averaged 7.8%, 7.2%, and 7.8% during baseline and decreased slightly to 7.2%, 6.9%, and 7.3%, for restaurants A, B, and C, respectively. The authors concluded that: (a) the performance-contingent pay improved productivity primarily through the waitpersons’ serving more customers per hour; (b) the increased pay for waitpersons were financed at “no cost” to the company, i.e., due to increases in sales; although (c) no important decreases in labor costs occurred as compared to dollars of sales, which would have been beneficial to the owners. Anecdotally and unfortunately, the owners of this restaurant chain filed for bankruptcy soon after the
completion of this study. In this study, the pay for waitpersons changed from an hourly wage system to a percent of sales pay system which resulted in 100% of the waitpersons' pay being incentive based.

Four laboratory studies (Farr, 1976; London & Oldham, 1977; Terborg & Miller, 1978; Yukl et al., 1972) have investigated the effects of monetary incentives, each using a variation of a between-groups experimental design. Unfortunately, the generality of each of these studies is limited due to the typical problems inherent in conducting laboratory research related to applied research questions (i.e., artificial work environment, student subjects, simple work tasks, short work sessions, small amounts of pay which is usually discretionary, etc.). Each of these studies is described below.

In the first laboratory study, Yukl et al. (1972) compared the effects of three monetary incentive "reinforcement schedules." Subjects were 15 females hired through a university placement office to perform part-time work at one of three predetermined daily time slots. Subjects were assigned to experimental groups according to the work time they selected. Thus it was not possible to randomly assign subjects to groups, but the groups were randomly assigned to the experimental conditions. The task performed was scoring batches of 60 answer cards used in a 25-item multiple-choice exam and writing each score beside a name on a computer printout listing of names. Subjects worked in isolation at desks in a business office setting for one hour per day for two weeks. Subjects were paid a rate of $1.50 per hour throughout the two weeks of the study with incentives added to the hourly rate
during the second week. Thus, the first week served as an hourly rate only or no-incentive period. At the beginning of the second week, one incentive condition was implemented with each group as follows: (a) a $.25 incentive (i.e., piece-rate) for each batch completed, identified as a “continuous reinforcement schedule (CRF)” ; (b) a 50% chance of a $.25 incentive, based upon correctly guessing a coin toss upon completion of each batch, identified as a “$.25-variable ratio schedule ($.25-VR2)” ; and (c) a 50% chance of a $.50 incentive, based upon correctly guessing a coin toss upon completion of each batch, identified as a “$.50-variable ratio schedule ($.50-VR2)” . (Readers are referred to Dickinson & Poling, 1996, for a discussion of the use of traditional reinforcement schedule names, that originally characterized the performance of nonhumans in basic research studies, to identify applied setting contingencies, to which there are little commonalities.) Subjects were paid by check at the end of two weeks for both the hourly pay earned for the two weeks and the incentives earned for the second week. The authors note that for the two groups that had the 50% chance of receiving the incentive, the actual average rates of incentive reinforcement were 43% for the $.25-VR2 group and 51% for the $.50-VR2 group. An analysis of subject performance between week one (hourly pay only) and week two (hourly pay plus incentives) was not conducted but sizable performance increases are noted in the mean daily output data for each group as follows: (a) from 197 to 269 for the $.25-CRF group, (b) from 244 to 320 for the $.25-VR2 group, and (c) from 250 to 362 for the $.50-VR2 group. Thus hourly pay with incentives resulted in sizable performance increases over hourly pay alone. Due to the variation in average
daily scores between groups during week one, “gain scores” between weeks one and two were used for the analysis of the effects between incentive groups. Gain scores in mean average daily output between the two weeks for each group were as follows: (a) 72 for the $.25-CRF group, (b) 76 for the $.25-VR2 group, and (c) 112 for the $.50-VR2 group. The analysis of these results indicated that: (a) the $.50-VR2 group had significantly higher production gains than both the $.25-CRF and the $.25-VR2 groups, and (b) the production gains for the $.25-CRF and the $.25-VR2 were approximately equal.

Using the data identified above, an average % incentive to base pay can be calculated for each group based on the average daily mean (ADM) scores during the incentive condition as follows: 

\[
\text{ADM incentive score} \div 60 \text{ cards per batch} \times \text{incentive amount of} \ .25 \text{ or} \ .50 \times \text{actual }\%\ \text{rate of reinforcement (100}\% \text{ for the} \ .25\text{-CRF group, } 43\% \text{ for the} \ .25\text{-VR2 group, and } 51\% \text{ for the} \ .50\text{-VR2 group)} \div \$1.50
\]

(the hourly base pay rate). This formula reveals the following % incentive to base pay rates for each group in the above study: (a) 75% for $.25-CRF, (b) 38% for $.25-VR2 and (c) 103% for $.50-VR2. The calculations used to obtain these % incentives are as follows, respectively: (a) \((269 \div 60 \times .25 \times 100\% = 112) \div 1.50 = 75\%\), (b) \((320 \div 60 \times .25 \times 43\% = 57) \div 1.50 = 38\%\), and (c) \((362 \div 60 \times .50 \times 51\% = 154) \div 1.5 = 103\%\). Thus, in this study, 103% incentives improved performance more than the 75% or 38%, which had equivalent effects on performance.

In the second laboratory study, Farr (1976) compared the effects of the presence and absence of individual and group incentives on subject productivity using
a two-by-two factorial design. Subjects were 144 introductory psychology students who worked in three-person groups on a card sorting task for two-20 min periods during a single experimental session. Subjects were randomly assigned to one of the following four experimental conditions: (1) differential-distribution group incentive (both individual and group incentives) in which pay was determined by total group productivity and divided differentially among group members according to individual performance levels, i.e., one-half to the subject with the highest level, one-third to the subject with next highest level, and one-sixth to the remaining subject; (2) equal-distribution group incentive (no individual incentive) in which pay was also determined by total group productivity but was divided equally among the three group members; (3) individual incentive/piece rate pay (no group incentive) in which pay was based upon individual task performance; and (4) hourly pay (no individual nor group incentives) in which subjects were paid $1.80 for the one hour session of participation. The author reported that the amounts earned between incentive and hourly conditions were "generally comparable." Both individual and group incentives resulted in significantly higher performance than hourly pay. The highest level of productivity was noted in the individual plus group incentives condition but this condition was also perceived by subjects as being the least fair. "Subjects in the conditions with no group incentives (i.e., piece rate or hourly pay) perceived the pay system to be more equitable and fair than did subjects in the group incentive conditions" (p. 167). Pay satisfaction was also evaluated using a self-report rating scale but no differences in satisfaction were noted between pay conditions.
In the third laboratory study, London and Oldham (1977) compared the effectiveness of three group and two individual incentive pay conditions using a between-groups design. Seventy male students, enrolled in an introductory organizational behavior course, participated in this study in noninteracting pairs (i.e., isolated from each other). The subjects performed a card sorting task for four 5-min trials during a single session and were given course credit, as well as their earned incentive pay, for participation. The three group piece-rate pay conditions were: (a) pay based on the highest performer, (b) pay based on the lowest performer, and (c) pay based on the average group performance. The two individual pay conditions were: (a) piece-rate pay and (b) fixed-rate pay. Pay, for all three group pay conditions and the one individual incentive piece-rate conditions, was $.01 for every card sorted, and pay for the individual fixed-rate condition was $.50 per trial no matter how many cards were sorted. Performance was significantly higher with the group high performance piece-rate and the individual piece-rate conditions in comparison to all the other pay conditions.

In the fourth laboratory study, Terborg & Miller (1978) investigated the effects of piece rate and hourly pay systems as well as goals on the quantity and quality of performance of student subjects in a laboratory setting. Sixty male subjects were hired for 2 hours with one hour being spent assembling complex tinker toy models and one hour spent in pre- and post assembly interviews. Half of the subjects were assigned to the piece rate pay condition and were paid $.40 per model during 1 hour of assembly and half were paid $2.50 for the hour regardless of the number of...
models assembled. The values of the pay systems were set such that average performance would result in equivalent pay between the two pay conditions. Subjects were also assigned to one of three goal conditions: quantity production goals, quality goals, or no goals. This resulted in a 2 X 3 “crossed” between-groups design with 10 subjects randomly assigned to each experimental condition. Quantity of performance was measured by counting the number of completed and partially completed models. Quality of performance was measured by supervisor ratings of the completed models. Effort was measured by self-ratings, supervisor ratings, and ratings of films taken of the assembly performance. Results indicated that the type of pay affected the quantity and effort of performance while goal setting affected the quantity and quality of performance. The piece rate pay condition resulted in significantly greater quantity performance than the hourly pay condition. The three measures of effort were also greater for subjects in the contingent pay condition. The pay conditions did not appear to influence performance quality. Quality of performance was influenced by assigned quality goals, as was quantity of performance by assigned quantity goals.

The consistent finding across all applied and laboratory studies described above is that monetary incentives show substantial increases in productivity over hourly pay. This finding has been replicated over a broad set of experimental conditions and a variety of subjects, work settings, and work tasks. Thus, one can be confident that monetary incentives are a worthwhile employee productivity improvement strategy.
The details of the incentive arrangements vary greatly across studies, and comparative parametric studies of potentially important variables are rare. One specific example is the actual percentage of total earnings that are incentives. As calculated and specified where possible within the studies above, a rather wide range of incentive percentages are included in these studies: (a) 3% incentive to base pay (Nebeker & Neuberger, 1985) (b) 17.2% incentive to base pay (Gaetani et al., 1986), (c) 100% commission (George & Hopkins, 1989), and (d) 38%, 75%, and 103% incentives to base pay (Yukl et al., 1972). Fein (1970) reports that the generally accepted “incentive potential” to affect motivation in American industry is 30%, and that incentive rates above 30% will not result in appreciable increases in employee performance. The broad spectrum of % incentives listed above, from 3% to 103%, is enough to begin to question this generally accepted standard. Thus, to meet the current need for information on how to effectively implement monetary incentive strategies, further research should identify and systematically investigate the significant parameters of this productivity improvement variable.

The current study compared the effects of five different levels of the % incentive to base pay parameter on worker productivity in a simulated work setting. The investigation was conducted with 75 undergraduate students who performed a simulated production task for pay, according to their assigned experimental conditions, in an experimental laboratory setting. The purpose of this study was twofold: (1) to determine if increasing levels of % incentive to base pay would result in increases in worker performance, as well as to identify if an optimum level of %
incentive to base pay exists, i.e., a level where workers maintain maximum performance without further significant increases; and (2) to conduct this research under highly controlled conditions, in which all other variables are held constant so that the effects of the different levels of monetary incentives could be legitimately compared, and to provide a solid foundation upon which future research could build.

This study also provided a replication of prior research, but with increased experimental rigor. The effects of pay with incentives is compared to pay with no incentives in that one of the % incentive to base pay levels was a 0% or base pay only condition.
CHAPTER II

METHOD

Pilot Study

A pilot study was conducted to provide data for several experimental design decisions for the current research, as well as to determine a number of procedural issues. This pilot study is briefly described below, identifying the information it provided.

Eight subjects participated in the pilot study which used a within-subjects experimental design with changing conditions. All subjects were initially exposed to a base pay only condition. Six of the eight subjects were then exposed to one or more base pay plus incentives conditions with each subject receiving a different sequence of experimental conditions. A return to base pay was implemented for two of the six subjects after they experienced several different incentive conditions. Subjects were paid a base amount of $2.00 for producing “widgets” during 45 min sessions with a range from 13% to 250% incentives (to base pay) in the various incentive conditions. The number of experimental sessions ranged from 10 to 57 per subject.

This pilot study provided information that was used in the design of the current study in the areas described below.
Task Proficiency

Subject performance on the work task revealed that an initial number of sessions were necessary to become proficient at performing the task. Thus a learning curve across sessions was observed in the performance data. Analysis of these data indicated that subjects required approximately 10 sessions to reach the asymptote of the learning curve, i.e., become proficient at the work task.

For the current study, subjects needed to be proficient in the performance of the work task in order to isolate and evaluate the effects of the independent variable. Only performance data that was generated once subjects were performing at their level of task proficiency would be useful. The pilot data indicated the number of experimental sessions that would be needed for a subject to become proficient at the task. This number of sessions was added to the number of sessions needed for data analysis to identify the total number of sessions needed for the current research.

Minimum Performance Requirement

Although the base pay amount in the pilot study was for performing the work task during a 45 min session, no "minimum" performance level was preestablished nor required of the subjects. As a result, some subjects performed at a near zero performance level. This indicated that a minimum performance requirement was necessary to earn base pay in order to increase the probability that subjects would indeed attempt to perform the work task. Requiring a minimum performance level would also more closely approximate a real work situation where a worker must
perform at some minimal acceptable level to remain employed. The procedure for establishing the minimum performance requirement for the current study is specified in the Experimental Design Statistics subsection below.

**Potential Confounding Variable**

During the pilot study, the dollar amount of the base pay was the same across all conditions with the incentive amounts per unit of task performance varying across the various incentive conditions. This resulted in the existence of a potential confounding variable to the levels of the % incentive independent variable. The confound was the total amount of money earned per session, which could vary considerable across the various incentive conditions. To protect against the occurrence of this potential confound, a constant was incorporated into the design of the current study. The total amount of money to be earned for “maximum” performance was held constant across all experimental conditions. A further explanation of this design component can be found in the Independent Variable section below.

**Maximum Performance Level**

In order to implement the constant identified above, as well as to provide a basis for determining the actual dollar amounts for base and incentive pays for the various conditions in the current study, data indicating the maximum performance level on the work task were needed. The maximum performance levels across subjects
under incentive conditions in the pilot study averaged at 120 correctly assembled widgets per session.

Experimental Design Sequence Effects

Data obtained from the pilot study indicated that the experimental design used, i.e., a within-subjects design with changing conditions, resulted in sequence effects across experimental conditions. Thus it was determined that a between-groups experimental design, with one incentive condition per group, would be more appropriate for the current research.

Experimental Design Statistics

Two design decisions for the current study depended upon knowledge of estimates of the mean, variance, and standard deviation of subjects' performance on the work task under baseline/base pay conditions. These statistics were needed: (1) to conduct a "power analysis" to determine the number of subjects needed in each experimental group to enable detection of a significant treatment effect, and (2) to determine the minimum performance level to be required of subjects, as discussed above, which was calculated as one standard deviation below the mean. The estimates of these statistics, as obtained from pilot study, data were as follows: (a) mean = 68 widgets/45 min session, (b) variance = 324, and (c) standard deviation = 18. It was decided to round these numbers to a mean of 70 and standard deviation of 20 for the current study.
Incentive Calculation Method

The calculation method to determine the dollar and cents amounts for base pay and per widget incentive pay for each %incentive/base pay condition was designed and refined during the pilot study. The method used in the design of the current research is described in the Independent Variable section below.

Work Performance Task Feasibility

The pilot study indicated that subjects were able to learn to perform the selected work task, i.e., assembling widgets, at a level of proficiency and that the quality of performance was not affected by improvements in productivity. Performance quality during the pilot study remained at 98% across all subjects and all experimental conditions. It was also determined that it was possible to measure subject performance on the work task at a high level of reliability. Interobserver agreement on the dependent variable measure of the work task averaged at 98%.

Practical experience obtained from the implementation of the pilot study revealed that this task was rather labor intensive to maintain. An adequate supply of quality parts needed to be available for experimental sessions requiring widgets to be disassembled and worn parts repaired between sessions.

Pay Amount Adequacy

Research funds to conduct both the pilot study and the current research were limited and had to be proportioned across the number of experimental sessions needed
to conduct these studies. Therefore the amount of money available per subject was limited, which limited the amounts that could be allocated to the % incentive/base pay conditions. The pilot study revealed that subjects would perform the work task for a base pay of $2.00, or for this amount of base pay plus supplemental incentive amounts, which fit within the amount of funds available. The same dollar amount framework was used in the design of the % incentive/base pay conditions for the current research.

Subjects

The number of subjects needed to detect a significant outcome in this study was determined by conducting a power analysis, using estimated statistics obtained from the pilot study (i.e., mean and variance). As described in the Experimental Design section below, the design of this study included five groups of subjects which resulted in the power analysis indicating that 15 subjects per group were necessary, for a total of 75 subjects (i.e., 5 groups × 15 subjects/group).

Due to the large number of subjects needed, this research was conducted across three semesters of two academic years, but within one calendar year, i.e., the winter and spring semester of one year and the fall semester of the next year. Subjects were recruited by research staff at several points throughout each semester from sections of introductory psychology courses. Thus, subjects were primarily freshman college students. Participation in this study was completely voluntary and there were no course requirements nor course credits linked to participation.
Not all individuals who were recruited and initiated participation in this study, became part of the experimental groups of subjects. Twenty-nine percent of those recruited (30 individuals) who attended at least the first experimental session, dropped out of the study, and most individuals who dropped out did so during the first few sessions. The mean number of sessions attended by individuals who dropped out equaled 2.5 with a range from 1 to 9 sessions per individual. Twelve of the 30 subjects (40%) who dropped out never met the minimum performance requirement and thus never received any pay, i.e., never experienced the % incentive/base pay contingency. Individuals who dropped out provided no data because only data from the last 5 of 15 sessions per subject were used for the analysis of results. In order to attain 75 subjects who completed all experimental sessions, a total of 105 individuals initiated participation in the experimental sessions with 30 discontinuing their participation.

Before the initial experimental session each subject was briefed on the research purpose and participation procedures, and reviewed and signed an informed consent form (see Appendix A). During this initial process, subjects were informed that they were free to discontinue their participation at any time. Subjects were paid for participation in this study as is specified in the Independent Variable and Experimental Procedures sections below. Approval to use human subjects in this research was obtained from the University’s Human Subjects Institutional Review Board (see Appendix B).
Experimental Setting and Materials

Experimental sessions were conducted in three private experimental laboratory rooms. These rooms were approximately 9' x 4' in size and contained a table, chair, radio, and magazines. Subjects worked in the room alone with the door closed during each session, although they were able to leave the room at any time.

Experimental materials included (a) widgets produced by subjects, which was a production item made of a bolt, nuts, and washers (see Appendix C for a widget diagram and the Dependent Variable and Work Performance Task sections for a more detailed description); (b) a "subject packet" which included a performance feedback graph, performance data sheet, widget (incentive) payment schedule, and payment receipt sheet (see Appendix D for the subject packet); (c) a cash box with money; (d) a cassette tape recorder and tape; and (e) a small blue plastic tub in which to place completed widgets.

Experimental Design

A between-groups experimental design with five experimental groups was used to evaluate the effect of the independent variable in this study. Each group of subjects was exposed to one experimental condition, i.e., one level of the independent variable. A between-groups experimental design was selected as opposed to a within-subjects design, in which a subject would be exposed to several levels of the independent variable interspersed with returns to baseline, primarily to control for
order effects that would occur from sequential exposure to different levels of the independent variable, as was observed during the pilot study.

As specified in the Subjects section above, the number of subjects needed per experimental group was determined by conducting a power analysis, using data obtained from the pilot study. This analysis indicated that 15 subjects were needed per group, to enable detection of a significant effect, for a total of 75 subjects in the five groups of this experiment. Subjects were non-randomly selected by recruiting students from introductory psychology classes as described in the Subjects section above. Once selected, subjects were randomly assigned to experimental groups. Random assignment was conducted using a table of random numbers.

Based upon the number of sessions determined for a subject to become proficient in the performance task (as observed in the pilot study) in combination with the practicality of the time available to complete this study, a standard number of experimental sessions was set for each subject. This standard was set at 15 sessions per subject with each session lasting 45 min. Only data from the last five sessions for each subject were used in the analysis of results for this research. The rationale for using this procedure was to obtain performance data for analysis that was no longer being influenced by the process of becoming proficient at the task, thus being influenced solely by the independent variable.
Dependent Variable and Work Performance Task

The work performance task consisted of a simulated production task of producing as many “quality widgets” as possible during each experimental session. Producing a single widget consisted of securely assembling three nuts and four washers, three of which had colored bands on the edge from 1/2” to 1” in length, on a bolt in the proper order. The order of assembly of parts on the bolt was as follows: nut, red banded washer, black banded washer, red banded washer, nut, plain washer (with no colored band), and nut. Widget assembly included arranging the washers with colored bands in such a way that the edges on one side of the bands were lined up. Widget quality was determined by the following criteria: (a) all parts were assembled in the correct order; (b) the entire widget was securely assembled, i.e., no loose parts; and (c) the colored bands on the washers were lined up on one side as described above (the tolerance for lining up the bands was determined visually). Refer to Appendix C for diagrams of widget parts and a correctly assembled widget. The dependent variable measure for this work performance task was the total number of quality widgets assembled per experimental session per subject.

The amount of money earned per subject per session was also recorded throughout the study. These data enabled an analysis between groups of the amount of money earned as compared to work task performance and incentive levels.
Independent Variable

The independent variable was the percent (%) of monetary incentive as compared to the amount of the base pay. The effects of five different levels of incentives to base pay were evaluated: 0%, 10%, 30%, 60%, and 100% incentives.

A potential confound to the independent variable existed which was identified as the total dollar value of the incentives and the base pay earned per subject per session. To control for this potential confound, the total dollar value to be earned per subject per session for maximum performance was equated across all % incentive/base pay levels. Pilot study data indicated that the maximum performance level under incentive conditions was 120 quality widgets per 45 min session. Earnings of $4.00 for the maximum performance level was set across all conditions in this study. The determination of the actual dollar amount available per subject per session was a practical issue relating to the amount of money available to conduct the entire study, but in actuality can be viewed to be a little bit better that paying "minimum wage" for maximum performance.

A minimum performance standard was imposed for the base pay (i.e., 0% incentive) condition because as explained earlier, during the pilot study, some subjects performed at near zero levels without such a standard when paid hourly. Using data from the pilot study, the mean performance level of subjects performing under base pay only conditions was estimated at 70 quality widgets per session and the standard deviation estimated to be 20 widgets. Minimum performance was set at
one standard deviation below the mean which equaled 50 quality widgets per 45 min
session \((X = 70) - (s.d. = 20) = 50\). Producing quality widgets at this minimum
performance standard level was required in order to earn base pay in all conditions of
this study.

Establishing these constants \((4.00\) for maximum performance of 120 quality
widgets and minimum performance of 50 quality widgets to earn base pay) provided a
basis for determining the actual dollar amounts of the base and incentive pay
parameter, which was the independent variable. For the five levels of the independent
variable that were investigated, the % incentive level reflected the total amount of
money to be earned in incentives for reaching maximum performance in relation to
the total amount of money allocated to base pay, holding total dollars earned constant
at \(4.00\) per session. For example, at the 100% incentive to base pay level, base pay
was set at \(2.00\) and an additional \(2.00\) could be earned in incentives for achieving
maximum performance, thus the incentive amount was equal to 100% the base pay
amount. At the 0% incentive level, base pay was set at \(4.00\) with \(0.00\) to be earned
in incentives, thus the incentives were 0% of the base pay. At the 30% incentive level,
base pay was set at \(3.07\) with \(0.93\) to be earned in incentives, incentives being 30%
of the base pay amount, and so on. Dollar amounts for the base and incentive pay for
all levels of the independent variable are displayed in Table 1 below.

Using the dollar value of the % incentive amounts for each condition, a per
widget payment amount was calculated, for payment of widgets produced above the
minimum standard of 50. The dollar value of the total pay available for incentives
was divided by 70 (the 120 widget maximum minus the 50 widget minimum) which provided a per widget incentive amount in "cents." These per widget incentive amounts are indicated in Table 1 below for each % incentive/base pay condition. Incentive payment amounts beyond the maximum performance level of 120 widgets were also calculated for all conditions because it was possible for a subject to exceed this maximum performance level. "Widget Payment Schedules" identifying incentive payment amounts for performance levels from 50 to 189 widgets for all % incentive/base pay conditions can be found in Appendix E.

Table 1

<table>
<thead>
<tr>
<th>Condition</th>
<th>0%</th>
<th>10%</th>
<th>30%</th>
<th>60%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Earnings for Maximum Performance</td>
<td>$4.00</td>
<td>$4.00</td>
<td>$4.00</td>
<td>$4.00</td>
<td>$4.00</td>
</tr>
<tr>
<td>Total Base Pay</td>
<td>$4.00</td>
<td>$3.63</td>
<td>$3.07</td>
<td>$2.50</td>
<td>$2.00</td>
</tr>
<tr>
<td>Total Incentive Pay</td>
<td>$0.00</td>
<td>$0.37</td>
<td>$0.93</td>
<td>$1.50</td>
<td>$2.00</td>
</tr>
<tr>
<td>Per Widget Incentive</td>
<td>$0.00</td>
<td>$0.005</td>
<td>$0.013</td>
<td>$0.021</td>
<td>$0.029</td>
</tr>
</tbody>
</table>

Experimental Procedures

Research Team and Tasks

Twenty-three graduate and undergraduate students assisted with the implementation of this study and were identified as "experimenters." All experimenters were students in psychology who were interested in gaining research.
experience. Prior to performing their roles, each experimenter received training in the
tasks they would be performing. Experimenters conducted the following tasks: (a)
recruiting subjects; (b) implementing experimental sessions with subjects (which
included obtaining materials, escorting subjects to experimental rooms, explaining
experimental procedures to subjects, obtaining subjects’ consents, teaching subjects
how to perform the work task, starting and ending experimental sessions, collecting
and charting data, determining the amount of money subjects had earned, paying
subjects, and debriefing subjects upon their completion of all experimental sessions);
(c) conducting reliability checks on data collected by other experimenters; (d)
disassembling widgets and sorting and repairing widget parts; and (e) attending
weekly research team meetings. After one semester of experience with this project,
two experimenters took on additional coordinating and monitoring responsibilities
and were titled “research assistants.” Their additional responsibilities included: (a)
subject and experimenter scheduling and follow-up, (b) set-up of materials for starting
new subjects, (c) monitoring implementation of scheduled experimental sessions, and
(d) daily procedural problem solving. To maintain implementation consistency across
this large research staff, “job aids”, specifying detailed step-by-step procedures for
every task an experimenter and research assistant needed to perform, were
strategically located and always available in the experimental laboratory (to review
the job aids for each of the above procedures, refer to Appendix F).
**Experimental Sessions**

Prior to the beginning of each experimental session, the experimenter needed to complete the following tasks: (a) set up the experimental room with an adequate supply of widget parts; (b) obtain the subject packet, cash box, plastic tub, tape recorder and tape, and consent or debriefing form, depending on whether it was the first or last session; and (c) await the subject’s arrival. Upon the subject’s arrival, the experimenter escorted the subject to the experimental room and initiated the experimental procedures, as described below.

Upon initiating participation in this study, the subject was asked to read and sign a consent to participate. The consent briefly described the participation requirements, indicated the amount of money the subject could expect to earn, clarified that participation was voluntary and the subject could withdraw at any time, and gave further contacts for questions or more information (for the consent letter and form, see Appendix A). If the subject consented to participate in this research, the experimenter first turned on the tape recorder and then read a script to the subject which explained the following: (a) the purpose of the research project; (b) that the subject would be asked to assemble widgets during 45 min sessions; (c) that the experimenter would count the number of good widgets assembled at the end of the session, record the number on a graph, pay the subject, and ask the subject to sign a receipt; (d) that the subject could look at any of the materials in the subject packet (which included the graph, data sheet, widget payment schedule, and receipt form) at any time before or after the session (for subject packet see Appendix D); (e)
instructions explaining how to correctly assemble a widget; and (f) the base pay amount the subject would receive for assembling the minimum of 50 widgets and the per widget incentive amount for each widget produced above the minimum (i.e., the subjects widget payment schedule). Following the widget assembly instructions (item e above), the subject practiced assembling five widgets and the experimenter immediately evaluated them as correctly or incorrectly assembled, identifying for the subject the specific characteristics that made the widgets correct or incorrect. To review the script read by the experimenter, refer to the job aid in Appendix F titled “Experimenter Instructions and Script for First Session.” Upon completion of the script and the subject’s indication that s/he fully understood the instructions, the experimenter turned off the tape recorder and initiated the procedure to begin the experimental session.

At the beginning of each experimental session, the experimenter reminded the subject of the widget payment schedule and asked if the subject would like to see the schedule before beginning. The experimenter then instructed the subject to start widget production, noted the subject’s start time, left the experimental room, shut the door, and determined the time to stop the subject. A radio and magazines were available in the experimental room during all sessions to approximate the availability of “distractors” that could exist in a real work environment. The subject was also free to leave the experimental room at any time during the session to take a break. Breaks taken by subjects were not monitored, although anecdotal reports by experimenters indicated that they seldom occurred.
Upon completion of the 45 min session, the experimenter reentered the experimental room and instructed the subject that it was time to stop. The experimenter immediately turned on the tape recorder, stated his/her name and subject and session numbers and completed the following tasks in the presence of the subject: (a) counted the number of correctly and incorrectly assembled widgets, being careful to refrain from making any judgmental statements (i.e., praise or criticism); (b) identified the specific characteristics for any widget judged as incorrect; (c) recorded the counts on the data form and plotted the number correct on the graph; (d) determined the subject’s pay as per the widget payment schedule; and (e) paid the subject, having the subject sign a receipt. The experimenter then reminded the subject of the next session or if it was the subject’s last session, the experimenter provided the subject with a debriefing form (see Appendix G). Following the subject’s departure, the experimenter turned off the tape recorder, carefully placed the widgets in the plastic tub, and carried them to the reliability area of the laboratory. For a more specific description of steps completed before, during, and after the experimental session, refer to the job aids in Appendix F.

As noted above, during the initial part of the first experimental session and at the completion of all sessions, all interactions between the experimenter and subject were audio taped. Experimenters were instructed to remain socially neutral at all times in relation to the subject’s performance on the work task, i.e., not to give any form of social consequence like praise or criticism, so as not to confound the independent variable with a socially reinforcing or punishing contingency. All
interactions were monitored with the audio tape as a reminder to the experimenters of this as well as to provide a mechanism to randomly monitor these interactions and, thus, enable detection of any unplanned consequences.

**Interobserver Agreement**

Experimental procedures were established in such a way that a second independent observer was able to recount the number of good widgets produced for almost all experimental sessions. All experimenters assisted in doing these "reliability checks." At the end of each experimental session, the experimenter placed all widgets produced by the subject in a tub, attached a label indicating the subject and session numbers, and placed the tub in the reliability area of the laboratory to await the second counting. A second experimenter would later select one or more widget tubs and recount the number of good widgets in each tub and write the count(s) on the interobserver agreement form (for procedural steps refer to "Job Aid for Conducting Reliability" in Appendix F). The percent of interobserver agreement for each session was later calculated by the project director. Percent agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements, then multiplying by 100. At the end of this study, the mean agreement for all sessions was also calculated.

Due to the variations in widget parts (the painted bands on the washers) and to the large number of experimenters collecting data and conducting reliability checks, the potential for disagreements in evaluating widget quality was substantial. Thus,
reliability training was held during each weekly research team meeting with all experimenters. Training consisted of (a) reviewing the % agreement achieved for all experimenters and all sessions for the prior week, as well as comparing it to the % agreement for all prior weeks and (b) practicing and troubleshooting reliability checks. This practice consisted of all experimenters independently rating the quality of approximately 20 widgets, comparing scores with each other, discussing the discrepancies observed in the ratings, reviewing widget standards, and establishing consensus rules for making decisions on variations and nuances in widget quality. Widgets used for this training were selected from widgets produced by subjects throughout the week. Weekly reliability training was conducted throughout the entire study and the weekly % interobserver agreement was posted on a feedback graph in the reliability area of the laboratory.
CHAPTER III

RESULTS

Interobserver Agreement

The quality of the subject performance measures used to evaluate the effects of the % incentive/base pay variable is reflected in the following interobserver agreement data. Interobserver agreement was calculated for 97% of all experimental sessions conducted (or approximately 1,090 of 1,122 sessions). Figure 1 displays the mean interobserver agreement for all sessions by week across the three semesters, or the 25 weeks of this study. Mean percent agreement per week ranged from 90% to 97% for the winter semester, 94% to 98% for the spring semester, and 94% to 98% for the fall semester. Interobserver agreement improved and stabilized between 96% and 98% at about middle of each semester, and remained at that level for the remainder of the semester. The primary reason for the lower agreement at the beginning of each semester followed by improvement in successive weeks, was due to the addition of new experimenters to the research team and the reliability training procedures described in the Interobserver Agreement section of the Method chapter above. The mean interobserver agreement for all weeks of the entire study was 96%.
The mean number of quality widgets produced by each group of subjects across the 15 sessions of this study is displayed in Figure 2. An observational analysis of these data indicates the following:

1. As predicted from the pilot study, an initial learning curve is observed as subjects became more proficient in assembling widgets. At approximately session 7, the slope of this learning curve begins to level off, although the performances of the incentive (10%, 30%, 60%, and 100%) groups continue to gradually increase throughout all sessions whereas the performance of the no-incentive (0%) group remains relatively stable.
2. The performance of the incentive groups is clearly higher than the no-incentive group throughout all sessions of the study. During the last five sessions, the incentive groups are performing at an average of 21% higher than the no-incentive group.

3. The performances of the incentive groups appear to be relatively similar to each other: there appears to be no observational difference in performance level as a function of the % incentive/base pay conditions.

![Figure 2](image.png)

Figure 2. Mean Number of Quality Widgets Produced Per Subject by Each % Incentive/Base Pay Group Across Experimental Sessions.

To determine if the incentive/base pay variable had a statistically significant effect on the performance of the subjects, an analysis of variance was conducted using
the pooled group means for the last five sessions of the study for each group. As discussed previously, only data from the last five sessions were analyzed due to the subjects' levels of task proficiency. The results of this analysis are provided in the source table displayed in Table 2 which indicates that the results of this study were significant at the $p<.007$ level. The pooled group means and standard deviations from this analysis are provided in Table 3, which supports the similarities and differences noted observationally in items 2 and 3 above.

Table 2

Results of the Analysis of Variance Conducted on the Pooled Means of the Number of Quality Widgets Produced Over the Last Five Sessions by Subjects in Five % Incentive/Base Pay Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
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<th>p</th>
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</thead>
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<td>Factor</td>
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<td>4129</td>
<td>1032</td>
<td>3.84</td>
<td>0.007</td>
</tr>
<tr>
<td>Error</td>
<td>70</td>
<td>18808</td>
<td>269</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>22936</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3

Means and Standard Deviations of the Number of Quality Widgets Produced by Subjects During the Last Five Sessions by % Incentive/Base Pay Group

<table>
<thead>
<tr>
<th>Group</th>
<th>0%</th>
<th>10%</th>
<th>30%</th>
<th>60%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>68.7</td>
<td>87.2</td>
<td>84.5</td>
<td>88.7</td>
<td>87.4</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>15.1</td>
<td>14.4</td>
<td>17.9</td>
<td>17.6</td>
<td>16.8</td>
</tr>
</tbody>
</table>

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An observational analysis of the individual performance data for each subject, indicated that a few subjects' performances were "atypical" when compared to the performances of the other subjects in their groups as well as to their groups' mean performance levels. Six out of the 75 subjects in the study, or 8% of all subjects, were identified as having atypical performances. Two atypical subjects were identified in the 0% group, both of whom had performance levels substantially higher than their group mean. One atypical subject was identified in the 30% group, one in the 60% group, and two in the 100% group, all of whom had performances substantially lower than their respective group means. No atypical performers were identified in the 10% group. Figure 3 displays the performances of each atypical subject in relation to their respective group means. The group means in these graphs have been recalculated to exclude the atypical subject data.

Figure 4 is a reproduction of Figure 2 above but using the recalculated group means with the atypical subject data removed. Note that, beginning with session seven, the performance levels of the 10% and 30% groups separate from the performance levels of the 60% and 100% groups. With the atypical subject data removed, the subjects in the 60% and 100% groups produced a mean of 4.7 more widgets, from sessions seven through 15 than the subjects in the 10% and 30% groups - a small but notable difference.

The analysis of variance was recalculated using the pooled group means for the last five sessions for each group with the atypical subject data removed. The
Figure 3. Mean Number of Quality Widgets Produced for Atypical Subjects in Comparison to Mean Performance Of All Other Subjects in Their Respective % Incentive/Base Pay Groups Across Experimental Sessions.
Figure 4. Mean Number of Quality Widgets Produced Per Subject by Each % Incentive/Base Pay Group With Atypical Subjects Removed Across Experimental Sessions.

results of this analysis are displayed in the source table in Table 4 which indicates an even greater level of significance at the p<.001 level. The pooled group means and standard deviations are provided in Table 5, which reveals the following as a result of removing the atypical subject data: (a) a decrease in the standard deviation for all groups, most notably for the 0% group (from s.d.=15.1 to s.d.=7.6), (b) a clear increase in the differences between the group performance means across all sessions for the no-incentive as compared to the incentive groups (with an average of 29% difference during the last five sessions), and (c) the means for the 10% and 30% groups clearly differentiate from the means for the 60% and 100% groups.

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Table 4

Results of the Analysis of Variance Conducted on the Pooled Means of the Number of Quality Widgets Produced Over the Last Five Sessions by Subjects in Five % Incentive/Base Pay Groups With Atypical Subject Data Removed

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>4</td>
<td>7112</td>
<td>1778</td>
<td>9.31</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>12221</td>
<td>191</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>19333</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5

Means and Standard Deviations of the Number of Quality Widgets Produced by Subjects During the Last Five Sessions by % Incentive/Base Pay Group With Atypical Subject Data Removed

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>30%</th>
<th>60%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>63.7</td>
<td>87.2</td>
<td>86.7</td>
<td>91.0</td>
<td>91.9</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>7.6</td>
<td>14.4</td>
<td>16.3</td>
<td>15.8</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Percent Incentive/Base Pay Earnings

Figure 5 displays the mean pay earned by subjects in each group across all sessions of the study. Note that subjects in the 0% incentive or no-incentive/base pay only group earned the highest mean pay per session while subjects in 100% incentive group earned the lowest mean pay per session, with the remaining incentive groups earning amounts in between in inverse order to their incentive percentage. In relating these data to the performance levels of the different groups, subjects with the lowest
performance level, the 0% group, earned the largest amount of pay, and subjects with
the higher performance levels, earned lesser amounts of pay. This relationship
provides evidence that the incentive independent variable was not confounded by the
amount of money earned.

Figure 5. Mean Total Pay Earned Per Subject by Each % Incentive/Base Pay Group
Across Experimental Sessions.

The differences in the total amount of earnings by incentive group is partially
an artifact of the manner in which the incentive schedules were designed. As
previously described in the Method chapter, Independent Variable section, to control
for the potential confound of magnitude of earnings, equivalent earnings ($4.00) were
set for the maximum performance level (120 widgets) per session across all %
incentive conditions, from which the base pay and per widget incentive amounts were determined. This resulted in decreasing amounts of base pay and increasing amounts of per widget incentive pay with the increasing % incentive conditions. Thus, for equivalent performances below the maximum performance level, the greater the % incentive condition, the less pay that would be earned. For example, for producing 90 widgets in a session, a subject in the 0%, 10%, 30%, 60%, and 100% groups would earn $4.00, $3.83, $3.59, $3.34, and $3.16, respectively. Only after by-passing the maximum performance level would a subject in the higher % incentive conditions earn more than a subject in the lower % incentive conditions, because the per widget incentive amount is larger. For example, for producing 130 widgets in a session a subject in the 0%, 10%, 30%, 60%, and 100% groups would earn $4.00, $4.03, $4.11, $4.18, and $4.32, respectively. Note, that in the 0% incentive condition, subjects would always earn $4.00 regardless of performance level as long as it was at the minimum level or above. Only two subjects exceeded the maximum performance level in this study, one subject (in the 60% group) producing 123 widgets during session 12 and the other subject (in the 30% group) producing 121, 122, and 121 widgets during sessions 8, 11, and 14, respectively. Two other subjects met the maximum performance level for one session each, during session 12 for one subject (in the 60% group) and session 15 for the other subject (in the 10% group). Thus, during only six sessions out of the total of 1,122 sessions that were conducted in this study, did subjects meet or exceed the maximum performance level. This resulted in
group means for performance and earnings, which were the units of data analysis in this study, that were always below the maximum performance level.

As indicated above, the design of the % incentive to base pay dollar amounts in each condition were based upon the subject attaining maximum performance (120 widgets/session). During most sessions subjects did not attain this maximum performance level. Thus, the actual % incentive to base pay amounts experienced by the subjects in this study were less than that indicated by the experimental conditions to which they were assigned. Within a condition, the % incentive to base pay amounts also varied between subjects because of the subjects different levels of performance. Table 6 identifies the range of actual % incentive to base pay levels experienced by the subjects in each group as well as the actual mean % incentive experienced, for the group as a whole. Excluding the 0% or no-incentive group, the figures in this table indicate that, on the average, the subjects in each group experienced a % incentive level that was about half of the incentive level designed in this study, with considerable variability in what each subject experienced as an individual. Table 7 displays the same figures as Table 6 with the data for the atypical subjects removed. Note that the means are slightly higher and the individual variability becomes increasingly less in the 30%, 60%, and 100% groups, respectively.

Summary

The interobserver agreement measures indicate that the quality of the subject performance data is high. Task proficient subjects who received base pay with
Table 6

Means and Ranges of the Actual % Incentive to Base Pay Earned by Subjects During the Last Five Sessions by % Incentive/Base Pay Group

<table>
<thead>
<tr>
<th>Group</th>
<th>0%</th>
<th>10%</th>
<th>30%</th>
<th>60%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0%</td>
<td>5.3%</td>
<td>14.7%</td>
<td>32.8%</td>
<td>54.1%</td>
</tr>
<tr>
<td>Range</td>
<td>0%</td>
<td>1.3%-8.5%</td>
<td>1.8%-29.7%</td>
<td>5.8%-55.3%</td>
<td>5.4%-87.9%</td>
</tr>
</tbody>
</table>

Table 7

Means and Ranges of the Actual % Incentive to Base Pay Earned by Subjects During the Last Five Sessions by % Incentive/Base Pay Group With Atypical Subject Data Removed

<table>
<thead>
<tr>
<th>Group</th>
<th>0%</th>
<th>10%</th>
<th>30%</th>
<th>60%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0%</td>
<td>5.3%</td>
<td>15.7%</td>
<td>34.7%</td>
<td>60.7%</td>
</tr>
<tr>
<td>Range</td>
<td>0%</td>
<td>1.3%-8.5%</td>
<td>5.2%-29.7%</td>
<td>13.2%-55.3%</td>
<td>34.6%-87.9%</td>
</tr>
</tbody>
</table>

incentives had clearly higher performance levels than task proficient subjects who received base pay with no incentives. This performance difference was statistically significant. A similar performance difference occurred during sessions when subjects were learning to become task proficient. Subjects who received incentives showed a continuously increasing rate of performance, beyond reaching task proficiency, across all sessions, whereas the performance of no-incentive subjects leveled off once they reached their initial level of proficiency.

The increasing % incentive to base pay levels did not differentially affect the levels of subject work task performance. Subject performance levels were relatively
similar across all incentive groups. Although, when the atypical subjects' data were removed, a small performance difference was observed in which subjects in the 60% and 100% groups produced an average of almost 5 widgets/session more than subjects in the 10% and 30% groups. The actual % incentive/base pay levels experienced by subjects varied within each experimental group and were up to an average of 50% less per group than designed. Thus the increased performance level was obtained with as little as a mean of 5% incentive in one group.

The % incentive/base pay variable was not confounded by the amount of money earned by subjects, in fact an inverse relationship occurred between subject performance level and amount of pay earned. Subjects who performed the highest made the least amount of pay and subjects who performed the lowest made the most amount of pay.
CHAPTER IV

DISCUSSION

The primary purpose of this study was to determine if increases in the percentage of incentives to base pay, with total magnitude of pay held constant, would result in increases in performance and, within this continuum, determine the existence of an optimum level of percentage of incentives to base pay.

The data from this study supports prior similar research in showing that pay with incentives resulted in observationally and significantly higher levels of performance (i.e., an average of 21% higher in this study) than pay with no-incentives (e.g., hourly pay). Under incentive conditions subjects also (a) reached a higher level of task proficiency than subjects under no-incentive conditions and (b) continued to show gradual increases in performance levels throughout the course of the study, whereas the performance of no-incentive subjects stabilized upon attaining their initial level of task proficiency. The fact that the performance of the subjects in the incentive groups continued to gradually increase indicates that, at the end of this study, the subjects’ maximum performance levels had not yet been attained. This results in a number of questions that could be pursued in future research, such as:

1. How long (many sessions) would it take for subjects to reach their maximum level of productivity under their respective incentive conditions?
2. Would subjects maintain their maximum performance level under their incentive conditions?

3. Would there be variations in maximum performance for the different % incentive/base pay levels?

Data from this study builds on prior research in demonstrating that the different levels of percentage of incentive to base pay, with pay magnitude held constant, (a) did not result in a significant difference in the levels of subject task performance and (b) resulted in significant performance increases with as little as an average of a 5% incentive to base pay. These findings contrast sharply with the generally accepted "incentive potential" to affect motivation of 30%, as reported by Fein (1970). The current study reveals that equivalently motivated performances are obtained with incentive percentages below 30%. In considering incentive rates above 30%, Henderson (1989) indicates that a 30% incentive rate "provides a maximum motivational impact on most workers" (p. 360) and Fein (1970) states that "increasing the potential above 30% does not appreciably motivate employees to increase their physical efforts over what would have been exerted under a 30% plan" (p. 28). The findings of the current study support these conclusions in that no differences in subject performances were obtained between incentive groups except when the data for the six atypical subjects were removed, and then the differences noted between the 10%/30% and 60%/100% groups were relatively small. Thus, the findings of the current study indicate that a maximum motivational impact will probably occur with a % incentive to base pay level of less than 30%. However, especially in light of the
differences in performance levels noted when the data for the atypical subjects were removed, future research should continue to investigate the effects of different percentages of incentives to base pay to refine or refute the findings of this study.

In summary, the conclusions of this study indicate: (a) that there appears to be no specific relationship between increases in incentives and increases in performance beyond the fact that base pay with incentives results in significantly higher productivity levels than base pay alone (e.g., hourly pay), and (b) if there is an optimum level of percentage of incentives to base pay, it is probably considerably lower than the generally accepted 30% level in American industry. These results support the behavioral theory that it is simply the "link" or the "contingency" in which increases in performance directly result in increases in pay, that is the controlling variable, as opposed to the percentage, and possibly the magnitude, of the pay that is earned in incentives. With this link, performers have direct control over a portion of their earnings through regulating their performance levels.

The secondary purpose of this study was to conduct this research under highly controlled conditions, i.e., a laboratory analog work setting, to: (a) enable careful control of the monetary incentives independent variable and (b) obtain accurate and reliable measures of the work performance dependent variable, thus providing a solid foundation upon which to build future research in this area. Along with the benefits of conducting basic laboratory research, come limitations in the generality of the research findings due to the differences between the highly controlled research setting and the realities and complexities of the real work environment to which the results of
this research should apply. The limitations in the generality of the findings from this study are as follows:

1. Subjects were undergraduate students performing a simulated work task for pay in their spare time and thus were only an approximation of a real employee, performing a real task, in a real job, for real pay. Subjects were also volunteers and were free to withdraw from the study at any time with no repercussions. Future research in this area would benefit greatly from the conduct of applied studies in which the effects of monetary incentive variables are evaluated on the performance of workers in real work environments.

2. The actual time spent working and being exposed to the incentive conditions by subjects was very brief compared to a real work setting and thus the results of this study could be an artifact of such a brief exposure to the experimental conditions. Subjects performed a work task for 15 work sessions of 45 mins each and thus were exposed to the incentive contingency for the same brief amount of time, although, this is a greater amount of work time and exposure to incentives than exists in prior similar analog studies. Future research in this area would benefit from studies designed to use greater amounts of work time and longer exposure to incentive conditions.

3. During the subjects' participation in this study, they performed the work task alone in an experimental room with the door closed and sessions were scheduled such that there was minimal to no interaction or contact between subjects in this study. Thus, subjects were isolated from interactions with others while working,
although there were other materials available to serve as potential distractors (i.e., radio and magazines). An analog study that investigated the impact of incentives and group size on the performance of individual workers (Stoneman & Dickinson, 1989), noted that individual performances appeared to be affected by the performance of others in the work group. Also, it is commonly known that workers typically impose "rate restrictions" on each other under piece-rate pay systems. Thus, the isolated context for the subjects in the current study was probably not a good approximation of the typical work environment where interactions with others could affect levels of productivity. Future research would benefit from the investigation of the impact of work related social variables on the performance of individuals who are working under monetary incentive contingencies.

4. The earnings subjects received in this study were small in total amount and of a discretionary nature which contrasts with the need basis for earnings of the typical employee. The effects of incentive contingencies on worker performance may differ when the income being earned is to meet the worker's needed expenses for daily living as opposed to being discretionary income. Again, future research with incentive contingencies in applied settings could address this issue.

A related issue, not addressed in this study, but certainly a significant variable in any longer term conclusions about the effects of incentive contingencies, is worker preference for what proportion of pay should be a guaranteed base pay (e.g., such as to meet fixed living expenses and needs) and what proportion should be more closely linked to performance levels, i.e., incentives. This is an important area for future
research because incentive systems employed by organizations will need to be ones that employees prefer, or choose to participate in, if they are to be effective.

5. The pay incentive contingency in this study was relatively simple and easy for subjects to understand. Subjects were able to look at their incentive or widget payment schedule for the amounts of pay for various levels of productivity. Subjects were informed of the specific dollar amounts of their base pay and per widget incentive pay but were not informed of the "%" amount as per the incentive condition. Incentive contingencies in the real work environment are often not as simple or as easy to understand as those represented in this study. They also may not be as simply related to the workers' moment to moment performance levels as occurred in this study. Future research should assess subjects understanding of the incentive contingencies, as well as approximate realistic incentive contingencies that would be found in applied work settings.

A number of methodological constraints occurred in the design of this study as a result of balancing the needs of the research versus the realities of being able to implement the study. These constraints are described below:

1. The design of this study required 75 subjects to complete all experimental sessions. Considering the relatively low rate of commitment typically obtained from volunteer student subjects, it was necessary to recruit a much larger number of individuals to result in the number of subjects needed to complete the study. This impacted the length of time it took to complete the study.
2. Participation as a subject in this study required a commitment of 15 sessions, of 45 min each, which is a considerable time commitment for a full-time student. This impacted the research team's ability to obtain commitments from subjects initially recruited as well as being the stated reason for some individuals dropping out.

3. Being that the subjects were students, the implementation of this study needed to coordinate with the University's semester system for subject availability. This resulted in three semesters and cycles of research implementation and related management tasks, and thus the study took a full year to complete.

4. Due to the fact that the independent variable was composed of real dollars, money was necessary to conduct this study. It was necessary to solicit funds from several sources and the funds that became available were limited. This impacted decision making in terms of the number of sessions that could be conducted, the number of subjects for which the study could be designed, and the total amount of money that could be available per subject, thus impacting the actual dollar values of the % incentive and base pay amounts.

Lastly, this study was not designed to evaluate subject satisfaction with the various incentive levels experienced nor was any anecdotal information collected that would indicate the level of subject satisfaction. Although, from a different perspective, it can be noted that 75 of the original 105 individuals who initiated participation in this study were satisfied enough with their various pay contingencies to complete all experimental sessions. A closer look at the 30 individuals who chose
to discontinue their participation may shed some light on this satisfaction issue.

Of the 30 subjects who dropped out of this study, 18 actually experienced the incentive contingencies as per their respective % incentive group. Of these 18 subjects, two, three, four, four, and five subjects dropped out of the 0%, 10%, 30%, 60%, and 100% groups, respectively. These numbers represent 12%, 11%, 21%, 21%, and 25% drop out rates as compared to the total numbers of subjects that were originally assigned to each of these experimental conditions, again respectively. The average amount of money earned per session by these individuals, during the sessions in which they earned pay (i.e., met or exceeded the minimum performance requirement), was $4.00, $3.73, $3.26, $2.90, and $2.22, while their average performance levels during these sessions were relatively similar across groups averaging 68, 70, 65, 69, and 58 widgets per session, for the 0%, 10%, 30%, 60%, and 100% groups, respectively. Thus, as the % of incentive to base pay increased per group and the magnitude of the average amount of pay earned per session decreased, the % of individuals dropping out of the study increased. It would have been valuable to assess subject satisfaction to determine the impact of the % incentive and pay magnitude variables on the subjects’ decisions to drop out of the study. Thus, subject satisfaction with the various % incentive pay levels, as well as the pay magnitude as related to those levels, is another important area for further research.

In closing, in order for an incentive pay system to be attractive to a work organization, the financial benefits of adopting the incentive system must outweigh the costs of implementing it. Such an evaluation was beyond the scope of the current
study but future research on monetary incentive systems, especially in applied settings, should consider incorporating a cost-benefit analysis into the design of such studies.
CHAPTER V

FOLLOW-UP RESEARCH

In order to fulfill the need for practical knowledge about the effective implementation of monetary incentive systems, research in this area continues. The consistent finding across all applied and laboratory studies, discussed previously in the Introduction Chapter, that monetary incentives show substantial increases in productivity over hourly pay, is continuing to be supported. Current research is systematically addressing a number of monetary incentive variables and their parameters as well as conducting replications to address the limitations in the generality of prior findings. Recent research continues to build on prior findings and continues to support the position that monetary incentives are a worthwhile employee performance improvement strategy.

The recommendations for continuing research discussed in the prior Discussion Chapter include suggestions about (a) specific variables to be investigated as well as (b) generality issues to be addressed. Variables recommended include: (a) continuing to investigate the effects of different percentages of incentives to base pay, (b) investigating employee preference for proportions of base pay and proportions of incentive pay, and (c) investigating the impact of work related social variables on the performance of individuals working under monetary incentive contingencies. Generality issues include: (a) conducting studies designed to use longer amounts of
work time and longer exposure to incentive conditions, (b) approximating realistic incentive contingencies that would be found in applied work settings and assessing subject understanding of those contingencies, and (c) conducting research in applied settings, evaluating the effects of monetary incentives on the performance of real workers, in real work settings, earning real pay, who need to pay real expenses. A number of these suggestions have been addressed in the recent monetary incentives research.

The significant studies in this body of recent research are described in detail in the remainder of this chapter. These studies are organized by their primary research variable of interest and include the following topics and studies per topic: (a) "Percentage of Incentives" - Austin, Kessler, Riccobono, and Bailey, 1996; Dickinson and Gillette, 1993; LaMere, Dickinson, Henry, Henry, and Poling, 1996; and Leary, Roberts, Trefsgar, Kaufman, Cassel, Jones, McKnight, and Duncan, 1990; (b) "Pay-Performance Function" - Oah and Dickinson, 1992; Smoot & Duncan, 1992; (c) "Satisfaction and Performance" - Oah, 1989; Sundby, Dickinson, and Michael, 1996; and (d) "Individual Versus Group Context" - Farr, 1976; Honeywell, Dickinson, & Poling, in press; London and Oldham, 1977; Stoneman and Dickinson, 1989; Weinstein and Holzbach, 1973.

Percentage of Incentives

The results of the research presented in this dissertation were published in 1990 with Frisch and Dickinson as authors. Following publication of this study,
several studies have continued to investigate the effects of different percentages of incentives to base pay. Four studies are described below, three of which were direct follow-ups to the Frisch and Dickinson study. Of these three studies, two are laboratory investigations (Dickinson & Gillette, 1993; Leary et al., 1990), and one is an applied study conducted in a work context that is unique to this body of research (LaMere et al., 1996). The fourth is a recent applied study, also conducted in a work context (Austin et al., 1996). This study does not specifically address the percentage of incentives, although the percentage is determined in the description below, but provides a novel and useful approach of determining individual incentives for members of a work crew based upon a performance outcome rather than performance itself.

In an unpublished laboratory simulation Leary, Roberts, Trefsgar, Kaufman, Cassel, Jones, McKnight, & Duncan (1990) examined the impact of varying schedules of incentive pay on individual productivity. A combined reversal and multiple baseline within-subject design was used in which 50 college student subjects were randomly assigned to one of ten 5-person groups. One group received the flat rate condition only, and the remaining nine groups received the flat rate condition plus one (8 groups) or two (1 group) incentive conditions. The various incentive conditions were counterbalanced across the groups. The productivity task consisted of constructing a "widget" made of 16 pop beads of several colors connected in a circle in a prespecified sequence. Subjects produced widgets for 15 min sessions and the number of widgets completed was measured. In the flat rate condition subjects...
received $1.00 per work session, and in the incentive pay conditions subjects received either $.25, $.50, $.75, or $1.00 in base pay plus a 10 cent per widget incentive for widgets produced over the minimum performance standard of 10 widgets.

Group means for the last five sessions of each condition were compared. Productivity increased in all the incentive conditions as compared to the flat rate baseline condition with productivity among the various incentive conditions appearing comparable. The authors reported that this study resulted in incentive conditions that were 63% to 90% of total pay. In closing the authors state that “this study suggests that contingency pay conditions control productivity more than flat rate conditions ... it is not clear that any particular incentive condition is superior to the others in terms of control of productivity” (p. 2).

In a close review of the information presented in the above paper, the design of this study is not as rigorous experimentally as most of the other studies in this research area. Even though this study is lacking in experimental sophistication and control, the findings are consistent with other recent research in this area.

Dickinson & Gillette (1993) conducted two experiments comparing the effects of a piece-rate pay system, or a 100% of total pay incentive system, with the effects of a base pay plus 30% of total pay incentive system. A within-subjects reversal design was applied in each experiment in which all subjects were exposed to both pay conditions, with the order of conditions reversed for half of the subjects to counterbalance the design. Six “keyboard proficient” college student subjects were randomly assigned to the two sequences of conditions per experiment, i.e., 3 to the
ABA sequence and 3 to the BAB sequence. The piece-rate pay system was represented by the A condition and the base pay plus incentive system was represented by the B condition. Subjects performed a computer simulation of a check verification task, which is a task typically performed by check proof operators in banks. Subjects worked for three hour sessions in the first experiment and four hour sessions in the second experiment. The rate of correctly verified checks per hour was measured. Subjects were able to obtain feedback on how many checks they had correctly completed at any point in time from the computer. At the end of each hour, the experimenter obtained the subject’s hourly performance from the computer and recorded it. At the end of each session, in the presence of the subject, the experimenter plotted the subject’s performance on a graph and determined and recorded the subject’s earnings. Subjects were paid for this performance in cash at the beginning of the next session. Subjects attended at least one session per week and the number of sessions per subject varied because phases were changed based upon the subject meeting performance stability criterion.

In experiment one, sessions were three hours in length and the number of sessions per subject ranged from six to nine, with two to three sessions per condition. The average performance per hour standard was estimated at 1300 correctly completed checks. In the piece-rate pay (100% incentive) condition (A), subjects could earn a total of $5.00 per hour for meeting the average performance standard, at a per check incentive rate of $.00385. In the base pay plus 30% incentive condition (B), i.e., 70% in guaranteed hourly wages and 30% in incentives, subjects earned a
guaranteed base pay of $3.50 (with no minimum performance required) and could earn a per check incentive rate of $.005 for all correctly verified checks above a minimum performance standard of 1,000. These two pay conditions were equated such that meeting the average performance standard would result in equivalent pay of $5.00 per hour. The results indicated that (a) two subjects in the BAB sequence increased slightly throughout the study, (b) one subject in the ABA and one in the BAB sequences had higher performances under the piece-rate condition, (c) one subject in the ABA sequence had higher performance under the base pay plus incentive condition, and (d) one subject in the ABA sequence had comparable performances under both conditions. Also, the actual percent of total pay earned in incentives in the base pay plus incentives conditions ranged from 0% to 37% as compared to the planned rate of 30%. The investigators concluded that this experiment indicated that “the proportion of total pay that was incentive-based did not systematically affect performance rates” (p. 33).

Based on the results of experiment one, five changes were implemented in experiment two: (1) a minimum performance requirement was added in order to receive base pay; (2) the keyboard proficiency requirement for subject selection and the minimum performance standard were decreased to 990 each and the average performance standard was decreased to 1250; (3) more stringent performance stability criterion were adopted for phase changes; (4) session length was increased by one hour; and (5) individualized performance standards were developed for the second conditions in each sequence using individualized data from the first conditions in an
attempt to equate total amount of earnings between conditions, thereby minimizing any potential confound that could be attributed to a difference in magnitude of earnings between conditions.

In experiment two, sessions were four hours in length and the number of sessions per subject ranged from nine to fourteen, with three to five sessions per condition. During the two piece-rate pay conditions (A) in the ABA sequence, subjects could earn $4.50 for meeting the revised average performance standard (1250 checks/hr), at a per check incentive rate of $.0036. During the base pay plus incentive condition (B), which was the second condition in this sequence (ABA), the base pay and incentive amounts were individualized. Each subject’s average level of performance and amount of earnings from the prior condition (A) were identified and used to determine: (a) the subject’s individualized minimum performance standard, (b) the 70% base pay amount, and (c) the 30% incentive total and per check incentive amounts. In the two base pay plus incentive conditions (B) in the BAB sequence, subjects could earn a total of $4.50 for meeting the revised average performance standard, $3.15 (70%) as base pay and $1.35 (30%), or $.0155 per check, as incentive pay. During the second condition (A), the per check incentive piece-rate was individualized using each subject’s average level of performance and amount of earnings from the prior condition. The results indicated that: (a) only one subject, who was in the BAB sequence, showed consistent responding to the two pay conditions, having lower and more variable performance during the piece-rate pay than during the two base pay plus incentives conditions; (b) the other two subjects in the BAB
sequence showed no significant changes or trends across conditions, and (c) the mean performance of all three subjects in the ABA sequence showed increases in performance with each successive condition. The investigators conclude that "taken together, the data indicate that the differences in pay systems did not influence performance" (p. 46) and that the increasing performance trends displayed by subjects in the ABA sequence "suggest that the order of exposure to the pay systems may have influenced responding" (p. 47).

Thus, the results of both experiments revealed no systematic differences in the effects of different percentages of total pay that were incentive-based. This outcome is consistent with previous studies and reinforces the position that it is the contingency between pay and performance, as opposed to the magnitude of this relationship, that is the significant factor in influencing performance.

This study not only provides a replication of prior findings with a different comparison of incentive contingencies, but also builds on prior laboratory studies by (a) having conducted considerably longer work sessions, more closely approximating a work day; (b) using an analog task that is very close in similarity to the real work task; (c) providing pay amounts that closely approximate what one would make in a part-time job, because of the increased work time per session and somewhat higher pay rates; and (d) providing subjects with their pay for work performed after a week's delay which more closely approximates the way pay is received in the work environment. From an experimental design perspective this study showed the potential existence of sequence effects, which was also noted in the Pilot Study.
section of the Method chapter above, perhaps indicating that a within-subjects reversal design may not be the design of choice for comparing different levels of the % incentives parameter.

LaMere, Dickinson, Henry, Henry, & Poling (1996) examined the effects of a multiple component individual monetary incentive system on the job performance, safety, and satisfaction of 22 truck drivers in the “rolloff” division of a waste disposal service company. A multiple-baseline across groups experimental design with two groups was used to evaluate the effects of the incentive system, i.e., conditions changed at different times for the two groups. The drivers were assigned to one of the two groups by pulling names from a hat at a driver’s meeting. Baseline, in which the drivers received their regular base pay, was 20 weeks for group one and 34 weeks for group two. Following baseline, the multiple component intervention was implemented (at week 21 for group one and week 35 for group two) which included (a) individual and group feedback, (b) incentive pay, and (c) loss of incentive pay for accidents. At week 49 for group one and 50 for group two, the first incentive increase phase was implemented in which the incentive amounts were increased by 92% as compared to the prior incentive phase, while base pay remained the same. This phase lasted for 30 weeks, after which the study ended. Follow-up data were collected on a weekly basis beyond the conclusion of the study for 116 weeks. Nine weeks after the conclusion of the study, or at week 88 for group one and week 89 for group two, a second incentive increase phase was implemented in which the incentives were again
increased, this time by 57% compared to the prior phase, with base pay again remaining the same.

The "primary measure" used to determine incentive pay, as well as to evaluate the effects of the intervention in this study, was the percentage of job points earned in less time than baseline average. This performance measure equated job tasks and corrected for the number of hours worked and miles driven, which were variables over which the drivers had no control. This measure was the end result of a number of activities which began with an analysis of the rolloff drivers' overall job and resulted in an identification of nine different types of job tasks or "jobs" that the drivers performed. Point values were assigned to each of the nine job types based on the relative amount of time taken to compete each job. During both the baseline and intervention phases, the drivers self-recorded the number and types of jobs they completed daily as well as their miles driven. During the intervention, the drivers earned the specified points for completing the various types of jobs. On a daily basis the drivers generated their own feedback by determining whether their performance was above, below, or at average and by calculating the amount of incentives they had earned for the day. At the end of the week the total number job points earned by a driver was divided by the total number of hours worked for the week resulting in the mean number of job points earned per hour per driver. This figure was then averaged for all the drivers in the group resulting in a "secondary measure", i.e., the mean number of job points earned per hour per group of drivers, which was graphed and posted in a communal area as weekly group feedback. Job satisfaction was also
measured during this study by having the drivers complete the work and pay
subscales of the Job Descriptive Index (JDI), once during the baseline phase and once
during the first incentive increase phase. Several organizational cost-benefit measures
were also calculated which included: (a) weekly labor cost savings = baseline labor
costs - current labor costs, (b) net labor cost savings per week = total labor cost
savings - total amount paid in incentives per week, and (c) return on investment (ROI)
= net labor cost savings + the total amount paid in incentives.

Incentive values were derived from an analysis of the projected labor cost
savings from implementing the incentive system, and thereafter it was management’s
decision to return 25% of these projected savings to the workers through their
incentives. The actual incentives earned per driver were generated from a computer
system. The performance data, i.e., job points earned and miles driven, were collected
by the supervisor and provided to a payroll clerk to be entered into the computer. A
weekly report was generated that identified by driver, the: (a) number of job points
earned per hour, (b) miles driven per job point, (c) level of performance as compared
to baseline average, and (d) amount of incentive pay earned. The drivers received
their incentives as part of their regular weekly pay with the amount of the incentives
identified separately on their pay check stubs. As indicated above, loss of incentive
pay for “chargeable accidents” was also part of the intervention. Chargeable accidents
were driver accidents that were investigated by the police or by management, in
which the driver was found to be at fault. If drivers had a chargeable accident, the
driver forfeited his incentives for the week.
Following implementation of the initial incentive intervention, performance increased for both groups of drivers and this performance was sustained across all incentive conditions. The incentive amounts across the incentive conditions were 2.6% for group one and 3.1% for group two during the initial phase, 6% for both groups during the first increase phase, and 9% for both groups during the second increase phase, thus resulting in increasing pay for the drivers. Consistent with results of prior similar research, the increasing incentive amounts in the subsequent conditions did not "consistently increase" performance beyond the initial increased level. Driver performance remained at this increased level throughout the nearly four-year follow-up. To evaluate the impact of the intervention on the number of chargeable accidents, data were compared between the five month baseline phase and the same time period one year later during the intervention phase. During baseline, 11 accidents (or 0.48 per week) occurred and during intervention, 8 accidents (or 0.35 per week) were reported. Therefore the authors concluded that accidents did not increase. No significant differences were found in the drivers' ratings of pay and work satisfaction on the JDI subscales between baseline and intervention phases, thus the investigators conclude that pay and work satisfaction ratings were not affected by the implementation of the incentive system.

The authors report a labor cost savings of $17,631 during the initial incentive phase (5 months) and $58,724 during the first incentive increase phase (10 months), for a total labor cost savings of approximately $76,000, or an average of more than $5,000 per month, for the first 15 months that the workers received monetary
incentives. ROI was reported to be 4.4:1 during the first incentive phase and 2.8:1 during the first incentive increase phase, thus the increasing % incentive resulted in a decrease in ROI for the company. The authors conclude that these results, “add to the substantial literature on individual incentives by documenting increased productivity sustained over a long period without accompanying increases in accidents or decreases in workers’ satisfaction” (p. 385). They also point out that performance increases were obtained with only a “small portion” of the drivers’ total pay being earned in incentives, and performance did not increase with further increases in incentives, which, once again provides a challenge to the accepted rule of “30%” (Fein, 1970, Henderson, 1989). Thus, “once pay is tied to performance, strengthening that link by increasing the amount or proportion of incentives may not lead to further increases in performance” (p. 403).

Although this study has the experimental limitations that occur when conducting applied research, its strengths as a replication in an applied setting and the resulting benefits in generality more than overcome these limitations. This study was applied in a real work setting, using real workers, doing their real job, and integrating the monetary incentive system with the workers' real pay system. The workers appeared to understand the incentive system even though the system was relatively complex. All components of the monetary incentive system were integrated into the company's processes as well as implemented by the company's employees. The monetary incentive system continued as an organizational system beyond the life of the study - with follow-up, this incentive system lasted for four years. Lastly, the
percentage of monetary incentives that impacted performance improvement in this
applied setting was relatively small, which further substantiates prior findings.

Austin, Kessler, Riccobono, & Bailey (1996) examined the effects of a “multi-
component intervention package,” which included monetary incentives, to improve a
roofing crew’s productivity. The roofing crew consisted of seven male roofers
employed by a roofing company and the work task selected for this study consisted of
“tearing off” or removing old roofs. An AB design “with repeated observations” was
employed in which workers were paid an hourly wage in the baseline phase and the
hourly wage plus monetary incentives, as part of the intervention package contingent
on performance, during the intervention phase. An outcome of the crew’s task
performance was measured because direct measurement of the task performance was
difficult to do. This outcome measure consisted of the percentage and dollars of
savings in labor costs, which were determined on a daily basis, by comparing the
actual daily labor costs with the estimated daily labor costs and calculating these
measures. Estimated labor costs were set through a competitive bidding process six
months prior to the study. Individual performances were also measured in terms of:
(a) hours worked and (b) “absences and tardies.” The multi-component intervention
package consisted of: (a) daily snack food reinforcers contingent on achieving the
daily performance goal during the previous day; (b) lunches provided by the
performance manager each time the crew accumulated a total of three “days saved”
(the cumulative difference between days estimated and days required to complete
work across days of work); (c) individualized daily feedback in which the items in a
feedback chart (which are further specified below) were privately reviewed with each worker by the performance manager; and (d) a weekly bonus check (which is further specified below) with feedback, i.e., a copy of the individual’s chart, displaying the weekly and cumulative project bonus earned. The individualized daily feedback was provided in two forms, as follows: (1) a chart showing the: (a) dollar bonuses earned for the previous day, week, and project to-date; (b) absences and tardies, with related costs to the employee, for the week and project; and (c) hours worked for the previous day, week, and project; and (2) a graph showing the cumulative dollar bonus amount earned by the individual across project days. The weekly bonus check was provided separately from the individuals hourly pay check and included the individual worker’s portion of the crew’s monetary incentives earned from the labor cost savings. Forty percent of every one dollar saved in labor costs was allocated to the work crew’s monetary incentives. Each individual worker’s share of the crew’s incentive was determined by a ratio equivalent to the ratio of his daily wages relative to the total labor cost for the day.

Results indicated that during the baseline phase, the mean actual labor cost was 141% of the estimated labor cost, which indicates that the company was loosing money. During the intervention phase, the actual cost decreased to a mean of 81% of estimated cost. The authors report that this indicates a “64% labor cost reduction” when compared to baseline conditions. The total estimated labor cost for the 26 days of the intervention phase was $31,913 (or mean per day of $1227) whereas the actual cost was $22,545 (or mean per day of $867), which represents a total savings from the
intervention of $9,368, assuming that the crew would have performed in such a manner without the intervention so as not to exceed the estimated cost, which does not appear to be the case from the baseline data. The authors conclude that "the effect was immediate, substantial, and practically significant" (p. 70). The management and work crew were given the opportunity to evaluate this intervention by completing an anonymous questionnaire. The authors indicated that the responses to this questionnaire were "generally positive" and indicated that the workers': (a) job satisfaction improved, (b) preferred the weekly bonuses when compared to a previous year-end profit-sharing bonus, and (c) strongly supported continuing the intervention.

It is not possible to figure any % incentives per individual worker in this study because data on individual earnings and bonuses, which varied between individuals, are not available. Adequate data are available to determine the mean % incentives earned per day for the crew as a whole. Both the % incentive as compared to base pay and the % incentive as compared to total pay can be computed using the: (a) estimated mean labor cost per day of $1227; (b) actual mean labor cost per day of $867 (which is also mean pay for the crew per day); (c) mean labor cost savings, i.e., $1227 - $867 = $360; and (d) percent of labor cost savings per day allocated to the crew as a bonus = 40%, i.e., 40% x $360 = $144. Using these calculations the: (a) % incentive to base pay = daily crew bonus incentive ÷ daily actual labor cost ($144 ÷ $867 = 16.6%); and (b) % incentive to total pay = daily crew bonus incentive ÷ (daily actual labor cost + daily crew bonus incentive) ($144 ÷ ($867 + $144) = 14.2%.
This study has weaknesses in that it is not possible to isolate and evaluate the impact of the monetary incentive independent variable because: (a) this is a case study design, and (b) the monetary incentive variable is combined with a number of other potentially reinforcing variables in the multi-component intervention package. The strengths in this study are that it is an investigation of the effects of monetary incentives in a unique applied setting with real workers and real pay, and where the incentive system was implemented by the employees in the work setting. Also unique in this study is the fact that the work performance was an interdependent task performed by a crew with the incentive being determined on an outcome of the crew’s performance and distributed somewhat differentially among the crew members (for more discussion on interdependent tasks and differential distribution of monetary incentives refer to the Individual Versus Group Context section below).

Performance-Pay Function

An extension of the focus on the relationship between the percentage of incentives and work performance is the monetary incentive performance-pay function. The concept of the performance-pay function has been applied primarily to the thinking of the per unit value of a unit of work as related to a specified amount of pay for that unit of work. That amount of pay can either stay consistently the same for successive units of work, it can increase in value for successive units of work, or it can decrease in value for successive units of work. Three performance-pay functions have been identified in relation to these concepts. The linear function, which applies
to most incentive research conducted thus far, the positively accelerating function or exponential function, and the negatively accelerating function. Two studies have addressed research questions about the monetary incentive performance-pay function (Oah & Dickinson, 1992; Smoot & Duncan, 1992), which are described below.

Oah & Dickinson (1992) compared the effects of two types of monetary incentive performance-pay function relationships, a linear function and an exponential function, on worker productivity. More specifically, the investigators were interested in determining if an exponential relationship between performance and pay would increase performance more than a linear relationship. A "linear" performance-pay function is one in which a specific and unchanging incentive amount is paid for each piece or unit of work that is produced, resulting in a linear relationship between performance and pay. An "exponential" performance-pay function is one in which the incentive amount paid for each piece or unit of work is increased as productivity increases, resulting in an exponential relationship between performance and pay. The effects of these performance-pay functions were investigated using a between-groups experimental design with two groups, one group per pay function. Forty college student subjects were randomly assigned to the two groups, resulting in 20 subjects per performance-pay function condition. Subjects participated in fifteen-45 min sessions during which they performed a computer simulation of a check proofing task, which is a task performed by check proof operators in banks. Subjects were able to obtain feedback on how many checks they had correctly completed at any point in time from the computer. The number of correctly completed checks per session was
measured. At the end of each experimental session the experimenter, in the presence of the subject, plotted the subject’s number of correctly completed checks on a graph and determined and recorded the subject’s earnings. Subjects were paid for their performance earnings in cash once per week.

All subjects received a base pay amount and earned incentives, according to their performance-pay function condition, when their performance exceeded the minimum performance standard of 490 correctly completed checks. The dollar amounts of the two pay functions were equated at the “average” preincentive performance level (based on data from pilot research) which was determined to be 585 checks. The dollar amount for completing the average performance of 585 checks was set at $2.39 for both pay functions. Incentive payments were “capped” at 860 checks for both pay functions and thus no increase in earnings could occur for performances above this level. For subjects in the exponential pay function condition, their per check incentive increased exponentially as the number of checks completed increased. Maximum possible earnings for 860 checks or more was $5.00. For subjects in the linear function condition, their per check incentive remained constant with a maximum earnings possible of $3.50 for 860 or more checks completed.

Observationally, the mean number of checks completed per session were consistently higher for the exponential group than the linear group and the difference increased with increasing sessions. An analysis of variance (ANOVA) was conducted on the pooled means of the last five sessions for each group to determine if performance was differentially affected by the two performance-pay functions. This
analysis indicated that there was not a significant difference. To determine if the exponential function increased performance more quickly than the linear function, an ANOVA was conducted on the mean slopes of the regression lines of the data for the two groups. This analysis also indicated no significant difference. The amount of pay earned by the subjects in the exponential group was substantially more than the pay earned by the subjects in the linear group. To determine if this difference in pay was significant, an ANOVA was conducted on the mean pay earned for all 15 sessions which indicated that the pay differences were statistically significant. The authors conclude that the "exponential performance-pay function did not result in greater overall productivity, nor did it increase productivity more quickly than the linear function" even though "subjects exposed to the exponential performance-pay function earned significantly more money per session than subjects exposed to the linear performance-pay function" (p. 106). Thus, productivity was comparable under both the linear and exponential performance-pay functions. In combining these results with results of similar recent research, the authors also conclude that "within certain parameters that have yet to be determined, the amount of the monetary incentives and the way in which they are related to performance may not influence productivity" (p. 109).

In an unpublished manuscript Smoot & Duncan (1992) report a series of four experiments investigating the effects of a "flat" pay system and three performance-pay functions (which are more specifically described below), i.e., linear, positively accelerating, negatively accelerating. Experiment one compared the effects of these
three pay functions, experiment two compared the three pay functions both with and without feedback, and experiments three and four compared the three pay functions under group versus individual work settings. All experiments were conducted using a within subject, multiple baseline design with two conditions, baseline (or flat pay) and incentive pay (one of the performance-pay functions). Subjects were college students who worked in groups of four to six subjects. Subjects were randomly assigned to one of three pairs of experimental groups. Each group was randomly assigned to one of three performance-pay functions resulting in one pair of groups per function. The performance task consisted of constructing a “widget” made of 16 pop beads of several colors connected in a circle in a prespecified sequence. Subjects produced widgets for 20 (experiments 1 and 2) or 25 (experiments 3 and 4) 15 min sessions. A minimum performance requirement of 10 widgets occurred in all conditions. The number of correctly completed widgets was measured as well as the cost per widget for each performance-pay function system.

The pay systems were as follows: (a) flat pay in which subjects received a flat rate of pay regardless of number of widgets produced, with the flat pay differing in the four studies; (b) a linear pay function in which subjects were paid a piece-rate of 10 cents per widget; (c) a positively accelerating pay function in which subjects were paid a piece-rate which increased incrementally with each additional widget produced; and (d) a negatively accelerating pay function in which subjects were paid a piece-rate which decreased incrementally with each additional widget produced.
The authors report that the four experiments produced mixed results with respect to widget productivity, performance variability, and cost-per-widget. Although two consistent findings are identified: (1) the incentive pay generated higher levels of productivity than did the flat pay, and (2) the three performance-pay functions differentially affected performance levels and the cost-per-widget. The authors indicate that the negatively accelerating pay system emerged as the most reasonable option for pay system designers, even though there were less substantial improvements in performance, because it was the most cost effective option. As has been concluded by a growing number of researchers, these authors state that "it is not the size of the incentive which controls performance, but rather the fact that there was a pay-for-performance contingency in place" (p. 34).

The mixed results obtained in this study are inconsistent with the findings of Oah and Dickinson (1992). Upon close inspection of the various experimental design components and the data obtained in these experiments, it becomes apparent that the level of experimental rigor is considerably less in the Smoot and Duncan (1992) study than that found in Oah and Dickinson study. Therefore confidence placed in the accuracy of the findings of the above study would be less. Some of experimental rigor issues that may have contributed to the variability of the data obtained are as follows: (a) there were only small differences in performance across conditions for the same subjects and between subjects; (b) the experimental sessions were very short; (c) the production task may have been one that, in a short period of time, may not show a great degree of sensitivity to changing conditions; (d) there were small and uneven
(due to drop outs) numbers of subjects in the groups; (e) condition changes between many of the pairs of groups, as per the multiple baseline design, occurred only one or two sessions apart which is insufficient to show any degree of control by the independent variable; and (f) even though there were different groups receiving different treatments, no tests of significance were employed to detect differences due to the independent variable.

Satisfaction and Preference

Worker satisfaction with specific pay systems or the outcomes of particular pay systems and worker preference for particular types of pay systems have been somewhat addressed in the monetary incentives literature, albeit unsystematically. Within the research reviewed in this document, the following studies have addressed worker satisfaction and/or preference to some degree. Weinstein and Holzbach (1973): (a) implemented a satisfaction questionnaire which indicated that subjects were less “satisfied with their performance” in a differential-reward condition than in an equal-reward condition, and (b) noted that satisfaction and productivity were unrelated. Farr (1976) assessed “pay satisfaction” with various individual and group incentive pay systems using a self-report rating scale and found no differences in satisfaction levels between pay systems. Honeywell et al. (in press) conducted a post-study questionnaire that addressed “pay system satisfaction” and “pay system preferences” which resulted in subjects reporting: (a) equal satisfaction with both individual and group incentive pay systems, but (b) high performers expressing a
preference for the individual incentive system and low performers expressing a preference for the group incentive system. LaMere et al. (1996): (a) evaluated "job satisfaction" using the work and pay subscales of the Job Descriptive Index and found no significant differences in ratings of pay and work satisfaction between non-incentive and incentive conditions, and (b) pay and work satisfaction were not affected by the implementation of the incentive system. Lastly, Austin et al. (1996) implemented an anonymous questionnaire that resulted in the workers indicating that their "job satisfaction" had improved and that they "preferred" the weekly bonuses as compared to a prior profit-sharing bonus.

An overview of the above attempts to evaluate satisfaction and/or preference in the research evaluating monetary incentives indicates that, at this point: (a) the methodology is unsystematic, and (b) there is a lack of clarity with respect to the type of satisfaction or preference being evaluated. The types of satisfaction specified in the above studies include pay satisfaction, pay system satisfaction, job satisfaction, work satisfaction, and performance satisfaction. These facets of satisfaction could be equivalent, or could reflect very different attitudes. Needless to say, there needs to be a clarification in terminology as well as a determination of what type of satisfaction is relevant when comparing satisfaction for different pay systems.

Clarifying the differences between "satisfaction" and "preference" may be a good place to begin. According to the common use of these terms, satisfaction typically is used to indicate a verbally stated degree of contentment with an event, situation, item, etc., and preference typically indicates a choice that an individual
would make between alternatives. Even with different common usages these terms seem to have been applied somewhat interchangeably in the research. Further difficulty arises when subjects are asked to state a “verbal preference.” Lockhart (1979) states that a “verbal preference (i.e., a verbal response that is usually immediately consequated with something other than the preferred thing, such as social approval for the statement) is not always a valid predictor of behavioral preference” (i.e., a choice that is consequated with the thing chosen) due to the differing reinforcement contingencies under which each operates and thus “it is hardly surprising that the two methods often yield different results” (p. 21). Perhaps the “mixed” and “conflicting” results (Dickinson & Gillette, 1993; Sundby, Dickinson, & Michael, 1996) that have been obtained when worker satisfaction or preference for different types of pay systems is examined, are partially due to the above factors: (a) terminological confusion, and (b) reliance on self-reports. The remainder of this section will be devoted to a discussion of two studies that attempted to develop a way to assess worker preference using behavioral, rather than verbal-report measures.

“The success of any performance management system depends not only upon its effectiveness but also on its acceptability by workers. If incentive systems are unattractive to workers they will be hard to implement and maintain ...” (Frisch and Dickinson, 1990, p. 31). In order for incentive systems to be acceptable to workers they need to be systems that workers would choose or prefer over other alternatives. Thus worker preference for types of monetary incentive systems as well as ways to assess such preference are worthwhile areas for research. Dickinson and Gillette
(1993) state that, “Valid assessments of employee preferences and the factors that
influence them are best obtained when individuals are exposed to the alternative pay
systems” (p. 59). Unfortunately, “Research studies using behavioral choice measures
in organizational settings are difficult to conduct” (Dickinson & Gillette, 1993, p. 62).
In response to this difficulty, Oah (1989) and Sundby et al., (1996) have pursued the
development of analog simulations.

Oah, 1989 conducted a laboratory simulation to study worker preferences for
different pay systems with two purposes: (1) to evaluate the feasibility of using a
laboratory simulation to conduct research in this area, and (2) to investigate the
percentage of total pay workers preferred to earn in incentives under two different
monthly expense conditions. These monthly expense conditions were a percentage
relative to total income at either 85% or 95%. It was hypothesized that subjects would
select lower percentages of incentives in the higher monthly expense condition
because there would be less flexibility in the amount of pay that could be at risk.

A within-subject experimental design was implemented with 30
undergraduate student subjects who were divided into ten-3 person groups and were
exposed to various sequences of both conditions. Condition A consisted of the 95%
monthly expenses and condition B, the 85% monthly expenses. The sequences by
groups of subjects were as follows: AB for two groups, BA for two groups, AB-
modified for one group, AA for two groups, and ABA for three groups. Each
condition included 24 simulated months except for the ABA sequence in which each
condition was 16 simulated months in length. Subject choice of the percentage of
incentive pay to total pay for each simulated month was measured. The % incentive pay to total pay choices were 0%, 25%, 50%, 75%, and 100%. As the percentage of incentives increased, so too did the potential earnings. Therefore, the riskier the pay, the higher the potential earnings.

The simulation was in the form of a game board, in which a group of three subjects would roll a die and earn play money. Subjects were provided with a list of fixed and variable expenses that averaged either 85% or 95% of total their expected earnings, depending upon the experimental condition in effect. Each subject’s work productivity was simulated by a roll of the die where a roll of 1 equaled poor performance, rolls of 2, 3, 4, and 5 equaled average performance, and a roll of 6 equaled excellent performance. After each roll of the die, subjects were paid according to the number on the die. Four rolls of the die, i.e., one per simulated week, represented the subject’s work performances for one month. After 4 rolls of the die, subjects paid their expenses and then selected their incentive percentage for the next month. Subjects were paid for their participation with the earnings being distributed competitively. At the end of the session the subject with the highest accumulated earnings received $5.00, the subject with the second highest earnings received $3.00, and the subject with lowest earnings received no pay.

The results indicated that 18 of the 30 subjects responded consistently to the expense conditions, ten of whom responded as expected selecting lower percentages of incentive pay when their expenses were higher. The author concluded that this study suggests that it may be possible to use a simulation to examine factors that
affect worker preference for different types of pay systems. The author also noted the method of payment for participation in this study created a competitive group environment that may have influenced responding more than the expense condition. Thus, subjects may have selected higher incentive percentages in an attempt to obtain simulated earnings that were higher than the earnings of the other group members, even during the riskier 95% condition.

An overview of the pay choices made by subjects in this study reveals some interesting information about incentive pay preferences. Subjects were given opportunities to make pay system choices 1,440 times across all subjects and both conditions, 936 of these choices were in the 95% condition and 504 of these choices were in the 85% condition. Within these opportunities to select a pay system, subjects in the 95% condition selected the 0%, 25%, 50%, 75%, and 100% incentive options 5%, 29%, 35%, 22%, and 10% of the time, respectively, selecting the non-incentive pay 5% of the time and incentive pay 95% of the time. Subjects in the 85% condition selected these incentive options 5%, 13%, 42%, 30%, and 10% of the time, respectively, also selecting the non-incentive pay 5% of the time and incentive pay 95% of the time. Note the high preference for incentive pay (95% for all incentive conditions combined) as compared to non-incentive pay (5%) in both conditions. In correlating the above data with the well substantiated findings that pay with incentives results in significantly higher performance levels than pay without incentives, it is interesting to see substantiation, although not unexpected, that individuals may show a preference, through choice, for incentives.
The purpose of Sundby et al.'s (1996) study was to "extend Oah's (1989) introductory research" using a computer simulation that would prompt subjects in using a "behavioral choice procedure." The same expectation was held as in the Oah study that subjects would be more likely to select higher percentages of incentive pay when they were working under the 85% expense condition as compared to the 95% expense condition. Five key changes were implemented in the design of this study as compared to the Oah study, as follows: (1) a computerized simulation was used instead of a game board; (2) subjects participated as individuals, not groups, and payment was based on the individual's accumulated earnings to eliminate the group and competitive influences detected in Oah's study; (3) to more accurately simulate performance under incentive systems, the computer simulation created an increased probability of excellent simulated performance if the subject selected incentive pay in consecutive periods; (4) subjects had to borrow money if they did not have enough to pay monthly expenses (although this never occurred in the study); and (5) subjects selected a pay system once every 3 months instead of once a month as in the Oah study.

This study was conducted using a within-subject counterbalanced reversal design with ABAB and BABA experimental sequences. The independent variable was the percentage of monthly expenses (fixed and variable) relative to total "expected" earnings with two values, 85% which was condition A and 95% which was condition B. Each experimental condition lasted for 24 simulated months or, in other words, two simulated years. The study was completed by each subject in one 2-
hr experimental session. Ten volunteer undergraduate students served as subjects with 5 subjects being exposed to each experimental sequence. Subjects were selected using a short quiz on basic percentages and finances to determine if they had the understanding necessary to perform the simulation. Subjects were paid for their participation relative to their monetary amount remaining in the simulation at the end of the session, with the computer calculating the actual amount of pay the subject would receive. The dependent variable was the subject’s choice of the percentage of total pay that is incentive-based, which could be 0%, 25%, 50%, 75%, or 100%. As the % of incentives increased, so too did potential earnings. The computer automatically recorded the subjects’ choices.

The computer controlled all aspects of the simulation. The work performance was simulated using a random selection procedure and could be poor, average, or excellent. The probability that a specific performance level would be selected depended upon the sequences of incentive pay selected by the subject. If the subject selected incentive pay at 25% or higher for two consecutive periods, then the probability of being an excellent performer increased, if the subject selected 25% or higher for three or more consecutive periods, the probability of being an excellent performer increased to the highest level. At the beginning of the simulation and every three simulated months thereafter, subjects selected the % incentive pay they desired. Every four weeks the simulation required the subjects to pay their monthly expenses. Upon completion of the simulation, subjects completed a three-question survey to
assess their perceived understanding of the independent and dependent variables and to determine whether boredom influenced their responding.

The results of this study indicate that only three of ten subjects “demonstrated any control by the expense conditions.” Thus the independent variable did not influence the responding of the majority of the subjects who completed the simulation. More specifically, responding for one subject in the ABAB sequence and two subjects in the BABA sequence were somewhat controlled by the independent variable. Subjects in the ABAB sequence tended to start out selecting higher incentive percentages than those in the BABA sequence and the 25%, 50%, and 75% incentive percentages were selected under both 85% and 95% conditions. In the 85% condition 0% was selected the least often with 25% selected the most often and in the 95% condition 100% selected the least often and 25% selected the most often. The author states that “these findings would tend to demonstrate at least a miniscule amount of control by the expense conditions” (p. 60). Subjects’ responding on the survey indicated that: (a) they all understood the expense conditions, (b) most understood the incentive conditions, and (c) boredom influenced the responding in half of the subjects. The authors concluded that the simulation had potential given further modification.

A close look at the data on the % incentive pay choices made by the subjects is as follows. Subjects were given opportunities to make pay choices 360 times across all subjects and both conditions, 180 of these choices were in the 85% condition and 180 of these choices were in the 95% condition. Within these opportunities to select a
specific pay incentive level, subjects in the 85% condition selected the 0%, 25%, 50%, 75%, and 100% incentive options 11%, 32%, 22%, 21%, and 14% of the time, respectively, selecting the non-incentive pay 11% of the time and incentive pay 89% of the time. Subjects in the 95% condition selected these incentive options 15%, 37%, 21%, 20%, and 7% of the time, respectively, selecting the non-incentive pay 15% of the time and incentive pay 85% of the time. Combining these data for both the 85% and 95% conditions, the high preference for incentive pay is apparent, 87% for all incentive levels combined, as compared to non-incentive pay at 13%. Thus, as in the Oah study, subjects selected incentive pay much more often than non-incentive pay.

Individual Versus Group Context

Several studies have investigated the effects of monetary incentives on individual work performance in group or group versus individual settings. Three studies that are frequently referenced by researchers are Weinstein and Holzbach (1973), Farr (1976), and London and Oldham (1977). The relevance of these three studies, two of which were described in the Introduction Chapter, is briefly discussed below. Two more recent studies, Stoneman and Dickinson (1989) and Honeywell et al. (in press), have examined the impact of group size on individual performance under individual and group incentive conditions. These studies are described below in more detail. A key factor to keep in mind when interpreting these studies is the degree to which the group context creates an interdependence between individuals in the group, which can be assessed by an identification of the following variables in the
studies: (a) whether the accomplishment of the task requires independent or interdependent worker performance, and (b) whether the incentives are distributed differentially (relative to individual performance) or equally (divided equally among individuals in the group regardless of the level of individual performance).

In a laboratory study using college student subjects working together in 3-person groups, Weinstein and Holzbach (1973) investigated the effects of equally and differentially distributed group “rewards” under interdependent and independent task conditions. The effect of these variables were evaluated using a 2 X 2 between groups experimental design with 4 groups, thus each group of subjects was exposed to only one condition. In the independent task condition, individuals worked on the task independently in the group context and in the interdependent task condition, each individual in the 3-person group shared one-third of the task, thus requiring the performance of all three group members to complete one unit of the task. In all conditions, a piece-rate monetary incentive pay system (the reward) was in effect. In the equally-distributed reward condition, the monetary incentive pay was determined by the total piece-rate performance of the group and divided equally among the group members. In the differentially-distributed reward condition, the monetary incentive pay was again determined by the total piece-rate of the group but distributed differentially among group members based on individual performance with one-half going to the highest performer, one-third to the middle performer, and one-sixth to the lowest performer. The results of this study indicated that there was significantly higher performance in the independent task performance condition than the
interdependent condition and significantly higher performance in the differentially-distributed reward condition than the equally-distributed reward condition. Subjects also responded to a satisfaction questionnaire which indicated that they were less satisfied with their performance in the differential-reward condition than in the equal-reward condition. The authors also note that satisfaction and productivity were unrelated. Thus, productivity was higher, but satisfaction lower in the differentially-distributed reward condition.

In another laboratory study using college students working together in 3-person groups, Farr (1976) investigated the effects of the presence and absence of individual and group incentives on subject performance of an independent task in the context of the group setting. The effect of incentive variables were evaluated using a 2 X 2 between groups experimental design with 4 groups, thus each group of subjects was exposed to only one combination of individual and/or group incentives. In three of the conditions where one or both of the incentive conditions were in effect, a piece-rate monetary incentive pay system was implemented based on individual or group performance. In the one condition where neither incentive condition was in effect, a flat rate was paid. In the individual plus group incentives condition, total incentives were based on the performance of the group but were differentially-distributed to group members in the same manner as in the Weinstein and Holzbach (1973) study above, in which one-half, one-third, and one-sixth of the total incentives were distributed to the high, middle, and low performers, respectively. In the group incentives only condition, the total incentives were again based on the performance of
the group but were divided equally among the members of the group. In the individual incentives only condition, each individual group member, still working within the group context, earned individual piece-rate pay. In the condition where neither the group nor individual incentives were in effect, group members earned an hourly or flat rate of pay for their performance. All incentive conditions resulted in higher performance than the no incentives, or hourly pay condition. The highest performance was noted in the condition in which both individual and group incentives were in effect but this pay system was perceived as least fair by the subjects. Pay satisfaction was also evaluated and no differences were noted between any of the pay conditions.

In a third laboratory study using college students working together in 2-person non-interacting groups, London and Oldham (1977) compared the effects of three group incentive, one individual incentive (piece-rate), and one individual fixed-rate pay conditions using a between-groups experimental design. Subjects performed an independent task in this study in the context of being linked with a partner with whom they did not interact. In all incentive conditions a piece-rate was in effect based on group or individual performance. The three group incentive conditions were, pay based on the performance of the: (1) highest performer, (2) lowest performer, and (3) group average. Subject performance was significantly higher under the group highest performer piece-rate and the individual piece-rate than all other pay conditions.

The results of these three studies indicate that incentives earned for performing independent tasks, whether earned (a) based upon individual performance
alone or within the context of the group, or (b) based on the average performance of
the group, result in significantly higher performance than non-incentive pay. Such
incentives for independent tasks, yet based on the total group performance, tend to
result in higher performance levels when the incentives are distributed differentially
as related to the group member's individual contribution, as compared to being
distributed equally among the members of the group. Yet, this form of incentive
distribution is perceived as the least fair. It is also noted that incentives resulted in
higher performances with independent tasks than interdependent tasks.

The differential effects of incentives in individual versus group contexts as
well as under independent and interdependent task conditions is an area in need of
additional research. This may be especially important from an applied perspective due
to the current prevalence of team-based work settings in organizational environments.
These interdependent group contexts are still composed of individuals whose work
performance needs to be motivated. In a theoretical and literature review paper by
Shea and Guzzo (1987) focusing on "groups as human resources," the authors refer to
two bodies of research that may provide useful information when ascertaining the
effects of incentives on the performance of workers in group contexts: (a) the
"distributive justice" literature, and (b) the "cooperation versus competition"
literature. Shea and Guzzo indicate that this literature appears to indicate that: (a)
competitive (differentially-distributed) rewards will result in higher performance
when work tasks are independent, (b) equally distributed rewards will result in higher
performance when work tasks are interdependent, and (c) competitive rewards will
result in poor performance when work tasks are interdependent. They posit that competitive rewards provided for interdependent tasks result in lower performance because of the occurrence of “blocking” behaviors and the lack of occurrence of “facilitating” behaviors (which are necessary for successful performance in the interdependent task situation) on the part of the workers. As applied work environments become more dependent upon groups performing interdependent tasks, it may not be possible to identify and measure discrete individual performance levels, and thus may not be possible to distribute incentives differentially. A recent case study published in the applied behavioral literature, Austin et al. (1996), addresses exactly these issues in using monetary incentives to improve the interdependent task of removing old roofs by a roofing crew. This study was described in detail in the Percentage of Incentives subsection above. Consistent with the recommendations of Shea and Guzzo, rewards were distributed equally, and both performance and satisfaction appeared to improve.

More currently, two studies have carefully investigated the impact of a specific parameter of the group context variable i.e., group size, on the effects of monetary incentives on worker performance. In the first study, Stoneman and Dickinson (1989) examined the impact of group size on individual performance under both individual and group incentive conditions. A combined within-subject, between-groups design was used. The within-subject component used an ABA sequence in which condition A was the individual incentive (base pay plus individual piece-rate) condition and condition B was the group incentive (base pay plus group average
piece-rate, equally distributed) condition. The between-groups component compared
the variable of group size. Each experimental group consisted of subjects working in a
small, medium, or large sized group. To equate the numbers of subjects per
experimental groups, the small condition consisted of five groups of two persons
each, the medium condition consisted of one group of four and one group of five
subjects, and the large condition consisted of one group of nine subjects. Twenty-
eight college student subjects were randomly assigned to these experimental
conditions. Subjects performed an independent work task which consisted of
producing widgets from nuts, bolts, and washers (the same widget as discussed in the
Method Chapter above). Subjects were paid a base salary of $1.50 and a per piece
incentive rate, group or individual (depending upon the condition), of 2 cents per
widget for each widget produced above 58. Experimental sessions were held three
days per week and lasted 45 mins each.

The results indicated that individual performance was not significantly
different under either the individual or group incentive conditions and did not differ
as a function of group size under either incentive condition. Some differences based
upon group size were noted by the authors as follows: (a) there appeared to be a
relationship between the range of performance differences between subjects and
group size, i.e., subjects in the groups of two had the greatest performance differences
and these performance differences decreased substantially as group size increased; (b)
there appeared to be no significant low or high performers in the largest group; and
(c) increasing performance trends were observed in three of the small 2-person
groups. The authors discuss an expectation of the impact of the group parameter that proved to be unfounded as follows:

As the group size increases, the link between an individual's performance and pay decreases. Because pay becomes less dependent on individual performance (when pay based on the collective group performance of subjects performing independent tasks, is equally distributed), one might expect performance to decrease under group incentives in comparison to individual incentives, and also expect the size of the decrease to be inversely related to the size of the group. These expectations were not confirmed in the present study ... (p. 147).

The authors conclude that, "The results of this study suggest that group incentives based on groups of under ten members may be as effective as individual incentives in promoting employee productivity" (p. 146).

In the second study, Honeywell et al. (in press) partially replicated the Stoneman and Dickinson (1989) research by investigating the impact of group size on individual performance under both individual and group incentive conditions. Twenty undergraduate students divided into two 10-person groups served as subjects, with two subjects dropping out half-way through the study, leaving one 8-person group and one 10-person group. A within-subject alternating treatments design was used to evaluate the effects of the two incentive conditions. These conditions alternated each session within each group of subjects. Subjects participated in experimental sessions for four hours a day for two consecutive days, for a total of 14 sessions. Each session lasted 20-min with a 10-min break between each session. Subjects performed an independent task in which they sorted cards punched with varying patterns of holes onto boards with corresponding wooden dowels. The number of cards sorted per
session was measured. Subjects were paid a base salary of $1.00 per session for sorting a minimum of 300 cards and a per piece incentive rate of one-half cent per card for each card sorted above 400. In the group incentive condition the incentives were based on the group performance average with incentives being equally distributed to group members. Subjects received feedback on individual and group performance levels, as well as their amount of money earned after each session, but were not paid until they completed all sessions. Subjects were also given a $10 bonus for completing the study. Upon completion of all sessions, subjects completed a post-study satisfaction and stress level questionnaire.

A statistical analysis of the card sorting data indicated no significant differences between the individual and group incentive conditions for either the eight or ten person group. Interestingly, the author observed that “although high performers earned less money under group incentives, they did not lower their performance accordingly, nor did low performers increase their performance as a result of increased earnings or group contingencies” (p. abstract). With the post-study questionnaire subjects reported equal satisfaction with the two pay systems.

When asked about preference, the high performing subjects chose the individual incentive system while the low performing subjects chose the group incentive system. The authors conclude that the:

Results suggest that although the relationship between performance and pay is stronger with individual incentives than with group incentives, small group incentives may maintain performance equally well. Nonetheless, high performers may prefer to work under individual incentive systems in which their pay is directly related to their performance (p. abstract).
The above two studies, investigating the impact of the parameter of group size on the performance of workers earning incentives, indicate that when subjects are performing an independent task in the context of a group work situation, both individual incentives and group-equal-distribution incentives may control performance equally well. These studies also indicate that group sizes of ten or less, will not affect performance differentially. Pay system satisfaction seems to be equal under all these variables. Pay system preference appears to vary in relation to the conditions that will enable the performers to maximize their earnings, i.e., high performers will probably prefer individual incentives whereas, low performers will probably prefer incentives that are equally distributed among group members.

Summary

The results of recent research continues to support prior findings in demonstrating that pay with incentives results in significantly higher levels of worker performance than pay with no incentives. Further, investigation into incentive variables appears to indicate that different parameters of these variables, i.e., percent of incentive, performance-pay function, individual versus group incentives, whether in laboratory or applied work settings, do not result in differential effectiveness of the performance-pay contingency. These findings continue to support the position that it is the contingency in which pay is directly linked with performance that is the significant variable.
Due to the highly variable nature of designed monetary incentive contingencies across various research settings, it is difficult to draw direct comparisons from study to study. There are some general formats, if adopted by all researchers, that would enable more effective comparisons of incentive studies. The "% of incentive to base pay" and the "% of incentive to total pay" are two such possibilities. Also, reporting dollar values for base pay, per unit incentive pay, total dollars earned, etc., as per hours worked would be beneficial. If studies consistently reported these types of descriptive factors about the monetary incentive system implemented, a meta-analysis of the research would soon be possible which would be valuable in drawing conclusions to monetary incentive research questions.

As briefly addressed in the Individual Versus Group Context section above, another area for future research is the effectiveness of monetary incentive systems in team-based work environments where workers are performing interdependent tasks in group contexts. Due to the nature of interdependent work, the difficulty in obtaining individual performance measures in relation to such work, the complications of determining appropriate incentive distributions for collective work performance, and the current growing prevalence of such types of work settings in organizations; the knowledge of effective monetary incentive strategies to fit this context, may soon be in high demand.

The research described in this dissertation has shown that for relatively small amounts of money, organizations can reap the benefits from worker performance improvements that can result in big savings and profits. The concept is simple and the
evidence of effectiveness is available, but the real effectiveness of applications of monetary incentive systems in work organizations lies in the appropriate design and implementation as related to the specific organizational context. A number of design questions that future research can help to clarify, as summarized by Dickinson and Gillette (1993), Frisch and Dickinson (1990), and Oah and Dickinson (1992) are as follows:

1. What is the appropriate proportion of incentives to base or total pay?
2. What is the minimum dollar amount of incentives necessary to affect performance improvement and to be preferred by the worker?
3. With what frequency should incentives be provided?
4. How should lack of worker control over work related variables be integrated into the monetary incentive system?
5. How should measures and standards of performance be developed in relation to the monetary incentive system?
6. What proportion of the organization's savings and profits, due to increased worker performance under monetary incentives, should be returned to the workers through the incentive system?
7. To what extent should employees be involved in the development of a monetary incentive system and what preferences or options should employees be given?

Some more specific questions to be addressed in the design of base and incentive pay components of a monetary incentive system are as follows:
1. For base pay: How much guaranteed pay is necessary to attract someone to the job? How much guaranteed pay does the worker need to stay in the job? How much guaranteed pay is demanded by unions or other influential entities?

2. For incentive pay: What % incentive is attractive to workers and considered fair? What % are the workers comfortable with? How much money, with what range and flexibility, does the organization have to allocate to incentives? What are the incentive preferences specified by unions? What should be the return on investment for implementing monetary incentives? (The greater the return, the more money that should be available to use for incentives.)

Monetary incentive system design issues that are currently well substantiated include the following:

1. Monetary incentive systems can be effective with relatively low percentages of incentives to base or total pay.

2. If the potential exists that the dollar value per unit of monetary incentives will need to change, it will be more behaviorally expedient to attach a lower dollar value to the incentive when it is first implemented and then increase it as necessary, as opposed to attaching a higher dollar value first and then decreasing it. Such a decrease will likely result in decreased, i.e., de-motivated, worker performance.

3. Feedback on daily performance is a necessary and integral part of effective monetary incentive systems because it enables the linkage between daily
work performance and the monetary incentives that are usually received at a later
date.

4. Allowing for worker participation in system design and offering
preferences in system options may increase acceptance of monetary incentive systems
by workers.

Regardless of the remaining questions, with this growing body of knowledge
monetary incentive systems are becoming a proven strategy for motivating the
workforce and thereby improving productivity in organizations.
Appendix A

Informed Consent Form
Dear

This research project will examine how payment systems affect worker productivity. You will be asked to attend approximately ten sessions, each of which will last 45 minutes.

The study will be conducted in Wood Hall, Room 272A. Sessions will be scheduled at times that are convenient for you. During each session you will be asked to assemble parts made from bolts, nuts and washers. The amount of money you will receive per session will depend upon your performance, although you can expect to earn between $2.00 and $4.00 per session. You will be paid immediately following each session.

Your participation in this study is voluntary. If at any time you decide that you no longer wish to participate, you may withdraw from the study. In addition, your performance data will remain confidential. If the results of this study are presented publicly, your performance data will be identified by number, not by your name. Finally, your participation will not affect the grade you receive in any course.

If you would like to participate in this research study, please sign the attached consent form and give it to the experimenter. If you have any questions, or need clarification on any item discussed in this letter please ask the experimenter or call me at 344-7914

Sincerely,

Alyce M. Dickinson, Ph.D.
Assistant Professor
INFORMED CONSENT FORM
THE EFFECTS OF PAYMENT SYSTEMS ON WORKER PRODUCTIVITY

I would like to participate in the research project being conducted by Dr. Alyce M. Dickinson that will examine the effects of payment systems on worker productivity. I understand that: (1) my participation is voluntary and that I may withdraw at any time; (2) my performance data will remain confidential; and (3) my participation will not affect my grade in any course.

Date: ____________________

Name (please print your complete name): ________________________________

Signature: ___________________________________________________________
Appendix B

Human Subjects Institutional Review Board Approval
October 14, 1996

To Whom It May Concern:

The research protocol for this study was approved by Western Michigan University's Human Subjects Institutional Review Board (HSIRB) prior to conduct, however, substantiating verification could not be located by either the author or the HSIRB due to the length of time that has elapsed, although all informed consent forms have been retained.

Richard Wright, the current Chair of the HSIRB, indicated that this letter was an acceptable substitute for the letter of approval, given the circumstances.

Sincerely,

Alyce M. Dickinson, Ph.D.
Associate Professor and Committee Chair
Appendix C

Widget Diagram
Widget Parts

- red band
- black band
- red band
Widget

red band
black band
red band
Appendix D

Subject Packet
### DATA WORKSHEET

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Widget Payment Schedule

To earn your base pay, you must assemble at least 50 "good" widgets. For each additional good widget that you assemble, you will receive $0.021, or in other words, a little more than 2 cents. The following chart indicates how much total pay you will earn for assembling the widgets.

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Signature
Data Form

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Appendix E

Incentive Schedules
You will be paid a wage of $4.00 per session. To earn your pay, you must assemble at least 50 "good" widgets.
To earn your base pay, you must assemble at least 50 “good” widgets. For each additional good widget that you assemble, you will receive $0.005, or in other words, 1/2 of a cent. The following chart indicates how much total pay you will earn for assembling the widgets.

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To earn your base pay, you must assemble at least 50 “good” widgets. For each additional good widget that you assemble, you will receive $0.013, or in other words, a little more than 1 cent. The following chart indicates how much total pay you will earn for assembling the widgets.

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Widget Payment Schedule

To earn your base pay, you must assemble at least 50 “good” widgets. For each additional good widget that you assemble, you will receive $0.021, or in other words, a little more than 2 cents. The following chart indicates how much total pay you will earn for assembling the widgets.

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# Widget Payment Schedule

To earn your base pay, you must assemble at least 50 "good" widgets. For each additional good widget that you assemble, you will receive $0.029, or in other words, almost 3 cents. The following chart indicates how much total pay you will earn for assembling the widgets.

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Appendix F

Job Aids for Experimental Procedures
JOB AID

FOR

RECRUITING SUBJECTS IN A CLASS

1. Contact the class instructor ahead of time and if the instructor is willing to allow you to recruit subjects from his/her class, set a day and time to meet with the class to recruit subjects. Tell the instructor:
   
a. What this project is about.

b. It will take about 5 minutes to describe the project to the class and state that you are here to recruit subjects to participate.

c. It will take another 5 to 10 minutes to pass the recruiting sign-up sheets around the class (this depends upon how large the class is).

2. Assuming that the instructor will allow you to recruit in his/her class:
   
a. obtain a handful of "Subject Recruiting Forms" from the file cabinet in the OBM Lab,

b. arrive at the class a few minutes ahead of schedule, and

c. remind the instructor why you are here.

3. When its time to talk to the class:
   
   - take a deep breath,
   - look directly at all the students in the class,
   - smile,
   - greet the class,
   - introduce yourself,
   - identify yourself,
   - explain who you are in relation to the project, and
   - explain why you are here.
4. Also, explain the project at a brief level of detail (tell the students enough so that they know what they would be getting into, without giving away the "secrets" of the project), such as:
   a. This is a psychology experiment studying the relationship between pay and work performance.
   b. You will be asked to do a production task for 45 minute sessions - producing widgets (you may want to explain what a widget is and how it is produced).
   c. You will be paid between $2.00 and $4.00 per session in cash at the end of each session.
   d. We will need you for 15 sessions.
   e. We need you for a minimum of 3 sessions per week (maximum of 5 or 6 sessions per week depending upon whether we have experimenters on Saturday).
   f. We must be able to finish your 15 sessions before finals week at the end of the semester.

5. Ask the students if they have any questions and respond.

6. Tell the class that you will pass around a sign-up form for them to sign on if they are interested in being a subject. Read through and explain the "Subject Recruiting Form" instructions so that the students understand what information to put down on this form.

7. Pass the form around the classroom to collect the names of the interested students. If you pass out one sign-up form per row in the class, then collect all sheets as each row finishes, the process will go much faster.

8. Thank the instructor for allowing you to recruit in his/her class.
This research study will involve a simulated work task and the effects of payment systems will be studied. If you participate, you will be paid approximately $2.00 to $4.00 per session. A session will last about one hour and you will need to be available for approximately 15 sessions. The days and times for your participation will be scheduled at your convenience.

If you would like to participate in this study, please write the following information below: name, phone number, days available, and times available.

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RESEARCH ASSISTANT

JOB AID

FOR

SCHEDULING A NEW SUBJECT BY TELEPHONE

1. Telephone the prospective subject.

2. Orient the caller to your purpose in calling:
   a. Introduce yourself and identify who you are in relation to the project.
   b. Remind the subject of his/her original contact with the possibility of being a subject (e.g., he/she signed a recruiting sheet in class, someone gave you his/her name, etc.).

3. Get a commitment of interest from the prospective subject before you continue (e.g., ask the subject if he/she is still interested in being a subject in this project).

4. If the subject is still interested, explain the project at a brief level of detail (tell the subject enough so that he/she knows what he/she is getting into), such as:
   a. This is a psychology experiment studying the relationship between pay and work performance.
   b. You will be asked to do a production task for 45 minute sessions - producing widgets (you may want to explain what a widget is and how it is produced).
   c. You will be paid between $2.00 and $4.00 per session in cash at the end of each session.
   d. We will need you for 15 sessions.
e. We need you for a minimum of 3 sessions per week (maximum of 5 or 6 sessions per week depending upon whether we have experimenters on Saturday).

f. We must be able to finish your 15 sessions before finals week at the end of the semester.

5. If the prospective subject is still interested at this point, set the days and time(s) that the subject can meet with a scheduled experimenter. (You will need your copy of the Master Schedule in order to do this.)

6. Set the start date for the first session.

7. Tell the new subject:
   a. Who will be his/her experimenter(s) throughout the project.
   b. Who will be his/her experimenter for the first session.
   c. Where he/she is to come to, e.g.:
      - Wood Hall, Room 272A
      - Experimental Analysis of Behavior Laboratory
      - Wood Hall, 2nd floor, back hallway
      - etc.
   d. To wait outside the Laboratory when he/she arrives and the experimenter will meet him/her.
   e. To call the Laboratory ahead of time if he/she needs to miss a session - phone number is 387-4490.

Note: If this subject has sessions scheduled on Saturday, also tell him/her:

- the outside doors will be locked,
- come to the door by the parking lot, east of the greenhouse (by the 151 classroom),
- the experimenter will meet you there to let you in.

8. Ask the subject if he/she has any questions and respond.
9. Restate the subject's schedule and start date and time before you close the call.

Note: If you notice any hesitancy, uneasiness, unsurity, etc. in the prospective subject, question him/her about the extent of their interest in being a subject. Do not persuade the individual to do something that they really are not interested in doing. Such people usually do not show up or they may come for the first session or two and then just not show up any more. This is a big waste of our time and money, so we need to be as sure as possible that the people we schedule as subjects have some commitment, and hopefully some personal interest, in participating in the full complement of sessions needed.
RESEARCH ASSISTANT

JOB AID

FOR

PREPARATION FOR A NEWLY SCHEDULED SUBJECT

Following the scheduling of the day(s), time(s), experimenter, experimental room #, and start date for a new subject, the Research Assistant must do the following tasks to prepare for the experimenter's first day with the subject:

Hint: Do these tasks as soon after the scheduling phone conversation with the subject as possible. It is absolutely necessary that these things are completed before the subject's start date so that the experimenter has all the necessary materials available and ready and so everything will go smoothly during the first session.

Remember: Support your experimenter's to help them to do their job well and they will support you.

1. Enter the scheduling information on your own schedule so that you have this information available to you at all times.

2. Update all experimenters' schedules who will be running this subject.

3. Start a "Subject Accountability" sheet for the new subject (i.e., write the subject's name and number on top of the sheet).

4. Leave a copy of the updated Experimenter/Subject schedule for the experimenter, preferably, several days before the subject's start date.

5. Prepare all the subject materials for the experimenter and place these materials in their appropriate subject folder in the file cabinet. Attach to these materials, a yellow Post-it with the new subject's name written on it. These materials include:
a) "Experimenter Instructions and Script for First Session" with appropriate last page attached which is determined by the subject's assigned experimental group.

b) "Consent Form"

c) Subject packet which consists of the following pages stapled together:

   Graph
   "Data Worksheet"
   "Widget Payment Schedule" (for the subject's assigned experimental group)
   "Receipt Form"

d) "Data Form" - enter the Subject's name on the form

6. Update the large "Master Schedule" posted on the OBM Lab wall, as follows:

   a. Enter the experimenter/subject information on the Master Schedule only the night before the start date for the new subject - this means not before this time and not after this time - or else you will cause a lot of confusion for your experimenters.

   b. Select the appropriate name and color coded squares for the experimenter. Write the subject's name and number on the squares. Post the squares at the correct day, time and experimental room # on the Master Schedule.

7. Contact the Experimenter to notify in advance about this new subject and that a new schedule has been prepared for them of which a copy is available.

8. Follow-up by checking to see if everything went as planned after the scheduled time for the subject's first session (i.e., ask the experimenter, check the available documentation, look for relevant "No Show" notes, etc.).
**EXPERIMENTER/SUBJECT SCHEDULE**

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<th>Subj #</th>
<th>Subj Name</th>
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<th>Days Scheduled</th>
<th>Time Scheduled</th>
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**Other Exp'ters for this Subject:**

**Other Information:**

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**Other Exp'ters for this Subject:**

**Other Information:**
"NO SHOW NOTE"

Date:
Exp'ter Name:
Subject #:
Subject Name:
Session # Missed:
Was Subject Contacted?: YES NO
If YES, what was the outcome?

Signed:
EXPERIMENTER

JOB AID

FOR

FIRST SESSION

If this is the subject’s very first session, do the following items before the session as well as the numbered items in the section labeled "Before the Session":

Meet the subject and immediately go into the designated experimental room for that subject.

Have the subject read and sign the "Consent Form".

** Turn on the tape recorder.

Follow the instructions in the "Experimenter Instructions and Script" and read the script to the subject. (Remember to obtain a container of the five good and bad widget examples to use with the script. Check these widget examples to make sure that they are correct.)

** Turn off the tape recorder after you have completed the instructions and script and are ready to leave the subject alone to start widget production.

** Remove the tape from the tape recorder before you leave the room and take the tape with you. The subject must not have an opportunity to listen to this tape.
KEY:

(Experimenter instructions are bolded and in parenthesis.)

Script that is to be read by the experimenter to the subject is in plain text with points of emphasis in bold and sometimes in CAPITAL LETTERS.

(Experimenter:

1) Meet the subject and immediately go into the subject's assigned experimental room. Conduct all of the following activities in the experimental room.

2) Before you read the following Script to the subject, have the subject read and sign the "Consent Form". The subject is to keep the first page and to return the second page to you. When you and the subject have finished this first session, place the signed second page in the file labeled "Signed Consent Forms" in the second drawer of the file cabinet. No one can participate as a subject in this research project unless he/she has signed this consent form.)

----------------------------------------

PROJECT AND SESSION DESCRIPTION

The purpose of this research project is to study the effects of payment systems.
During each session I will ask you to assemble widgets. This is a widget.
(Experiment: Show the subject an assembled widget.)

The sessions will be timed and will last for 45 minutes. I will tell you when to start and at the end of 45 minutes I will tell you to stop.

I will then count the number of good widgets that you assembled and I will pay you for this work.

At this time, I will also record on a graph, the number of good widgets that you assembled. You may look at this graph at any time before and/or after each session. Attached to this graph will be a "Widget Payment Schedule" that will let you know how much you will be paid for the number of good widgets that you produce. You may also look at this payment schedule at any time before and/or after each session. A receipt form will also be attached to this graph which you will be asked to sign each time that I pay you. At the end of this study, this form will go to the Accounting Office at WMU for purposes of our accounting for our use of research funds.

If, during the session, you wish to take a break, there are magazines available. You can go to the restroom at any time or just leave your work station to take a break whenever you want to. Smoking is only allowed in the entry way of Wood Hall. You can also turn on the radio if you wish.

THE WIDGET

A correctly assembled widget is made with these parts that are assembled on a bolt and are put together in this order (Experiment: Show the subject the disassembled parts 1 through 7 and the bolt. Then assemble the widget while showing the order of the parts):

1) nut
2) red washer (has a red painted stripe)
3) black washer (has a black painted stripe)
4) red washer (has a red painted stripe)
5) nut
6) blank washer (has no painted stripe)
7) nut
As I stated earlier, I will be counting and paying you only for "GOOD" widgets that you assembled. GOOD means that the widget that you assemble must have the following characteristics:

1) All pieces must be assembled in the correct order.
2) The three painted washers (red, black, red) must all be lined up on one side of the painted band. Notice that the painted hands often have different widths but it is still possible to line them up on one side.
3) The whole widget must be screwed together tightly. There must absolutely be NO LOOSENESS - in other words, NOTHING should jiggle.

Each widget that you assemble MUST meet these criteria in order for it to be counted and thus in order for you to be paid for its assembly.

Here are some examples of widgets that have already been assembled. Notice that some of these widgets are good and some of them are bad.

(Experimenter: You will have five widgets each of which have the characteristics identified in the following script. The widgets are numbered 1 through 5 to correspond to the descriptions below):

1) This is a good widget - notice how it is tightly assembled and the painted bands are lined up on one side.
2) This is a bad widget - notice how loose it is and because it is so loose, the washers move around and thus it is not possible for the painted bands to stay lined up.
3) This is another good widget - Can you tell me why this is a good widget?
4) This is a bad widget - notice that it is tight but the painted bands are not lined up on one side.
5) This is another bad widget - notice that the bands are lined up and at first glance it seems tight but if I touch the blank washer, it moves (or jiggles), and thus it is loose.

Before we start, I would like you to assemble 5 widgets. I will then look at them and tell you if they qualify as good or bad widgets. (Experimenter: Wait for the subject to complete the five widgets. Take a close look at each widget for quality. When you are telling the subject about the quality of his/her widgets, point out specifically the characteristics that qualify each widget as good or bad - as you did above with the examples.)
GETTING THE FIRST SESSION STARTED

We are now ready to get you started with assembling the widgets.

If you have any problems or questions I will be right outside this room. When the 45 minutes are up, I will come in to stop you and then count your good widgets and pay you.

You will be paid a base wage of $____ per session for a minimum of assembling 50 widgets during the session. In other words, you **must produce at least 50 widgets** during the session in order to earn **any** pay. For each widget produced above the 50 widgets, you will earn $0.0____ per widget, or in other words, a little more than ____cents per widget. So the more GOOD widgets you assemble during the session, the more money you will make. **Remember:** You **must** assemble a **minimum of 50 widgets** per session to earn **any pay** at all.

Do you have any questions before you get started?

(Experimenter: Leave a model widget with the Subject if there is not one displayed in the experimental room. Remember **not** to include this model in your count of the Subject's widgets at the end of the session.)

You can go ahead and get started.

(Experimenter: Look at your watch for the start time. Leave the experimental room that the subject is in and shut the door. Write down the start time and calculate and write down the stop time, all on the "Data Worksheet", so that you don't forget.)
EXPERIMENTER

JOB AID

FOR

BEFORE THE SESSION

1. Check the supply of widget parts in each experimental room that you will use and replenish the supply as necessary.

2. Obtain your own cash box. Check to see if you have sufficient funds.

3. Obtain the subject packet(s) for the subjects you are going to run.

   (If you obtain more than one subject packet, put the packets in a folder and keep them in the folder at all times except when recording a subject's data at the end of the session - and then only have that one subject's packet outside of the folder.)

   **Note: If this is going to be the subject's last session (session #15), obtain a "Subject Debriefing Form" which you will have the subject complete after the session.

4. Obtain your cassette tape to place in the tape recorder for "After the Session". (and for "Before the Session" if this is the subject's first session).

5. Obtain an empty widget container. Make sure that a towel is in the bottom of the container to prevent the widgets from rolling around during transport.

6. Go to the Experimental Analysis of Behavior Laboratory (where the Experimental Rooms are located) a few minutes before your subjects scheduled start time.

7. Meet your subject and take him/her to his/her assigned experimental room.

   (Make sure that you take the subject to his/her assigned experimental room or else we will have schedule conflicts with other subjects and experimenters.)
8. Remind the subject of his/her pay schedule. Ask your subject if he/she would like to see his/her "Widget Payment Schedule" before he/she gets started.

9. Do not conduct any other conversation about this research project with the subject. (Please feel free to talk about anything else.)

10. Start the subject.

11. Note the subject's start time.
**Note: If your subject does not show up for their scheduled session, telephone him/her at their scheduled start time to notify that he/she is missing a session. Remind the subject of the day and time of his/her next session. (Your subjects' phone numbers are on your "Experimenter/Subject Schedule"). If you do not reach your subject at the session time, try again later. Also leave a "No Show" note for the Research Assistant indicating the Subject#, day and time of session missed.

1. Write the subject's "Time Started" on the "Data Worksheet".
2. Calculate the "Stop Time" and write it on the "Data Worksheet".
3. Also fill in "Date" and "Experimenter" on the "Data Worksheet".
4. If your subject schedule allows you some free time during the session, conduct one or more reliability count(s) on widgets from previous sessions:

   Obtain a widget container from the "Widgets for Reliability" area.

   Obtain your reliability data sheet from the second drawer of the file cabinet (titled, "Interobserver Agreement Form").

   Make sure that the widget container that you choose has a yellow "Post-it" attached to it with the Subject # and Session # written on it. Copy these numbers into the appropriate spaces on your reliability data sheet as well as entering the date.

   Count the numbers of good, total and loose widgets in the container and enter your counts on your reliability data sheet.
Sort out the widgets that have badly painted washers and place these widgets in the "Bad Widget Bucket" for repainting.

Put away your reliability data sheet and place the widgets in a container in the "Widgets for Disassembly" area.

5. If your subject schedule allows you more free time during the session, repaint some red or black washers from the "Bad Widget Parts" container located in the "Widget Washers for Repainting" area.

6. If your subject schedule allows you even more free time during the session, disassemble some widgets from previous sessions:

   Obtain a widget container from the "Widgets to be Disassembled" area.

   Have a great time disassembling!

   Sort the disassembled parts and place them in their appropriate individual containers.

   OR

   Obtain the "Bad Widget Bucket" from the "Widget Washers for Repainting" area.

   Disassemble the bad widgets.

   Carefully sort through the painted washers from these widgets and place any badly painted washers in the "Bad Widget Parts" container in the "Widget Washers for Repainting" area.

   Place the rest of the widget parts in their separate containers in the "Widgets for Disassembly" area.

7. Keep an eye on your calculated stop time for the subject and stop your subject on time. If you happen to forget to stop the subject on time, make sure you note it on the "Data Worksheet" and in the "Comments" section of the "Data Form". This will enable us to make the necessary adjustments in the data.
EXPERIMENTER

JOB AID

FOR

AFTER THE SESSION

1. Stop the subject at the calculated stop time. For example, say, "The time is up." or "It's time to stop."

2. Immediately thereafter, before you or the subject says anything else, place your tape in the tape recorder and turn the "Record" function on. (Make sure the switch on the microphone is on the "On" position or else the tape recorder will not work.) Then state and record the following information:

   "Experimenter is ______(your name)______"
   "Subject number is ____________
   "Session number is ____________

3. Count the widgets that the subject assembled, checking each widget for quality.

4. Show/tell the subject why each bad widget is bad.

5. **BE CAREFUL** to only discuss the quality of the widgets. Do **NOT** praise the subject for good work nor criticize for poor work. Try to keep your conversation with the subject as neutral as possible. (This is to prevent confounding our independent variable.)

6. Record the number of "Good Widgets" and "Bad Widgets" on the "Data Worksheet".

7. Chart the number of **good widgets** produced on the graph. Show this graph to the subject. (The subject may also see any of the other pages attached to the graph.)

8. Look at the payment schedule to determine the amount of pay that the subject earned.
9. Pay the subject this amount from your $ box.

10. Have the subject sign the receipt for payment (attached to the graph).

11. Remind the subject about when his/her next session is and ask if he/she plans to attend.

**Note: If this is the subject's last session (session #15), have the subject read and complete (as desired by the subject) the "Subject Debriefing Form".

12. Tell the subject that you are done and that he/she may leave.

After the subject leaves, do the following:

13. Turn off the tape recorder and remove your tape. (Do not rewind the tape.)

14. Complete the "$\$\$ Accountability" sheet in your cash box with the pertinent information for that subject and session.

15. Carefully place the widgets in a container, cover the container, and write the Subject# and Session# on a "Post-it" and adhere it to the container lid.

16. Replenish the widget parts supply in the experimental room that your subject used. (This will be a great help to the next experimenter who needs to use this room.)

17. Put your cash box away in Alyce's office in the middle or bottom drawer of the left hand side of the desk.

18. Carefully carry this container to the OBM lab and place it in the counter area labeled "Widgets for Reliability".

19. Obtain the "Data Form" for your subject and transfer your data from your "Data Worksheet" to this form and write any pertinent comments on the back of the form.

(Comments should include anything that you think is important or interesting in relation to the subject such as, a comment by the subject about the experiment, OR they should...
include any unusual or unplanned happening that may have occurred that could influence the experimental results, OR anything you would like to say.)

20. File your subject's packet and data form in its designated folder in the second drawer of the file cabinet.

21. Put your cassette tape away in the second drawer of the file cabinet.

22. Leave a "No Show" note for the Research Assistant for any subject who missed a session - include the subject's *, day and time of session missed.
1. Obtain a widget container from the "Widgets for Reliability" area on the counter in the OBM lab.

2. Obtain your reliability data sheet from the "Reliability" file folder in the second drawer of the file cabinet (the data sheet is titled, "Interobserver Agreement Form").

3. Make sure that the widget container that you choose has a yellow "Post-it" attached to it with the Subject # and Session # written on it. Copy these numbers into the appropriate spaces on your reliability data sheet as well as entering the date.

4. Count the number of good widgets and total widgets in the container and enter your counts on your reliability data sheet.

5. Do NOT complete the "Original Observer" nor "% Agreement" columns. (Alyce will take care of this information.)

6. Place your reliability data sheet back in the "Reliability" folder in the second drawer of the file cabinet.

7. Place the widgets back in the container and place the container in the "Widgets for Disassembly" area of the counter in the OBM lab.
Interobserver Agreement Form

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JOB AID
FOR
DISASSEMBLING WIDGETS

1. Obtain a blue widget container (that contains assembled widgets) from the "Widgets for Disassembly" area on the counter of the OBM lab. Do NOT take a widget container from any other area in the lab.

2. Disassemble each widget in the container. There are drills available to help you with this task in the bottom drawer of the file cabinet.

3. When you have finished, stack the empty blue widget container in the area labeled "Empty Widget Containers".

4. As you disassemble the widgets, sort the widget parts into separate plastic containers. (There are shallow clear plastic containers available for this purpose.) Use one container for nuts, one container for bolts, one container for red washers, one container for black washers, and one container for plain washers.

5. When you have completed disassembling widgets, take the containers of separated widget parts to Experimental Room #2 in Room 272A (the Experimental Analysis of Behavior Laboratory) and dump the widget parts in their respective larger containers that are stored in Room #2. Make sure that there is NOT a subject working in this room before you go in.

6. Return the widget part containers to the "Widgets for Disassembly" area on the counter of the OBM lab.

7. If you used the drill, return the drill to the bottom drawer of the file cabinet.

Thank for your help!
Reprint the bad widget washers. During repainting, do the following:

1. Paint a band on the edge of the washer.

2. Repaint red washers only with red paint and black washers only with black paint.

3. Make sure to cover all splotches and tails that may exist on the edge of the washer.

4. Make sure that the band you are painting on the washer has very straight edges.

5. Place the newly painted washer on a paper towel to dry.

6. When the newly painted washers are dry, add them to their container(s) for red and/or black washers in the "Widgets for Disassembly" area.
Appendix G

Debriefing Form
Thank you for your participation in this research project. Your participation has been a contribution to:

- Dr. Alyce Dickinson’s research on studying the effects of monetary incentives on work performance.
- Carol Frisch’s doctoral dissertation in the same area.
- the development of an OBM research laboratory in the Psychology Department at WMU, and
- hopefully, a significant contribution to science.

We hope that your participation has been a beneficial and educational experience for you. If you are interested in participating in our future research as part of the research team, contact Dr. Dickinson or Carol Frisch.

The study in which you participated is projected for completion during December, 1988. At this time we will be glad to debrief you about the study in which you participated. If you are interested in knowing the details and overall results of this study, please write your name and address below (for Dec. 1988). When the study is completed, we will send you a written summary of the research project and the results obtained.

Name __________________________
Address: _________________________
________________________________
________________________________
________________________________
Appendix H

Copyright Permissions
November 13, 1996

UMI Dissertation Services  
300 North Zeeb Road  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

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Total Pages ____________ Advisor ____________ School Code ____________

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Please type or print in black letters.

PERSONAL DATA

1. HIRSCH, CAROLINE JAMES
   Last Name First Name Middle Name
2. Year of Birth (optional) 1951
3. Country of citizenship USA
4. Present Mailing Address
   2 PO BOX 1131
   Street Address
   OSHKOSH, WI 54901
   City State Zip
   Future Mailing Address - Same
   Street Address
   City State Zip
   Effective date for future mailing address (mm dd yyyy) 11 11 11
   Home telephone number
   Business/other

DOCTORAL DEGREE DATA

5. Full name of university conferring degree, and college or division if appropriate
   WESTERN MICHIGAN UNIVERSITY
   COLLEGE OF ARTS & SCIENCES
6. Abbreviation for degree awarded
   PHD
7. Year degree awarded 1996
8. Year manuscript completed 1996

DISSEPTION TITLE AND SUBJECT DATA

9. Important: Attach a copy of your dissertation title page and abstract to this Agreement Form. Please include the name of your adviser/director on either the title page or the abstract.
10. List up to five additional words or short phrases not in your manuscript title or abstract for database access:

   a. EMPLOYEE PAY SYSTEM
   b. EMPLOYEE COMPENSATION
   c. 
   d. 
   e. 

11. Subject category for your manuscript. Enter four-digit code from "Subject Categories" list, followed by the name of the category selected. (You may enter two additional categories and/or codes on the extra lines provided.)

   0424 PSYCHOLOGY INDUSTRIAL
   0384 PSYCHOLOGY BEHAVIORAL
   0434 BUSINESS ADMINISTRATION

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Author’s Signature: ____________________________
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