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Effects of Linear and Non-Linear Incentive Pay Systems with Individual and Group Payouts on the Social Psychology Phenomenon of Social Loafing

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EFFECTS OF LINEAR AND NON-LINEAR INCENTIVE PAY SYSTEMS WITH INDIVIDUAL AND GROUP PAYOUTS ON THE SOCIAL PSYCHOLOGY PHENOMENON OF SOCIAL LOAFING

by

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The purpose of the present study was twofold. First, the experiment investigated the occurrence of social loafing behavior when individuals are engaged in a production task. Social loafing is defined as a decrement in individual performance when working co-actively with a group. Second, the experiment compared the effectiveness of three incentive pay systems (linear, positively and negatively accelerating) in eliminating social loafing behavior and in generating performance levels higher than those generated by a flat or hourly pay system.

Sixteen undergraduate students, all female, participated in twenty-five 15-minute work sessions in which they made widgets from pop beads. Subjects were paid based on their productivity during each session, received $10.00 for participating in a debriefing session and a $15.00 bonus for completing the study. Using a within-subject design, subjects were exposed to four pay conditions: (1) flat individual, (2) flat group, (3) incentive individual, and (4) incentive group.

The absence of statistical significance between mean productivity during the flat individual and group conditions indicated that social loafing did not occur. However, given seven subjects produced fewer widgets during the flat group condition, some degree of performance decrement was observed. This decrement was eliminated by the incentive pay systems.

A systematic relationship between pay and productivity emerged in that the incentive pay systems generated higher levels of performance than did the flat pay systems. In addition, the incentive pay systems differentially affected performance levels and cost-per-widget. These findings suggest that it was not the size of the incentive which controlled performance, but rather the fact that there was a pay-for-performance contingency in place.

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Delores A. Tinley Smoot

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CHAPTER I

INTRODUCTION

Management of individual performance is critical to the effectiveness of organizations (Gilbert, 1978; Lawler, 1990) and to the survival of United States business and industry in the world market (Blinder, 1990). Considering that labor costs can account for 60-80% of an organization's total operating costs (Blinder, 1990; Perry, 1988), the ability to manage performance improvements and to maintain consistent performance over time may well determine an organization's success or failure.

Individual performance impacts more than the immediate organization. The United States' current economic position, prompted by the reduction in the average annual productivity growth rate and a decline in the competitiveness of U.S. industries in the world market (Blinder, 1990; Grayson & O'Dell, 1988; Lawler, 1990) is good reason to consider performance management an urgent issue.

> From 1973 to 1988 output per worker-hour in all U.S. businesses grew at a paltry compound rate of 1.05 percent a year. That is barely more than a third of the growth rate we enjoyed during the halcyon 1947-73 period (2.96 percent a year) and, more important, only about half our long-term historic average (Blinder, 1990, p. 1).

With respect to competitiveness in the world market, the United States' average productivity growth between 1960 and 1980 was 2.7% compared to 9.3% for Japan during the same time period (Mainstone & Levi, 1987).

This downward trend in productivity growth rate does not merely affect America's economic standing in the world market, it produces an adverse impact on the living standards of all U.S. citizens. Blinder (1990) eloquently addressed this point:

> If our productivity growth rate remains so depressed for a protracted period of time, America is destined to slip into the second rank of nations in terms of wealth and income, just as the United Kingdom did before us. To most Americans, that is a distasteful prospect (p. 1).

Solutions to Productivity Problems

Monetary Incentives

Recent efforts to improve productivity and to place America in a more favorable economic position have found companies increasingly turning to group monetary incentive systems and team work as possible solutions. The popularity of the incentive pay system concept in business and industry is evidenced, in part, by the frequent occurrence of articles on the subject in compensation, personnel and management periodicals and the popular press (e.g., Kerr, 1996; Kopelman, 1983; Milkovich, 1992; Ritzky, 1995; Skryzcki, 1987). A 1987 survey conducted by the Hays Group indicated that 37% of the organizations surveyed use some sort of profit sharing plan, 16% use group incentives and 15% use gain sharing plans. Profit sharing plans, designed to enhance productivity by linking worker pay to the profitability of the organization, and gain sharing plans, designed to motivate greater performance by promising bonuses to workers based on money saved, are gaining popularity (Blinder, 1990; Lawler, 1990; Perry, 1988; Skryzcki, 1987; Weitzman & Kruse, 1990).

According to Agnew, Dickinson, Acker, and Cronin (1992), such incentive plans are only marginally effective at changing organizational behavior because they violate a basic behavioral principle relevant to pay-for-performance. As specified by Bijou and Baer (1978) and Frederiksen (1982), to derive the greatest benefit from monetary incentive systems money should be delivered contingent upon clearly defined individual behavior and as soon after the behavior as possible. Agnew et al. (1992)

suggest that individual incentive systems, defined as "systems involving the timely delivery of money contingent upon individualized, overt work performance" (p. 1), conform to this behavioral principle and, therefore, are better at managing and maintaining performance improvements over time. Lawler (1990) supports this position in suggesting that a good monetary incentive system is one that focuses on immediate rewards for individual performance. Thus, one weakness of profit sharing, gain sharing and lump-sum bonus pay plans is the considerable (e.g., delivered annually) delay in the delivery of the money incentive.

Blinder (1990) has suggested the "1/n problem", where "n" represents the number of workers covered by the incentive pay plan, accounts for another weakness of profit sharing and gain sharing plans. In such group-based incentive systems, the amount of incentive earned by any worker is dependent upon the performance of the group collectively.

Lawler's (1990) concept of "line of sight or line of influence" supports Blinder's (1990) contention. When pay is contingent upon performance, the individual should be able to directly influence his or her pay through performance. In other words, the power of the pay-performance contingency to motivate individual workers to work more and work better is dependent, in part, upon the extent to which individual workers can control pay levels as a function of their own behavior.

Monetary incentive pay systems conforming to the requirements specified by Agnew et al. (1992) and Blinder (1990) have been effective in managing worker productivity in the laboratory (e.g., Agnew et al., 1992; Berger, Cummings, & Heneman, 1975; Dickinson & Gillette, 1993; Farr, 1976; Frisch & Dickinson, 1990; Johnstone, Trefsgar, Berg, Kaufman, Jones, Roberts, Leary, & Duncan, 1989; Leary, Roberts, Trefsgar, Kaufman, Cassal, Jones, McKnight, & Duncan, 1990; London & Oldham, 1976; Oah & Dickinson, 1992; Riedel, Nebeker, & Cooper, 1988; Pritchard,

Leonard, Von Bergen, & Kirk, 1976; Smoot & Duncan; 1997; Stoneman & Dickinson, 1989) and in applied settings (e.g., Abernathy, Duffy, & O'Brien, 1982; Bushhouse, Feeney, Dickinson, & O'Brien, 1982; Dierks & McNally, 1987; Dickinson, LaMere, & Biby, 1991; Gaetani, Hoxeng, & Austin, 1985; George & Hopkins, 1989; Nebeker & Neuberger, 1985; Yukl & Latham, 1975; Yukl, Latham, & Pursell, 1976). A general finding among these studies is that workers tend to perform at higher levels when they are paid for what they produce as opposed to being paid a flat hourly rate or salary. When pay is tied to performance and workers know there is a direct relationship between their productivity and their pay level, individual performance is better.

Investigations of the performance-pay contingency have analyzed such factors as pay curve design, percentage of incentive pay, incentives combined with feedback, incentive versus flat or hourly pay, group versus individual payout conditions and group size. The most basic research on individual monetary incentives has focused on incentives versus hourly pay. George and Hopkins (1989) demonstrated that the performance of waitpersons could be greatly improved with incentives while controlling labor costs. Waitpersons were paid 7% of their gross sales. Gross hourly sales increased substantially and given that the incentive was paid from proceeds from increased sales and given that increased profits exceeded the increased labor costs, the benefits of the incentive pay system outweighed the costs.

Percentage of Incentive Pay to Base Pay

The most recent efforts to pinpoint the essential features of effective incentive pay systems have focused on percentage of incentive pay to base pay. Specifically, these studies have sought to answer the question "what is the appropriate mix of base pay and incentives?" In a laboratory simulation Riedel et al. (1988) employed a

between-subjects design to investigate the effects of monetary incentives on goal choice, goal commitment and task performance. Subjects were assigned to one of seven groups-two control and five experimental. The control groups were distinguished in that one group was given a minimum performance standard requirement in order to receive the hourly wage while the other group was not. Five levels of the independent variable, incentive percentage, defined the five experimental groups where subjects worked in groups paid one of five percentage levels - 25%, 50%, 75%, 100% or 125% of their base hourly wage of $4.40. To illustrate how the base wage and incentive percentage were delivered, a subject in the 125% group would receive $4.40 base pay for the hour plus $5.50 incentive pay when performance exceeded the minimum standard.

The laboratory simulation was characterized by four design factors. First, the performance task of transferring questionnaire data on to scanning forms is very much like scanning tasks performed by employees of financial institutions. Second, subjects were required to work a typical half-time work schedule - five days, four hours per day for a total of twenty work hours. Third, subjects worked in rooms resembling actual offices. Fourth, a break area was available to subjects where they could interact with other subjects and where they could consume refreshments.

The hypothesis that subjects in the incentive groups would perform better than subjects in the non-incentive groups was supported. An analysis of variance revealed a significant difference ($p<.001$) between the mean performance of control groups and incentive groups. However, the differences between the performance means of the five incentive groups were not significant. Therefore, the 25%, 50%, 75%, 100% and 125% incentives did not affect performance differentially.

An interesting aspect of this study is that Riedel et al. (1988) fail to attribute the task performance differences between the control and experimental groups to the

functional relationship between incentive pay and performance. Rather, the researchers' explain the effects as a function of mediating variables typically found in "expectancy models" of human behavior. However, the fact remains that performance levels were significantly better for subjects receiving incentive pay.

While the Riedel et al. (1988) study provides useful data with respect to the efficacy of individual monetary incentives, there are two issues which make the utility of the results somewhat questionable. First, the effects of daily performance feedback are not accounted for in the results data. Balcazar, Hopkins, and Suarez (1986) suggest that performance feedback may have a supplemental effect on performance when used in conjunction with differential consequences. Research has shown consistently that feedback in combination with monetary incentives (e.g., Abernathy et al., 1982; Dierks & McNally, 1987; Gaetani et al., 1985; Haynes, Pine, & Finch, 1982) improves performance. Second, the data analysis is based solely on subject performance on the third work day which fails to capture performance trends over time.

Frisch and Dickinson (1990) and Dickinson et al. (1991) continued research into the efficacy of various percentages of incentive to base pay. These researchers enhanced the laboratory simulation by including a systematic investigation of the effects of competitive sources of reinforcement. Subjects were permitted to take work breaks during which they could socialize with other subjects, study, read, consume refreshments, etc. In real-world work environments employees are not confined to simply performing their assigned tasks. Typically, there are many other sources of reinforcement during the course of a work shift. Therefore, as Dickinson and Gillette (1993) showed, the results of incentive research could be viewed as having limited external validity when competitive sources of reinforcement are not included in the study. In such situations it could be argued that the incentive pay system increases performance by increasing the amount of time a worker spends on task.

Frisch and Dickinson (1990) challenged the validity of Fein's (1970) contention that incentive potential below 30% of base pay will not greatly affect performance nor will incentive potential above 30% significantly increase worker performance. The researchers tested the efficacy of five pay systems: (a) base pay or 0% incentive, (b) base pay plus 3% incentive, (c) base pay plus 13%, (d) base pay plus 25%, and (e) base pay plus 54% incentive. The pay systems were designed to pay a maximum of $4.00 per work session, therefore, the amount of money that could be earned in any one session was held constant across all work groups. Subjects working in groups of fifteen while being paid individual incentives performed a work task assembling parts from bolts, nuts and washers, similar to piece-work tasks performed in true work environments. A minimum of fifty quality parts per session was required to receive pay for the session. Subjects participated in fifteen forty-five minute sessions.

Results were consistent with those in the Riedel et al. (1988) study. Performance for subjects in the four incentive groups was significantly better than for subjects in the non-incentive group. More interestingly, incentives as low as 3% of base pay proved effective in generating higher performance levels which runs counter to Fein's premise. However, the second part of Fein's premise is supported in that performance was comparable under the four incentive systems and there were no corresponding increases in performance with increases in incentive percentage.

Dickinson et al. (1991), conducting a systematic replication of the Frisch and Dickinson (1990) research, expanded the investigation of percentage of incentives to base pay by moving into the real work arena. The researchers sought to determine whether the incentive effects obtained in the laboratory simulation would generalize to an applied setting, more specifically to roll-off truck drivers employed by a municipal disposal service.

In a multiple-baseline design twenty truck drivers received a guaranteed base pay and incentive pay when their weekly individual performance exceeded the average group performance during baseline. Incentives were delivered on a per-job basis. When performance exceeded average performance, the driver received a per-job incentive for each job completed. The multiple-baseline design consisted of a five-month baseline for one group followed by a one-month period of hourly pay with feedback followed by the implementation of the incentive system. For the second group, the incentive system was implemented three months later. The exposure to the incentive levels was extensive: seven months for the 3% incentive; nine months to the 6% incentive; fourteen months to the 10% incentive.

Mixed results were reported. Significant increases in performance occurred when drivers were paid a mere 3% incentive over base pay and these increases were maintained over time. When the incentive percentage was increased to 6% and 10% of their total pay, performance increased beyond the 3% level for some drivers and decreased for other drivers. These results from a real work setting support the conclusions Frisch and Dickinson (1990) drew from their laboratory simulations. That is, incentive pay systems can generate higher performance levels when the incentive is as small as 3% of total pay.

Others have continued this line of empirical inquiry. Leary et al. (1990) conducted a similar percentage of incentive to base pay study. A within-subjects design was used to evaluate the effects of incentive pay on the performance of individuals engaged in constructing widgets from popbeads. There were five pay systems: (1) flat pay of $1.00, (2) 25% of $1.00 flat pay plus $.10 per widgets over the 10 widget minimum performance standard, (3) 50% of play pay plus $.10 per widget, (4) 75% plus $.10 per widget, and (5) 100% plus $.10 per widget. The results obtained in the prior studies were replicated by Leary and her colleagues. Performance in all incentive

pay conditions was significantly greater compared to widget productivity during the flat pay condition and the four incentive systems were equally effective in generating performance improvements.

Dickinson and Gillette (1993) extended this line of investigation in two studies where they compared the effects of a base pay plus incentive system with the effects of a piece rate pay system in which 100% of the workers' pay was incentive. Unlike the Frisch and Dickinson (1990) and Leary et al. (1990) studies, the length of the work session, three to four hours, was more representative of a typical work environment. In addition, competitive sources of reinforcement were enhanced whereby subjects were advised they could take breaks whenever they wanted and that during those breaks they could engage in any activities they wanted (e.g., reading, studying, using the telephone, socializing). Also, refreshments and magazines were made available during break periods. The final variation was the inclusion of a within-subjects design.

For the first study, subjects engaged in a computerized check verification task during nine 3-hour sessions. The task consisted of subjects scanning the dollar value of simulated checks appearing on a computer screen and, then, typing the value of each check. The dependent variable was the number of corrected completed checks. A within-subjects, reversal design was employed to evaluate the two pay systems. Under the piece rate pay system subjects received a per-check incentive and could earn $5.00 for completing 1300 checks per hour. Subjects could earn more than $5.00 per hour for completing more checks. The 1300 checks was considered average performance per hour and served as a benchmark for both pay systems. Under the base pay plus incentive system subjects received a guaranteed base rate and could earn a per-check incentive for exceeding a performance minimum standard. The system was designed so that 70% was guaranteed hourly wages and 30% was incentive-based. The two

different systems were set up so that subjects would earn the same amount of money for 1300 correct checks.

The results led the researchers to two general conclusions. First, while there was a "stronger link between performance and pay in the piece rate pay condition" (Dickinson & Gillette, 1993, p. 33), what Lawler (1990) calls a short line of sight, performance was not higher during this condition. Second, performance rates were not systematically affected by the proportion of total pay that was incentive-based.

Study 2 was a systematic replication of Study 1 and included four major changes. First, an individualized performance standard was added. Second, a similar change was made in the average performance level for the piece rate pay system which resulted in subjects being able to earn $4.50 per hour for completing 1250 checks. Third, work sessions were extended from three to four hours. Fourth, individualized performance standards per subject were used under both incentive systems.

Generally, the results indicate that there was no systematic relationship between productivity levels and the percentage of total pay that was incentive-based. And, the two pay systems produced comparable results. Therefore, one pay system does not appear superior with respect to generating higher performance. For example, the subjects who completed more checks during the base pay plus incentive condition (the second phase) than during the piece rate condition (the first phase), showed further increases in check production during the final phase which was the reintroduction of the piece rate pay system. Similar trends were observed for subjects working under the base pay plus incentive - piece rate - base pay plus incentive configuration.

Considering the overall effects from the two studies, it can be seen that the Dickinson and Gillette (1993) results are consistent with those observed in the studies conducted by Frisch and Dickinson (1990), Leary et al. (1990), Riedel et al. (1988) and Dickinson et al. (1991). The Dickinson and Gillette studies resulted in subjects

earning percentages of base pay ranging from 2% to 52%. In line with the findings in previous investigations, these percentages did not produce differential performance rates. However, a consistent finding among all of the base pay plus incentive percentage studies is that just about any percentage will be effective.

Linear Versus Non-Linear Pay Systems

The pay curve investigations compared the effects of linear and non-linear incentive pay systems to the effects of flat or hourly-type pay systems. Essentially, pay curve studies have attempted to answer such questions as "what is the optimum incentive pay system with respect to productivity and cost minimization and, how much incentive is necessary to generate significantly higher productivity levels?" Previous research on hourly pay versus incentive pay has consistently shown incentive pay to be superior in producing performance improvements. For example, Dierks and McNally (1987) reported significant increases, 200% to 300% over hourly pay rates, for employees of the Union National Bank in Little Rock, Arkansas.

Oah and Dickinson (1992) extended these empirical comparisons by looking at the effects of a linear and an exponential (or positively accelerating) incentive pay system. More specifically, two research questions were investigated: (1) Does an exponential performance pay function increase productivity more quickly than a linear performance pay function? and (2) Does an exponential performance pay function sustain higher levels of productivity?

Subjects were paid under one of two incentive pay systems while performing a computerized check-proofing task during fifteen 45-minute sessions. For the incentive system, the per check incentive increased exponentially as the number of completed checks increased, whereas the per check incentive remained constant under the linear

incentive system. All subjects earned a minimum of $2.00 per work session provided the productivity standard of 490 checks was achieved.

Interestingly, a visual analysis of the data indicates that performance was consistently higher for subjects in the exponential pay condition, however, statistical analysis showed that the productivity differences between the two pay systems was not significant. Therefore, Oah and Dickinson (1992) concluded that productivity was not differentially affected by the linear and exponential incentive pay systems.

Smoot and Duncan (1997) conducted a series of four laboratory studies in which independent variables were systematically varied to answer a series of questions about the efficacy of linear and non-linear incentive pay systems. The initial study in the series extended the work of Oah and Dickinson (1992) by adding a negatively accelerating pay system. Thus, in all four studies the effects of a flat pay system were compared to the effects of three incentive pay systems - linear, positively accelerating and negatively accelerating. The next three studies were progressive extensions with the findings of each providing a basis for further refinements of the experimental question.

The second study was expanded to include a manipulation of feedback. The role of feedback in the optimum incentive pay system is well worth investigation given that feedback often yields positive effects on worker performance (e.g., Dierks & McNally, 1987; Gaetani et al., 1985; Karan & Kopelman, 1987; Silva, Duncan, & Doudna, 1982). It is accepted that incidental feedback is present in all incentive pay situations. However, while researchers have demonstrated that feedback in combination with monetary incentives is effective (e.g., Abernathy et al., 1982; Haynes et al., 1982), the supplemental effects of feedback on performance beyond improvements derived from the individual monetary incentive systems have yet to be empirically investigated. The investigation of the supplemental effects of feedback was

accomplished by introducing the incentive system with feedback and then removing the feedback during the final incentive pay condition.

The third study extended the second through the addition of a work setting manipulation to assess the effects of the presence of others on productivity when an incentive pay system is operative. Investigations of the pay-performance contingency had assessed the effects of individual versus group incentives and the effects of incentives on worker performance in various sized groups (e.g., Stoneman & Dickinson, 1989). However, the effects of the mere presence of other workers on productivity levels when an individual monetary incentive system is in place had not been empirically investigated.

The fourth study directly replicated the third study and added the calculation of the percentage of incentive to base pay actually earned by subjects. As has been discussed earlier, research on monetary incentive-to-base pay (Dickinson et al., 1991; Frisch & Dickinson, 1990) demonstrated that incentives as low as 2% produced substantial performance increases. However, in all studies subjects performed comparably and there was virtually no difference in performance improvements when subjects were paid incentives ranging from 2% to 100%. Calculation of the incentive-to-base pay in the fourth study was intended to provide additional information in clarifying the functional relationship between pay level and performance.

Methods and experimental design were similar for the four studies. First, the same performance task of constructing widgets from pop beads was employed. Second, a within-subject, multiple-baseline, counterbalanced design was used where all subjects worked under a flat pay condition and one of the three incentive pay systems. Third, subjects worked in fifteen-minute work sessions for twenty to twenty-five sessions.

Two consistent findings emerged from the four studies. First, the incentive pay systems generated higher productivity levels than did the flat pay systems with productivity increases over flat pay levels ranging from 3.5% to 49.3% This finding is consistent with the results of earlier pay-for-performance investigations. Second, productivity was differentially affected by the three incentive pay systems. Interestingly, this finding is inconsistent with the results of the Oah and Dickinson (1992) study. In Experiments 1 and 2, the linear system produced the greatest gain in widget productivity, whereas in Experiments 3 and 4, the positively accelerating system generated the highest levels of productivity. And, while productivity under the negatively accelerating system increased in all four studies, improvements were less substantial.

Smoot and Duncan (1997) also looked at the cost effectiveness of the three incentive pay systems and found a pattern with respect to generating higher levels of performance while minimizing cost. In Experiments 2 through 4, the negatively accelerating system proved to be the best and the system was considered second best in Experiment 1. These findings are particularly interesting considering the design of the negatively accelerating system where each additional widget is worth slightly less than the previous widget.

While the manipulation of the incentive pay systems produced clear differences, the precise impact that the presence or absence of others had upon the incentive pay systems was unclear. First, the data indicated that any change in work setting, individual to group or group to individual, had some effect on productivity. This effect was observed in 5 of the 6 groups in Experiment 3 with productivity increases in four groups and lowered productivity in one group.

The data from Experiment 4 contradict Fein (1970) and Henderson (1985). For example, the 30% incentive level for subjects in the linear groups was paid for 13

widgets yet mean productivity during the incentive condition was 22.3 widgets representing a percentage of incentive to base pay level of 65.5%.

Finally, supplemental effects of feedback were not found during Experiment 2. However, the feedback manipulation, in and of itself, may have interfered with widget productivity. Subjects were given a copy of the pay scale they were working under and were required to place a check mark on the sheet indicating they had completed another widget. It is very likely that stopping to make the check marks took enough time away from the task to decrease the number of widgets that could be completed in the fifteen minute session.

Incentives With Performance Feedback or Performance Goals

Other researchers have focused specifically on the effects of monetary incentives in conjunction with performance feedback. They have found the combination to be effective in generating higher productivity among bank employees (Abernathy et al., 1982) and among auto machinists (Gaetani et al., 1985).

Abernathy et al. (1982) demonstrated an hourly rate plus incentive combined with performance feedback to be more effective than an hourly rate with feedback. The incentive consisted of giving points, which were worth $.75 each, for exceeding hourly performance standards. One point was given for exceeding a standard of 1700 items, two points for exceeding 2100 items and three points for exceeding 2500 items per hour. Proof operators improved their performance from an average of 2200 items per hour under the hourly pay plus feedback system to an average of 2700 items per hour under the incentive plus feedback system.

In another bank, the implementation of a new incentive system that closely approximated the system described above resulted in greater improvements. Under the old incentive system, proofers were given cash incentives, ranging from 20% to 30%

of base pay, for exceeding a 1000 item per hour standard. The new system paid proofers an hourly rate plus $.25 for every hour that performance exceeded a standard of 2200 items per hour. Performance improved from an average of 1465 items under the old system to 2250 items under the new system.

In another applied study, Gaetani et al. (1985) demonstrated that a commission plus feedback system can have dramatic effects on the performance of auto machinists. The incentive system had three major components: (1) employee-generated feedback which consisted of the mechanic tallying the daily invoices, (2) performance had to exceed an historical standard in order for any incentive pay to be earned, (3) the hourly rate was paid plus a commission of 5% of the dollar value (of work billed to customers) over the historical standard. Daily productivity averages increased from $77.10 to $238.00 for one machinist and from $98.23 to $269.00 for the other machinist.

Other combinations of interventions has been investigated. Campbell (1984) compared the effects of incentives with performance goals with the effects of hourly pay. His findings indicate that performance was significantly better for individuals paid under incentive w/ performance goals. And, while the performance for those paid under the hourly pay system was slightly better than those subjects who received no pay, the difference between the two groups was not statistically significant.

Group Incentive Pay Systems

Finally, monetary incentive studies have asked the question "which is better at controlling higher levels of performance - individual or group incentive systems?" According to Farr (1976) and Johnstone et al. (1989), the answer is both are equally effective. The results of both studies indicate that individual and group incentive systems are comparably effective in generating higher performance levels when

compared to productivity under hourly pay plans. The more important variable is the pay for performance contingency.

Stoneman and Dickinson (1989) and Roberts and Leary (1989) extended the individual versus group line of investigation by looking at the efficacy of incentives in groups of varying size. Both studies reported that group productivity did not differ as a function of group size for small groups. However, what has been seen in previous incentive studies was also evidenced in the Stoneman and Dickinson (1989) and the Roberts and Leary (1989) studies. That is, monetary incentives effected productivity improvements.

Summary Comments About Incentive Pay Systems

The studies discussed thus far have documented the effectiveness of monetary incentives in laboratory simulations and in field studies. Common themes that have emerged from the more than twenty years of investigations are: (a) monetary incentives are better at generating and maintaining higher performance levels than are hourly pay systems; (b) incentive systems are effective when people are engaged in manual, simple tasks and in more complex tasks (e.g., computer simulations); and (c) what seems to matter more than the magnitude of the incentive is the pay-for-performance contingency. To elaborate on this point, it seems clear that the defining consequence is the fact that people do more when they earn more.

Teamwork

The search for solutions to productivity problems has not been restricted to incentive systems. Organizations, following the lead of Deming (1986) and Berry (1991), have turned to teamwork and the "Total Quality Management" concept. Annually, over 10,000 people attend Deming's four-day seminars, which emphasize

improvements through cooperative efforts (Geller, 1992). According to Wellins, Byham, and Wilson (1991), approximately 25% of all U. S. industries are experimenting with work teams to improve quality and quantity. Reich (1987) has proclaimed the "team as hero" in resurrecting U. S. economic stability and improving the country's position in the world market. In light of the above, and given that practical evidence of the proliferation of the work team concept can easily be found in everyday life, it seems reasonable to conclude that the implementation of work teams will continue to grow.

The Social Loafing Problem

Interestingly, according to some social psychology literature, teamwork may not be a solution at all, but may actually constitute another source of productivity problems in the form of "social loafing" (Brickner, Harkins, & Ostrom, 1986; Harkins & Jackson, 1985; Harkins & Szymanski, 1989; Jackson & Williams, 1985). The phenomenon of social loafing, a term coined by Latane', Williams, and Harkins (1979), is said to involve the loss of individual motivation to perform when working in a group coaction setting. Coaction occurs when individual outputs are summed and the group's performance is presented as this sum. Social loafing is said to exist when the level of an individual's performance in an "alone" setting is greater than the level of that same individual's productivity when working in a coaction setting with others.

Since Latane' et al. (1979) first labeled this behavioral phenomenon as social loafing 40 to 50 studies have been conducted to test hypotheses, to derive explanations for social loafing, and to uncover effective intervention strategies. Six general explanations have emerged from the studies and have been used as evidence of the generality of social loafing to different sized groups and tasks: "Social Loafing Effect" (Latane' et al., 1979); "Free-Rider Effect" (Kerr & Brunn, 1983); "Output Equity"

which subsumes the "Sucker Effect" (Kerr, 1983) and "Expectancy Theory" (Jackson & Harkins, 1985); "Hide In The Crowd/Lost In The Crowd Effects" (Kerr & Bruun, 1981); Matching To Standard (Harkins & Jackson 1985); Absence of Personal Involvement (Brickner et al., 1986).

While the social loafing effect, free-rider effect, sucker effect, and hide in the crowd/lost-in-the-crowd effects were originally put forth as specific forms of social loafing, it seems that these phenomena are more appropriately viewed as explanations for the occurrence of social loafing. Therefore, the following discussion treats those effects as explanations for rather than outcomes of social loafing behavior.

Another important point with respect to the following treatment of the social loafing research has to do with the absence of laboratory simulations. It is clear that the overall purpose of the collective body of social loafing research was to uncover the underlying causes of social loafing behavior not to determine the functional relationships in order to control and eliminate social loafing in the workplace, which is the focus of OBM research. The lines of analysis for social psychologists and behavior analysts are at cross purposes. Therefore, the absence of appropriate laboratory simulations in the social psychology research is not a flaw in the studies, rather the absence of a work place simulation makes the results of the studies not terribly useful to OBM practitioners.

Causes of Social Loafing

Social Loafing Effect Explanation. While Latane' et al. (1979) are credited with coining the term "social loafing", according to Kravitz and Martin (1986),the first empirical investigation of behavior decrement in groups is attributed to Ringlemann more than 50 years earlier. In Ringlemann's experiment, subjects acting alone or with one, two, or seven others, were asked to pull as hard as they could on a rope.

Individuals averaged 63 kg of pressure, while dyads pulled at 93% of the sum of their individual efforts, trios at 85%, and groups of eight at 49%.

Ringlemann's research has been reviewed by a number of social psychologists (Ingham, Levinger, Graves, & Peckham, 1974; Steiner, 1966; Zajonc, 1966). Interestingly, the reviews have been mixed in that some conclude that the results are indicative of "motivation" loss when working coactively (social loafing) and others attribute the performance differences to coordination loss. For example, Ingham et al. (1974), in two studies attempting to replicate the Ringlemann results, reported that decrements in rope-pulling performance were a function of motivation loss rather than coordination loss. A more interesting finding from both studies was that increases in performance decrements were correlated with increases in group size but only up to three member groups. In other words, there were no significant increases in performance decrements after the addition of a fourth, fifth or sixth group member. This later finding is contradictory to the Latane' et al. (1979) findings.

The early works of Latane' et al. (1979), Harkins, Latane', and Williams (1980), and Kerr and Bruun (1981) kicked off a new wave of investigations of the phenomenon. Latane' et al. (1979) conducted two laboratory experiments in which group size (alone and groups of 2, 4, and 6) was manipulated and the dependent variable was the effort "used" in generating noise expressed as dynes/cm. In the first study, subjects cheered (said Rah! Rah!) during 36 five-second trials and clapped their hands during 36 five-second trials alone, in groups of 2, 4 and 6. Individuals working alone averaged 3.7 dynes/cm, 2.6 in pairs, 1.8 and 1.5 in groups of four and six, respectively. Put another way, dyads worked at 71% of the sum of their individual efforts, groups of four at 51%, and groups of six at 40%. For the second study, subjects were told to "feel free to let loose and really shout" (Latane' et al., 1979, p. 827). Thus, the performance task was limited to shouting in the second experiment.

As opposed to the first study, these subjects wore blindfolds and earplugs and, therefore, were not affected by the noise produced by other subjects. Each subject shouted alone, in groups of 2 and in groups of 6 for a total of 24 trials. Results indicate that groups of two shouted at 66% of the sum of individual efforts and groups of six at 36%.

Expanding on their original notion of social loafing, Latane' and his colleagues drew four general conclusions. First, when engaged in an effortful and physically fatiguing task, individuals exhibit a sizable decrease in effort when working in groups. Second, as group size increases individual output decreases. Third, as group size increases the total group effort increases but at a slower rate than would be expected from the sum of the individual outputs. Fourth, behavioral decrements in groups may be a function of "attribution and equity" (subjects reduce their efforts to match what they perceive to be the level of effort by other group members), "submaximal goal setting" (subjects ignored the experimenter's instruction to "let loose and really shout" and set their own lower goals), or "lessened contingency between input and output" (subjects believed their efforts would not be identified among the total group's effort).

In two systematic replications, Harkins et al. (1980) hypothesized that social loafing may be a function of adopting an "allocational strategy" or a "minimizing strategy." When employing an "allocational strategy," people are said to

> Realize they have only a finite amount of resources to put into a task. Given the choice between working hard with others or concentrating their efforts on performing alone, they may decide to allocate more energy to the alone trials where their efforts can be identified and rewarded (Harkins et al., 1980, p. 459).

When employing a "minimizing strategy," people are said to "wish to minimize their overall energy expenditure," particularly in the case where the task such as "making loud sounds is tiring work" (Harkins et al., 1980, p. 459).

In the first study, group size (alone and in groups of 2) and the perception of working with others (pseudo-groups) were the independent variables and sound pressure produced from a hand clapping task was the dependent measure. The pseudo-group condition was arranged by manipulating the verbal instructions to subjects. All subjects wore headphones and were told that the study was to investigate the effect of sensory feedback reduction on the production of sound in social groups. All instructions to subjects were delivered via stereophonic recording through the headphones. In the pseudo group condition, the relevant subjects were told they were clapping with someone else, while the non-pseudo group subjects were given the instruction "no one clap." In actuality, some subjects always clapped alone, some subjects clapped alone but perceived they clapped with others (pseudo groups), and some subjects clapped alone sometimes and sometimes perceived they were clapping with others (pseudo groups). Clapping trials lasted for 5 seconds each and all subjects clapped for 6 trials. The data indicate that when performing in groups, subjects produced only 75% as much noise as when performing alone. And, subjects who perceived they were clapping with others (in pseudo groups) produced only 62% of the noise created by subjects who always performed alone.

For the second study, the performance task, trial duration, and number of trials remained the same. Though, the second study differed from the first study in that half of the subjects always clapped alone while the other half were told they would always clap in pairs to create the pseudo-group work condition. In actuality, all subjects always clapped alone. The results reported in the first study were replicated in that subjects who perceived they were clapping with another person produced only 57% of the noise produced by subjects who always clapped alone.

Five conclusions were drawn. First, individuals who performed alone and in a group made less noise when clapping with a partner. Second, individuals who clapped

in groups exclusively and, therefore, had no reason to conserve energy for individual trials, exhibited social loafing. Third, subjects working in pseudogroups (perceived they were working with another person) exhibited social loafing because they clapped less loudly than when they clapped alone. Fourth, social loafing is not the result of adopting an "allocation strategy," it occurs when people work in groups, regardless of whether they have also worked alone. Fifth, the observed social loafing behavior is the result of adopting a "minimizing strategy."

Another study on allocational strategy, dubbed the "me-first" explanation, was conducted by Kerr and Bruun (1981), but they approached the concept from a different angle. Rather than attempting to show that conserving energy accounts for social loafing behavior, the researcher set out to show that when there is no need to conserve energy to protect one's self-interest social loafing will not occur. Kerr and Bruun (1981) predicted that "when group size is manipulated between-subjects the social loafing effect should not obtain, or at least should be sharply attenuated" (p. 225).

Using an air pumping task over 14 trials, the performance of subjects in a within-subject condition, who pumped in groups of 1, 2 and 4, was compared to subjects in a between-subject condition, who pumped in a single-sized group. The data from the within-subject manipulation indicates that social loafing behavior was obtained and as group size increased social loafing increased. A similar performance pattern was also observed in the between-subject condition leading Kerr and Bruun (1981) to conclude that social loafing behavior does not occur exclusively in settings where individuals must work sequentially in different sized groups. Further, they concluded that in-tact (stable) groups are susceptible to social loafing. As a result of these findings, Kerr and Bruun (1981) concluded that their prediction was not supported and determined that the "me-first" explanation of social loafing was not confirmed with respect to a physically demanding task.

These initial studies resulted in labeling performance decrements in groups as social loafing and lead to identifying two parameters essential to determining the occurrence of social loafing behavior: (1) the performance task must be effortful and physically fatiguing, and (2) as group size increases individual output decreases.

Free Rider Effect Explanation. The free-rider effect explanation, first postulated by Kerr and Brunn (1981), suggests that individuals will reduce their performance level when it is perceived that they can benefit from the contributions of other group members. "Given this perception, the individual concludes that his or her output is dispensable, and exerts little effort as a result" (Geen, 1991 p. 389). Put another way, "free-rider refers to a member of a group who obtains benefits from group membership but does not bear a proportional share of the costs of providing the benefits" (Albanese & Van Fleet, 1985, p. 244).

Three laboratory studies conducted by Kerr and Brunn (1983) have been offered as evidence for the free-rider explanation. The studies tested the general hypothesis that group members exert less effort as the perceived dispensability of their efforts for group success increases. Kerr and Bruun (1983) have drawn the connection between social loafing and "dispensability of effort" from Olson's (1965) economic analysis of the basis for apathy in seeking public goods. According to Olson, dispensability of effort occurs when an individual expects she or he can obtain the valued results of successful task performance when she or he exerts little or no effort because success can be achieved through the group's efforts; and the larger the group the more dispensable individual efforts are for group success and the less motivated the individual will be. Kerr and Bruun (1983) have qualified Olson's notion of "dispensability of effort" by asserting that dispensability is also dependent upon the individual perceiving others in the group to be more capable of performing the task and

labeled the resulting explanation of social loafing as the free-rider effect. Given that the three studies are similar, the following discussion covers only the first of the three. An expanded discussion of the other two studies appears in the literature review.

For the first study an air-blowing task was employed to test four predictions: (1) Ability will have opposite effects on task motivation for disjunctive and conjunctive tasks, (2) Effort will decline with group size for both disjunctive and conjunctive tasks, (3) Ability will have opposite effects on perceived dispensability of individual effort for disjunctive and conjunctive tasks, and (4) Perceived dispensability of individual effort for group success will increase with increases in group size. Disjunctive tasks require that the group product be the contribution of the most able group member, whereas conjunctive tasks require that the group product be the contribution of the least able group member (Steiner, 1972). For additive tasks the group product is the sum or average of the individual contributions (Steiner, 1972). Four independent variables were manipulated: (1) group size (alone, in groups of 2, 4, and 8); (2) member ability (high and low); (3) task demands (additive, disjunctive, conjunctive); and (4) subject sex (male vs. female). Member ability was manipulated by giving subjects contrived feedback on pretrial performance. Subjects were shown their score as well as the scores of the others in their group. All subjects performed in isolation but were told they were part of a group. Subjects completed six 30-sec performance trials with 1 minute intertrial intervals. The dependent variables were an index of subject task motivation derived from task performance scores, the amount of air pumped per trial, and perceived dispensability derived from self report data.

Performance on the air-blowing task was used to determine subject task motivation and to draw conclusions about the first prediction. The following was provided as evidence that member ability had opposite effects on member task motivation for disjunctive and conjunctive tasks. Low-ability subjects produced less air

during the disjunctive task condition (where only the best score counted) and, therefore, were considered to be less motivated. High-ability subjects produced less air during the conjunctive task condition (where only the worst score counted) and, therefore, were considered to be less motivated.

The prediction that member effort will decline with group size for disjunctive and conjunctive tasks was not supported. The performance data indicate just the opposite occurred with dyads averaging 95.9 c.l., tetrads 102 c.l., and groups of eight 99.25 c.l.

With respect to the third and fourth predictions, the data support one but not the other. For the ability x task demand prediction, the self report data indicate that high-ability subjects felt more important than the low-ability subjects in the disjunctive task condition, however, the opposite occurred in the conjunctive task condition. Thus, the third prediction was considered to be supported by the data. The prediction that perceived dispensability would increase with increases in group size was not supported in that only one comparison was statistically significant. An additional finding was a main effect for subject sex in that males were deemed more capable than females with respect to the air blowing task.

The findings among the three studies are consistent in some respects and contradictory in other ways. However, the consistencies across the studies lead to the inclusion of two additional parameters (in addition to the coaction and group size parameters identified by Latane' et al. (1979) for the occurrence of social loafing: (1) individual workers must perceive that their personal efforts are not needed (are dispensable) for the group to succeed, therefore, they can loaf and still reap the maximum benefits, and (2) individual workers must perceive that others in the group are more capable (can perform the task better).

Output Equity Explanation. The output equity explanation of social loafing behavior takes two forms, the sucker effect and expectation of co-worker performance. First, the sucker effect arises when individuals perceive that other group members are benefiting from their contributions. Others in the group who are capable of high performance are seen as free riding, thereby, making the high-performing individual a "sucker" (Kerr, 1983). "Rather than exert effort while others do not, the person achieves a sort of equity by reducing his or her output" (Geen, 1991, p. 389). Second, when working in a group, individuals will "reduce their own efforts to establish an equitable division of labor" (Jackson & Harkins, 1985, p. 1199) when they expect their co-workers to loaf.

With the introduction of the sucker effect explanation, Kerr (1983) offers an alternative to his free-rider explanation. In the free-rider explanation, individuals reduce their efforts when working in a group because they perceive that their efforts are not needed and they can benefit from the efforts of the other group members; whereas in the sucker effect explanation, individuals perceive that other capable members of the group are free riding on their efforts and, therefore, they lower their performance to achieve equity.

Kerr (1983) tested the general hypothesis that group members would exert less effort if they perceived their partner was capable of contributing to the group but would not. Using a between-subjects design, Kerr manipulated three independent variables: (1) group size (alone and dyads), (2) subject sex (male and female), and (3) perception of partner ability. Kerr did two things to accomplish the manipulation of the third IV. First, subjects were told their partner was either capable or incapable of performing the task to criterion. Second, contrived feedback matching the partner's mock ability level was given to subjects.

There were four experimental conditions and a control condition. In the first experimental condition, which was called the able/succeeds condition, subjects were told their partner was capable of performing the task and the performance feedback indicated that their partner always succeeded. This condition was included as a test of Kerr's free rider explanation. In the able/fails condition, which was designed to test the sucker effect explanation, the partner was capable of performing the task but the contrived feedback indicated that the partner consistently failed to meet the performance criterion. In the unable/fails condition, the partner was designated as incapable and the feedback indicated that the partner consistently failed to reach criterion. The individual model condition provided the "alone" comparison which is essential to all social loafing research. Here the subjects performed "alone" in that they did not have a designated partner, however, they worked with a "high ability" subject who consistently failed at the task. The control condition provided a baseline comparison because the subjects worked individually and were not exposed to the independent variables. Even though subjects were told they were working with a partner, all subjects worked in isolation.

In each dyad, there was only one real participant because the partner who was designated as capable or incapable was a confederate. The performance task was identical to the air pumping task in the Kerr and Bruun (1983) study described in the free rider explanation section above. Subjects engaged in nine 30-second trials. The dependent variable was the proportion of trials that reached or exceeded the criterion of 350 ml. If either member of the dyad reached criterion on a trial, then the group succeeded on the trial. Of course, the performance levels of the confederates were contrived and in the able/succeeds condition the feedback indicated that the confederate had met the criterion.

As predicted, Kerr found contrasting effects. For dyads in the able/fails condition, actual success rate was 75.4% compared to a 88.9% success rate of the

control group. From these data, Kerr concluded that the sucker effect was "clearly obtained and that subjects sometimes preferred to fail at the task rather than be a sucker and carry a free rider" (Kerr, 1983, p. 823). In contrast, for the dyads in the unable/ fails condition, where one partner was designated as unable and the contrived feedback indicated the partner consistently failed to reach criterion, trial success rate for the real participant was 84.4% (compared to the control rate of 88.9%). In this case, Kerr concluded that social loafing did not occur because subjects were willing to carry an incapable partner. In addition, Kerr concluded that the free-rider effect explanation accounted for the performance decrements observed in the able/succeeds dyads where the success rate was only 74.6% compared to the control rate of 88.9%. "A capable partner who consistently succeeded and thereby guaranteed the success of the group presented the subjects with a situation in which their efforts were clearly dispensable for group success" (Kerr, 1983, p. 826). With respect to the individual model condition, subjects succeeded on 95.4% of the trials which is considerably higher than the 88.9% success rate of the control group. Therefore, social loafing was not observed in these subjects.

The output equity explanation has been investigated from the perspective of subject expectation of co-worker effort while engaged in a physical and an idea generation task (Jackson & Harkins, 1985; Williams & Karau, 1991) and in terms of self-efficacy and outcome expectancy while engaged in a vigilance task (Sanna, 1992). Jackson and Harkins (1985) and Williams and Karau (1991) looked at the notion that when people work in groups they expect their co-workers to loaf and, therefore, reduce their own outputs to achieve equity in effort. When working in a group, individuals will "reduce their own efforts to establish an equitable division of labor" (Jackson & Harkins, 1985, p. 1199) when they expect their co-workers to loaf.

To test their general hypothesis, Jackson and Harkins (1985) employed a shouting task (shout Raaaah for as long as possible) with female undergraduates. The manipulation of expectation was accomplished by confederates, acting as the other half of the dyad, who would feed their partners contrived performance feedback from the confederate's pre-trials on the shouting tasks. There were four experimental conditions where all subjects shouted alone and with a partner. In the alone condition, subjects simply performed the shouting task without a partner. When in the "high-effort group condition", the confederate told her partner that "she had tried very hard on the practice trial and, because she thought the research was interesting, she was going to try hard throughout the experiment." Those subjects in the "low-effort group condition," the confederate told her partner that "she had not tried on the practice shout and, because she thought the research was boring, she wasn't going to try hard during the rest of the experiment." And, in the "social loafing replication group condition," the confederate provided her partner no information on practice trial performance. This condition was a means to replicate social loafing behavior as originally described by Latane' et al. (1979).

The researchers cite the following data as support for the expectation explanation and concluded that individuals "who expect their co-performers to loaf, will reduce their own efforts to establish an equitable division of labor" (p. 1199). For the social loafing replication condition, subjects shouting alone generated more noise (mean = 4.58 dynes/cm) than when they thought they shouted with a partner (mean = 3.6). These alone/group differences in performance were eliminated in the high-effort and low-effort conditions. In the high-effort condition the alone performance mean was 6.77 dynes and the group mean was 6.66 dynes. A similar pattern was observed in the low-effort condition where subjects generated similar levels of noise in the alone (mean = 3.73) and group (3.45) settings than was generated by subjects in the "no

manipulation" condition. The performance of subjects in the alone and group low effort conditions was less than that for subjects in the alone and group social loafing replication conditions. In addition, to rule out the sucker effect explanation as the cause of the loafing effect, Jackson and Harkins (1985) performed a manipulation check whereby subjects were asked to indicate whether their partners were more, less or equally capable as themselves at performing the shouting tasks. The self-report data indicate there were no reliable differences in ability.

In contrast, Williams and Karau (1991) used an "idea generation" task in three experiments to test the "social compensation" hypothesis of social loafing which is in opposition to the hypothesis offered by Jackson and Harkins (1985). The social compensation hypothesis states "that people will work harder collectively than individually when they expect their co-workers to perform poorly on a meaningful task" (p. 570). Therefore, worker expectation was a common theme in the three studies. In Experiment 1, expectations of co-worker performance were inferred from participants' interpersonal trust levels; in Experiment 2, expectations of co-worker effort were manipulated by a confederate's statement of his or her intended effort; in Experiment 3, the manipulation was accomplished by a confederate's statement with respect to his or her ability at the task. In both experiments, productivity data were used to confirm social loafing behavior and self-report data provided the basis for concluding that "social compensation" accounted for the performance decrements.

The research by Sanna (1992) offers a variation on the expectations explanation. Sanna (1992) looked at self-efficacy and its effects on social loafing. Specifically, Sanna (1992) incorporated the two aspects of Bandura's (1977) self-efficacy theory, efficacy expectancy and outcome expectancy, into two experiments. Self-efficacy theory contends that:

> A person's motivation is determined by two related expectancies: an efficacy expectancy, the belief by a person that he or she is capable of performing the requisite behavior; and an outcome expectancy, the belief by a person that a given behavior or set of behaviors will lead to a given outcome (Sanna, 1992, p. 774).

Sanna tied efficacy and outcome expectancies to social loafing through the hide in the crowd explanation (Williams, Harkins, & Latane', 1981) and used the Sanna and Shotland (1990) research findings as a foundation for the connection. Recall that the hide in-the-crowd explanation ascribes social loafing to the perception that an individual cannot receive credit nor blame for performance because of the absence of evaluation and anonymity. The Sanna and Shotland (1990) findings indicate that when individuals expected to perform well, they also expected a positive evaluation from an audience, and performance improved relative to individuals who worked alone. But, when individuals expected to perform poorly, they expected a negative evaluation from an audience, and performance was impaired relative to individuals who worked alone. With respect to social loafing, then, the typical collective work setting creates a "loose performance-outcome contingency at best" (Sanna, 1992, p. 776).

Therefore, Sanna (1992), using a vigilance task and a word associates task, tested contrasting predictions: an interaction of high-efficacy expectancy (expected high ability) with high-outcome expectancy (expect individual evaluation) will produce expectations of positive evaluation and improved social performance; whereas an interaction of low efficacy expectancy (expected low ability) with high-outcome expectancy will produce expectations of negative evaluation and impaired social performance. Performance data and self-report data were used to support the three conclusions: (1) efficacy expectancy and outcome expectancy jointly affect individual performance when subjects are engaged in a computer simulated vigilance task, (2) social loafing behavior is influenced by efficacy- and outcome expectancies occurring

jointly, and (3) social loafing behavior is a function of the interaction between low efficacy expectancy and high-outcome expectancy.

The output equity explanation studies suggest that social loafing behavior is a function of (a) working co-actively in a group, (b) perceiving that another group member is capable of performing the task but that capable group member is not working at his or her level of capability, (c) preferring to fail to work at his or her level of capability rather than be taken advantage of by perceived co-loafers, and (d) having a low-efficacy expectancy together with a high-outcome expectancy.

Hide in the Crowd Explanation. Hide in the crowd/lost in the crowd social loafing appear to be two sides of the same coin in that they share the common property of causing some degree of social loafing, however, they are subtly different. With respect to the hide-in-the-crowd explanation, when individual performance is not explicitly identifiable, the presence of group members provides a cover of anonymity for the "unmotivated" individual (Williams et al., 1981). Thus, "individual outputs were lost in the crowd, submerged in the total" (Harkins, 1987, p. 6), providing an opportunity for the "unmotivated" individual to hide in the group and, thereby, avoid any blame for slacking off. On the other side, the lost in the crowd explanation states that when individual contributions to the total group effort can not be identified, loafing is said to occur because individuals "feel lost in the crowd and unable to command their fair share of the credit" (Brickner et al., 1986, p. 763). While both explanations are referred to in the social psychology literature, the empirical investigations of social loafing as a function of the lack of identifiability and evaluation of individual performance do not make a clear distinction between the two. Therefore, for the present purpose, both explanations will be subsumed under the hide in the crowd explanation.

The hide-in-the-crowd explanation of social loafing has been derived from studies in which subjects engaged in a physical task (Kerr & Bruun, 1981; Williams et al., 1981) and in which subjects engaged in a cognitive task (Bartis, Szymanski, & Harkins, 1988; Earley, 1989; Harkins, 1987; Szymanski & Harkins, 1993). While the focus of these investigations was to determine the cause(s) of social loafing behavior, the researchers may have demonstrated that the potential for individual identification and evaluation as an effective intervention strategy.

Performance and self-report data have been offered as support for a variety of hypotheses consistent with the hide-in-the-crowd explanation. For example, Williams et al. (1981) suggest that (1) "if identifiability is the mediator, then convincing people that their outputs are never identifiable, when they perform alone, should cause them to perform at a consistently low level across all group sizes" (p. 307). Harkins (1987) hypothesized that identifiability interacted with the mere presence of others (group size), whereas Kerr and Bruun (1981) postulated that "for fatiguing motor tasks subjects will take advantage of the anonymity afforded by working in larger groups and reduce their efforts" (p. 228). The hypotheses for social loafing involving cognitive tasks are more complex. Earley (1989) hypothesized that:

> Cultural beliefs about individualism (characteristic of U.S. workers) and collectivism (characteristic of Peoples Republic of China workers) would moderate the interactive effects of shared responsibility (working collectively in a group) and accountability on personal performance such that the reduced performance associated with social loafing would occur for individuals with highly individualistic beliefs but not for individuals with highly collectivistic beliefs (pp. 2-3).

Finally, Szymanski and Harkins (1993), who were interested in the effects of self evaluation on social loafing, investigated the notion that "the potential for experimenter evaluation may capture the participants' attention to such an extent that they disregard the potential for self-evaluation" (p. 274) and, therefore, tested the "potency of the self evaluation effect and the effect of experimenter evaluation on self evaluation" (p. 275).

The following discussion covers one experiment employing a physical task (Williams et al., 1981) and one experiment employing a cognitive task (Bartis et al. 1988). The first of the hide-in-the-crowd investigations was conducted by Williams et al. (1981) who manipulated group size (alone, actual groups of 2 and 6, pseudogroups of 2 and 6) and identification of individual productivity levels to test the hypothesis that identifiability is an important mediator of social loafing. Using a within-subjects design, each subject shouted as loud as they could during 5-sec trials when alone and when in groups of 2 and 6. Throughout the trials, subjects wore blindfolds and earphones and, therefore, had no contact with co-workers. Identification was manipulated through verbal instructions. Using the prototypic social loafing paradigm to get a measure of social loafing behavior, subjects in the alone condition were told their performance could be identified, whereas, when they shouted in the group condition, subjects were told only the summed performance of the group could be tracked. To investigate the identifiability hypothesis, Williams et al. (1981) instructed subjects in the group conditions that individual performance could be identified and they had subjects wear individual microphones. Subjects shouted in seven experimental conditions: alone and in groups of 2 and 6 when individual performance was unidentifiable; pseudogroups of 2 and 6 when individual performance was unidentifiable; and in groups of 2 and 6 when individual performance was identifiable.

The following data have been offered as evidence of the hide in the crowd effect of social loafing. First, subjects averaged 9.50 dynes/cm per trial when shouting alone, pairs only averaged 59% of the alone level and groups of six averaged only 31%. In pseudogroups, subjects made 69% as much noise when they shouted in pairs and 63% of the alone level when they perceived they were shouting with five others. From these data, it was concluded that social loafing had occurred and that social loafing behavior increased with increases in group size. Second, when the identifiable

condition groups of two subjects shouted at 98% of the alone level and at 92% when shouting in groups of 6. And, when comparing the performance of subjects shouting in the group-identifiable condition to that of subjects in the group-unidentifiable condition, the difference in performance was said to be statistically significant at $p < .0005$. Williams and his colleagues concluded that social loafing had been discouraged by the introduction of the identifiability variable.

Bartis et al. (1988) integrated Amabile's (1979) research on creativity into their investigation of the hide-in-the-crowd explanation. Amabile (1979) contends that minimizing the expectation of evaluation facilitates performance on creativity tasks. This notion runs counter to the general hide-in-the-crowd hypothesis that the absence of identifiability and evaluation leads to lower performance levels. Following Amabile's contention, Bartis et al. (1988) hypothesized that evaluation attenuates social loafing behavior when subjects are involved in an algorithmic task and that evaluation contributes to lowered performance levels when subjects are involved in a heuristic task. An algorithmic task is defined as one which is routine with a straightforward solution path and a heuristic task is defined as one that is interesting and which does not have an obvious solution path. Thus, Bartis et al. (1988) hypothesized that evaluation mediates social loafing behavior when subjects are involved in an algorithmic task and that evaluation contributes to lowered performance levels when subjects are involved in a heuristic task.

To test their hypothesis, Bartis et al. (1988) manipulated performance evaluation (experimenter evaluation vs. no experimenter evaluation) and task type (number/algorithmic vs creativity/heuristic instructions). A brainstorming task was employed in which subjects in the number/algorithmic condition were told to generate as many uses as possible for a knife; whereas subjects in the creativity/heuristic condition were told to come up with creative uses for the knife and not to worry about

the quantity of uses they generate. Creativity points, ranging from 1 (for not at all creative) to 11 (extremely creative) were assigned to each use by six raters. The evaluation variable was manipulated through verbal instructions. Subjects in the experimenter evaluation/creative task condition were told that only the experimenter would be aware of their responses and would evaluate the level of creativity; in the experimenter evaluation/number task condition subjects were told only the experimenter would know how many uses they generated; subjects in the no evaluation/ creativity task and the no evaluation/number task conditions were told that no one would track their individual performance. Because the researchers were not interested in social loafing group effects, group size was not manipulated as had been the case in all the studies which came before.

The performance data indicate, at least to some extent, that the Bartis et al. (1988) hypothesis was supported. Subjects who were given the number instructions generated more uses in the evaluation condition (M = 22.9) then were generated in the no evaluation condition (M = 16.6). The researchers concluded from these data that previous loafing research had been replicated. Subjects given the creativity instructions generated an average of 13.4 uses in the evaluation condition and an average of 12.6 uses in the no evaluation condition. These data lead Bartis and his colleagues to conclude there was no reliable difference in performance. With respect to creativity, points were assigned to the uses generated in all experimental conditions. Uses generated in the number instruction/evaluation condition received a mean rating of 2.2 and the uses generated in the number instruction/no evaluation condition received a mean rating of 2.0. This difference was considered to be statistically insignificant at $p < .01$. Uses generated in the creativity instruction/no evaluation condition received a mean rating of 3.1 and uses generated in the creativity instruction/evaluation condition

received a mean rating of 2.5. This difference was considered to be statistically significant at $p < .20$.

Consistent findings across the studies suggest that hide-in-the-crowd social loafing is characterized not only by the coaction setting and group size but also by: (a) anonymity within the group effort context, (b) absence of individual performance evaluation, (c) engaging in either a physical or cognitive task, and (d) group members possessing an individualistic repertoire rather than possessing a collectivistic repertoire.

Matching to Standard Explanation. In contrast to the hide in the crowd/lost in the crowd explanations, the matching to standard explanation suggests that "identifiability alone may not be sufficient to eliminate loafing" and "motivation may come from the participant's knowledge that his or her performance can be compared to the performances of other participants" (Harkins & Jackson, 1985, p. 458). Put another way, social loafing behavior is not merely a function of lack of identifiability. Group members must also believe that their performance can not be compared and, therefore, can not be evaluated even if identification were possible. So if there is no standard of comparison to determine the relative characteristics of good or bad performance, it does not matter whether individual outputs can be measured.

Other hypotheses have been offered. Szymanski and Harkins (1987) hypothesized that the opportunity for self-evaluation was "motivation" enough to eliminate social loafing and, therefore, experimenter evaluation was not necessary when subjects are provided with a social standard (based on the average performance by participants in a previous study) against which they could evaluate their own performance. In contrast, Harkins and Szymanski (1988) hypothesized that the opportunity to compare one's performance against an objective standard (a pre determined criterion) is sufficient to motivate performance. Finally, Harkins and

Szymanski (1989) hypothesized that "the possibility of group evaluation could motivate performance in the absence of the potential for individual-level evaluation by any source" (p. 935) and "the prospect of evaluation by the experimenter would not motivate performance at the group level" (p. 939).

A discussion of two studies which are illustrative of both the identifiability (Harkins & Jackson, 1985) and the evaluation (Szymanski & Harkins, 1987) lines of investigation is presented. Harkins and Jackson (1985) used a brainstorming task, generating uses for a knife, and a between-subjects design to test their identifiability hypothesis. Subjects, in groups of four, were assigned to one of four experimental conditions in which identification (individually identifiable vs pooled outputs/not identifiable) and comparability (comparable vs. not comparable) were manipulated. Identifiability was manipulated through verbal instructions and by having all group members when working in the unidentifiable condition put the slips of paper containing uses in one common box, and when working in the identifiable condition put the slips of paper into a designated compartment of the box. However, individual performance in all conditions was tracked because each subject was given only a certain number of blank slips of paper. The number of unused slips was used to reveal the number of uses generated. Comparability was manipulated by informing subjects that the object for which they were generating uses was the same as (comparable) or different from (not comparable) the object given to other members of the group. Comparability, than, consisted of the subject believing, because they were generating uses for the same object, that the experimenter could compare his or her performance level with that of other subjects. The success of this manipulation was evaluated via self-report data.

The performance data indicated that subjects who were individually identifiable generated more uses (M = 22.3) than subjects in the pooled, unidentifiable condition

(M = 19.6). In addition, subjects who believed their performance could be compared to others generated more uses (M = 22.4) than those who believed comparability was not possible (M = 19.5). Harkins and Jackson concluded there was a statistically significant main effect for identifiability and for comparability. Subjects whose outputs were identifiable and comparable to others produced more uses (M = 24.9) than were produced by groups of four in the pooled/comparable, pooled/not comparable, and identifiable/not comparable conditions. In addition, Harkins and Jackson concluded that there was a statistically significant interaction effect ($p < .05$) and that the absence of individual identifiability and opportunity for comparability of performance foster social loafing and the presence of identifiability and comparable evaluation eliminate it.

Szymanski and Harkins (1987) used the same brainstorming task employed by Harkins and Jackson (1985) to test their hypothesis about the sufficiency of self evaluation to eliminate social loafing behavior. Subjects were assigned to one of four experimental conditions: (1) experimenter evaluation/self-evaluation, (2) experimenter evaluation/no self-evaluation, (3) no experimenter evaluation/self- evaluation, and (4) no experimenter evaluation/no self-evaluation. The potential for experimenter evaluation was manipulated by telling subjects that the experimenter would count the number of uses, for each subject, at the end of the trial or that the experimenter would not be able to identify individual effort. The opportunity for self-evaluation also was manipulated via verbal instructions. Subjects in the self-evaluation condition were told that, at the end of the trial, they would be provided with the average number of uses generated by subjects in a previous experiment. The performance data from a previous experiment served as the social standard. Conversely, subjects in the no self-evaluation condition were told that "to ensure confidentiality, this information would be withheld" (p. 893).

Analysis of performance data revealed differences across the four conditions. Subjects in the experimenter evaluation/self evaluation condition generated a mean of 23.6 uses, whereas those in the experimenter evaluation/no self-evaluation condition generated a mean of 27.0 uses for a knife. Szymanski and Harkins (1987) concluded that "experimenter evaluation led to equivalent performances in the self-evaluation and no self-evaluation conditions." (p. 896). However, means of 23.6 and 27.0 are not equivalent and some explanation needs to be offered for the discrepancy between the two. Further, they concluded that these data support the notion that the "potential for experimenter evaluation motivated performance, regardless of the potential for self evaluation" (p. 894). Subjects in the no experimenter evaluation/self evaluation condition generated more uses (M = 28.6) than did subjects in the experimenter evaluation/self-evaluation condition (M = 23.6) and subjects in the experimenter evaluation/no self-evaluation condition (M = 27.0). Yet, Szymanski and Harkins (1987) concluded that "self-evaluation alone motivated participants to generate as many uses as were generated in the experimenter evaluation conditions." (p. 896). The data do not support this conclusion because a mean of 28.6 is bigger than a mean of 23.6, and both experimenter and self-evaluation were manipulated simultaneously, therefore, the independent effects of self-evaluation can not be determined from these data. Finally, the fact that subjects in the no experimenter evaluation/no self-evaluation condition produced far less uses (M = 16.8) than subjects in any of the evaluation condition lead the researchers to conclude that performance evaluation is an essential ingredient to the elimination of social loafing.

Absence of Personal Involvement Explanation. The absence of personal involvement explanation contends that social loafing behavior is influenced by task characteristics. In situations where individual efforts are pooled and, therefore,

individual effort is masked by the group product, social loafing may occur when the task is "intrinsically uninteresting" (Geen, 1991, p. 385) or in "situations that subjects find personally uninvolving" (Brickner, Harkins, & Ostrom, 1986, p. 763).

Studies by Brickner et al. (1986), George (1992), and Price (1987) have looked at the effects of the absence of personal task involvement on group productivity. Situations that individuals find personally involving are "those that have intrinsic importance, personal meaning, or result in significant consequences for their lives" (Brickner et al., 1986). In all these studies, personal task involvement was examined in conjunction with the hide-in-the-crowd explanation of social loafing. Therefore, to some extent, identifiability played a role in the observed effects.

In three identical studies, Brickner, Harkins and Ostrom (1986) hypothesized:

> That persons working on involving tasks would be willing to invest greater amounts of effort in the task than would persons who were unlikely to be personally affected by task outcomes. These effects should persist even in group situations in which participants are told that individual outputs will not be measured (p. 764).

Further, Brickner et al. (1986) have characterized involving tasks as those which have "future consequences for participants" (p. 764).

To test this hypothesis, undergraduate students, working in pairs, were asked to "list the thoughts that a proposal on the introduction of senior comprehensive exams brought to mind" (p. 764). The proposal was considered to be of importance to undergraduates who would be affected by the comprehensive exam requirements. Personal task involvement was manipulated by telling subjects that the proposal was under consideration for adoption at their school in the upcoming year (high involvement, all replications), or that it was being considered for adoption at another school (low involvement, replications 2 and 3), or that it was being considered for adoption at their school in six years (low-involvement, replications 1 and 3). Subjects recorded their opinions on separate slips of paper and put them in tubes that went to

collection boxes. Identifiability was manipulated by verbal instructions and by showing subjects a collection box which either had dividers for individual performance tracking or no compartments for the group performance condition. Subjects in the high-identifiability condition, were told that their individual performance would be tracked, whereas subjects in the low identifiability-pooled condition were told all responses would be combined and presented as a group effort. This study, and all the investigations of personal involvement, personal task involvement was examined in conjunction with the hide-in-the-crowd explanation of social loafing. The number of opinions generated by each subject during a 12-min period was the primary dependent variable, while self-report data were employed for a manipulation check. Subjects in studies 1 and 2 were paid $3.00 for their participation.

The performance data indicated similar results for the three studies. An interaction effect for identifiability and involvement was observed. Pairs in the low involvement/high identifiability condition generated more thoughts (M = 8.65) than did pairs in the low involvement/low-identifiability-pooled condition (M = 6.82). These data were used to draw the conclusion that the Brickner et al. (1986) studies had replicated the results of previous loafing research. Pairs in the high-involvement/high identifiability condition generated a mean of 9.15 thoughts, which was only slightly higher than the mean of 8.87 thoughts generated by the high-involvement/low identifiability-pooled pairs. Main effects for involvement and identifiability were found in that pairs in the high-involvement conditions generated more thoughts (M = 9.01) than did pairs in the low- involvement condition (M = 7.74), and pairs in identifiability conditions generated more thoughts (M = 8.90) than did pairs in the low-identifiability pooled conditions (M = 7.74).

A manipulation check was conducted using questions anchored on an 8-point scale. In all three studies, when asked "How important is this proposal to you?"

subjects in the high-involvement conditions reported a mean score of 5.93 and subjects in the low-involvement conditions reported a mean score of 5.38. Additionally, in studies 2 and 3 subjects were asked "How likely is this proposal to affect you personally?" Subjects in the high-involvement conditions rated the proposal as more likely to affect them personally (M = 5.88) than did subjects in the low-involvement conditions (M = 4.36). A main affect for identifiability was not obtained in any of the three studies. However, post-hoc analysis showed no significant differences between the responses of high- and low-involvement.

From the performance and self-report data, Brickner et al. (1986) drew these conclusions:

> We demonstrated the importance of personal involvement in group situations. When subjects thought that they were likely to be personally affected by the outcomes of their efforts, they did not loaf, whether or not their products were identifiable. Participants in low-involvement conditions, on the other hand, were willing to work only when their responses were identifiable. When they were not, hey loafed. In the absence of intrinsic interest, expected personal consequences, personal meaning, or expectations of evaluation of individual effort persons reduced their efforts (p. 767).

Solutions for Social Loafing

The results of nine studies have been offered as evidence for the efficacy of a variety of intervention strategies. Researchers have suggested that difficult or challenging tasks (Harkins & Petty, 1982; Jackson & Williams, 1985), punishment (Miles & Greenberg, 1993), non-monetary incentives (Shepperd & Wright, 1989) and goal setting combined with vicarious punishment (Schnake, 1991) are useful in the elimination of social loafing behavior.

Difficult or Challenging Tasks. In five systematic replications, Harkins and Petty (1982) offered the general hypothesis that:

> Lack of identifiability may not be a sufficient condition for social loafing. Loafing may also require that subjects feel that the group task does not afford them an opportunity to make a contribution substantial enough to warrant their best efforts (p. 1216).

From this general hypothesis, the researchers speculated that social loafing could be reduced either by increasing the difficulty (challenge) of the task or by giving each subject a different task to perform, thereby, giving each group member the perception that his or her unique talents and skills are required.

Jackson and Williams (1985) followed up the Harkins and Petty (1982) studies by taking a different approach to the notion that working collectively can improve performance when individuals are engaged in a difficult task. Jackson and Williams (1985) suggest that working collectively on simple tasks "reduces the drive to exert effort" and, therefore, "working collectively is calming" (p. 938) which leads to social loafing. Drawing upon social facilitation theory, they suggest that increased drive leads to poor performance on difficult tasks. So, if "one could relax when working on a difficult task, then presumably the opportunity for correct responses would increase. Logically, therefore, working collectively should decrease drive, which would result in enhanced performance on difficult tasks" (pp. 938-939). Thus, Jackson and Williams (1985) hypothesized that working collectively would improve performance on difficult tasks.

This experiment also differed from the Harkins and Petty (1982) investigations with respect to the conceptualization of the social loafing paradigm. Jackson and Williams (1985) contend that the group size manipulation in most social loafing research does not involve an alone vs group condition. Rather, they insist that the alone baseline condition is really a condition in which other participants are always present and each subject's performance is individually tracked. Therefore, the comparisons in this study include a co-worker condition (working in pairs with

performance individually identified) vs. a collective worker condition (working in pairs with performance combined as a group product). Because the researchers were simultaneously investigating social facilitation, an alone condition was also included. However, because our interest is solely with social loafing the alone condition and social facilitation results will not be considered. The group size manipulation was crossed with a simple vs. difficult task manipulation. The task was to maneuver, as fast as possible, a cursor through eight mazes on a computer. Simple mazes had wide paths, a few blind alleys and obvious solution paths, whereas difficult mazes had complex narrow paths, many blind alleys and the solution was not obvious. Because task difficulty was a within-subject manipulation, all subjects completed both the simple and difficult mazes with the simple and difficult mazes alternating on the computer.

The primary dependent variable was a duration measure - the time elapsed from beginning to completion of the eight mazes. These performance data were reported in log-seconds per correct maneuver. A comparison of the performance in the co-work /simple condition (M = -0.37 log seconds) with the performance of subjects in the collective/simple condition (M = -0.23) led Jackson and Williams (1985) to conclude that the social loafing replication was only marginal. They speculated that the lack of an effect was due to a ceiling effect with respect to time to complete the mazes. However, subjects in the co-workers/simple task condition, who were supposedly identifiable, tended to perform more quickly than did subjects in the collective/simple task condition, who were supposedly unidentifiable. With respect to the difficult task, subjects in the collective/difficult task condition worked faster (0.37 log seconds) than did subjects in the co- worker/difficult task condition (0.58). These data led to the conclusion that "working collectively enhanced performance on difficult tasks and impaired performance on easy tasks, whereas those working co-actively performed better on simple tasks and worse on complex tasks" (p. 941).

Non-Monetary Incentives. Shepperd and Wright (1989) investigated the usefulness of a non-monetary incentive as a solution for social loafing. They hypothesized that "when faced with a request to 'do your best' individuals are expected to take into account both the costs and benefits of doing so. If available incentives (benefits) are sufficient to justify the costs of a best effort, then a high level of performance would be expected" (p. 142). To test this hypothesis, subjects working individually and engaged in generating uses for a knife were assigned to one of four conditions: individual/no incentive, individual/incentive, group/no incentive, and group/incentive. The group size manipulation involved telling subjects they alone would be generating uses for the knife or that they would be generating uses along with others. The incentive manipulation entailed telling subjects that they would be given an incentive if they generated as many uses as they were capable of based upon their best effort. The incentive was the opportunity to leave the experiment early and, thereby, avoid a tedious memorization task later in the session.

The performance data were as expected. Subjects in the individual/no incentive condition generated more uses than did subjects in the group/no incentive condition. These data were considered indicative of social loafing in that subjects whose efforts were not identifiable put forth less effort than subjects who could be identified. Subjects in the group/incentive condition performed better than did subjects in the group/no incentive condition leading to the conclusion "as predicted, anonymous group members will not reduce their efforts when there is sufficient justification for a high level of effort" (p. 147).

As with many other investigations of social loafing this study relied heavily on self-report data to infer the cause of social loafing behavior. For example, the differences between mean responses to a questionnaire item regarding the sufficiency of

the incentive were sited as proof that the value of the incentive eliminated social loafing behavior in the group/incentive condition. A comparison of mean responses (on a 9 point Likert scale) for subjects in the group/no incentive condition (M = 4.60) and for subjects in the group/incentive (M = 6.00). These two means are not that different, yet, the performance data (M = 18.9 vs. M = 26.85) clearly show that performance was better when subjects were promised a performance incentive.

Punishment. Miles and Greenberg (1993) took the investigation of cures for social loafing into the widely studied area of punishment, a stimulus that is often associated with inadequate performance. The researchers investigated the effects of punishment threats on relay swimming performance by high school students. Two hypotheses were offered: (1) when punishment threats are not given, subjects will swim more slowly when performing as members of four-person groups than when swimming as lone individuals, and (2) when punishment threats are given, subjects will swim equally fast when swimming as lone individuals as when swimming as members of four-person groups.

Two independent variables, performance setting and punishment, were manipulated. The performance setting involved subjects being assigned to either an individual or a group condition. Subjects in the individual condition were assigned to a group of four swimmers but individual performance (in seconds) was tracked on swimming 100 yards freestyle. In the group condition, the time for all four members to swim 100 yards freestyle each was the measure of interest. There were three levels of the punishment variable: none (no punishment was threatened); moderate (swimming four freestyle laps = 200 yards); severe (swimming eight freestyle laps = 400 yards). Punishment would be given for failure to reach the pre-established performance goal. The goal for individuals was 1 minute 8 seconds and the goal for the groups was 4

minutes 32 seconds (4 x 1 minute 8 seconds). These manipulations resulted in six experimental conditions: individual without punishment; group without punishment; individual with moderate punishment; group with moderate punishment; individual with severe punishment; group with severe punishment.

The performance data were mixed with respect to the hypotheses. First, subjects in the individual/no punishment condition (1 min 6.3 sec) swam faster than subjects in the group/no punishment condition (1 min 13.49 sec), leading Miles and Greenberg to conclude that social loafing had occurred and hypothesis 1 was supported. Second, performance in the individual/ moderate punishment condition (1 min 8.33 sec) and in the group/moderate condition (1 min 9.31) were comparable, resulting in the conclusion that hypothesis 2 was supported. However, a reverse effect was observed in the severe punishment conditions where subjects in the individual/ severe punishment condition (1 min 10.19 sec) performed worse than subjects in the group/severe punishment condition (1 min 4.8 sec).

There are some additional, and perhaps more interesting, data which should have been discussed. First, with respect to the punishment variable, there was a reverse effect between the individual and group conditions. In the individual conditions, the greater the punishment the poorer the performance. In the group conditions, the greater the punishment the better the performance. Second, in all but one of the punishment conditions (group/severe), the goals were not achieved, therefore, punishment would have been delivered. So, while it may be that the threat of punishment influenced better performance in the group/severe condition and equal performance in the individual/ moderate and group/moderate conditions, the fact remains that threats of punishment did not lead to reaching the performance standard for many swimmers. These two points are particularly important to OBM practitioners

who are seeking solutions to performance deficiencies associated with the social loafing phenomenon.

Goal Setting and Vicarious Punishment. Unlike Miles and Greenberg (1993), Schnake (1991) explicitly manipulated goal-setting and vicarious punishment in his investigation of solutions to social loafing as described by the output equity explanation, more specifically as a function of the sucker effect. Much like Jackson and Harkins (1985), Schnake conceptualized social loafing as an expectancy that co-workers will loaf, so the individual reduces his or her efforts to achieve some equity in effort. In the present study, Schnake speculated that "social cues" from group members could create such an expectancy and that goal-setting and punishment could turn such social loafing off. More specifically, he made three hypotheses: (1) negative social cues that suggest that the co-worker intends to withhold effort will have a detrimental effect on quantitative task performance, (2) challenging goals will offset the effects of negative social cues on quantitative task performance, and (3) vicarious punishment will offset the effects of negative social cues on quantitative task performance.

Summary. All of the social loafing studies taken together make some general conclusions possible. First, decrement in individual performance appears to occur when people work coactively in groups (the efforts of 2 or more individuals is summed and presented as the collective efforts of the group). Second, this social loafing behavior seems to generalize to physical tasks (such as shouting, hand-clapping, pumping air, blowing air, freestyle swimming), cognitive tasks (such as brainstorming uses for objects, solving computer mazes, completing in-basket items) and combined cognitive-physical tasks (such as a computer vigilance task). Third, additive, disjunctive and conjunctive tasks seem to be susceptible to social loafing. Fourth,

social loafing has been observed in real groups of people ranging from 2 to 10 and in pseudogroups of up to 10 people. Fifth, the degree of social loafing appears to increase as group size (and pseudo-group size) increases with groups of two working at only a 71% level of alone subjects and groups of six generating effort at only 40% of the alone level. This only holds for groups up to 6 members. Sixth, social loafing behavior appears to occur with male and female undergraduate students, high school age swimmers, and managerial trainees in the United States. Seventh, social loafing may be more likely to occur with individuals who have been exposed to an individualistic rather than collectivistic culture. Eighth, consequences such as punishment and incentives may be effective intervention strategies.

While these findings have utility in that they provide more information about the variables that impact upon behavior in group environments, from a practical and behavior analytic perspective, these studies have not answered real world questions about social loafing behavior. First, the theories of causation have been built, primarily, upon self-report data. While subjective data may be a useful supplement to objective data, they are no substitute. Functional relations only can be derived from objective evaluation of behavior as it occurs (Skinner, 1953).

The second problem is that the vast majority of the studies analyzed behavior with between-subjects comparisons. In a few cases the group-size IV was arranged as a within-subject manipulation, however, only 2 to 4 data points were collected in each phase and the unit of analysis was group performance. The use of a within-subjects design to assess social loafing in the laboratory has practical benefits for the real world and is consistent with the recommendation by Balcazar, Hopkins and Suarez (1989) that "future simulation studies should better reflect the *Journal of Organization Behavior Management's* historic tradition of within subject (group) designs" (p. 35). It is typically difficult to employ a between-subjects design in an organization (Komaki,

1982): (a) an equivalent control group is difficult to achieve, particularly in smaller organizations, and (b) collateral negative effects are often generated when one group of employees receives a treatment and the control group does not. This is especially the case when reward systems and monetary incentives constitute the intervention strategy. The use of a within-subjects design obviates both problems in that in-tact groups can serve as their own control group, and all subjects in the experiment are exposed to all treatment levels. Also, the use of within-subjects designs has an especially important benefit when working with small-businesses in that large numbers of employees are not needed to demonstrate an effect. Finally, tracking individual performance over time can reveal important temporal aspects of social loafing and provide answers to such questions as: "Does social loafing occur immediately upon being placed in a group coaction setting or does it arise gradually and grow in strength the longer the individual is exposed to the group contingencies?" "Does social loafing occur continuously after the first instance or is it cyclic?"

The third problem concerns external validity. The generality of the results from the social loafing research is limited given that none of the studies were designed to be laboratory analogues of the real world. Simulation of the essential aspects (i.e., work tasks and physical work environment) of the real world better insures generalization to those settings (Barlow & Hersen, 1984; Dickinson, 1991). Many of the studies employed such performance tasks as shouting "Rah Rah", clapping hands, and air pumping. While these tasks could be viewed as analogues of physically demanding work tasks, the actual environments in which such behaviors would likely occur were not arranged in the laboratory setting. Only three social loafing studies (Earley, 1989; Miles & Greenberg, 1993; Schnake, 1991) attempted to simulate the context in which the performance task would likely occur. Conversely, it seems that painstaking effort was taken to control for contextual factors. For example, Latane' et al. (1979) had

subjects wear headphones and blindfolds so that subjects could not hear nor see others in their group, and Harkins and Petty (1982) placed partitions between workers. This was done to prevent subjects from being influenced by the performance of others in their group. While it is always a good thing to eliminate confounding variables, in this case the experimental controls eliminated an essential aspect of the work environment that is always present when people work in groups. Given that the environmental context in which social loafing behavior occurs was not addressed, the contingency arrangement that constitutes the functional relation of social loafing has not been investigated.

Rationale for the Current Study

While the utility of the social psychology literature is questionable, it seems reasonable to conclude, given the plethora of research on the topic and the growth of the teamwork concept, that organizations wishing to use teams to improve performance should give some attention to social loafing. However, after an extensive literature search across the fields of management and organizational behavior management, only one study on social loafing and teams was uncovered. The article, by George (1992), appeared in the *Journal of the Academy of Management*, and was an investigation of extrinsic and intrinsic motivation as a source of social loafing. This was a correlational study with findings that relied upon self-report data.

Given the current trend of industry toward teamwork and the use of group incentive pay systems, the potential that social loafing exists in the real world, and the fact that monetary incentives effectively increase productivity when individuals are working alone and with others, an empirical investigation of the effects of monetary incentives on social loafing using behavior analytic technology is a logical step. The current study, by addressing the group phenomenon of social loafing, provides

valuable information to designers of incentive pay systems and to organizations with team cultures.

This study is a systematic extension of the previous incentive pay system studies conducted by Smoot and Duncan (1997). The current study brought together the fields of teamwork, management, social psychology and behavior analysis to answer questions that are critical to designing a work environment that supports performance improvements. Consistent with those earlier studies, this study employs a laboratory analogue of the real world. Generally, by employing tasks and work conditions that simulate a real work environment, the study takes the first step to determining whether social loafing occurs in the real world of work and, if it does occur, what effects incentive pay systems have on social loafing behaviors. Because there is no evidence that social loafing actually exists in the real world, there was a possibility that social loafing will not occur in this study. However, the results of this study can still be useful to those involved in designing monetary incentive systems. The data on the group and individual incentive pay conditions provide additional information on the characteristics of the optimum monetary incentive pay system.

Specifically, this study sought to answer seven research questions. First, does social loafing (decrement in individual performance when working in a group coaction setting) occur when a group of 3 workers engaged in a simple construction task are paid a flat, hourly-type rate? Second, if social loafing occurs what effect will group monetary incentives have on social loafing behavior when the incentives are paid as an equal-share of the group's total earnings? Third, if social loafing does not occur will equal-share group incentives have any effect on individual performance beyond that observed when subjects received flat pay while working in a group coaction setting? Fourth, if social loafing occurs what effect will individual monetary incentives have on social loafing behavior when incentive pay is based solely on individual widget

production? Fifth, if social loafing does not occur will individual incentives have any effect on individual performance beyond that observed when subjects received flat pay while working alone? Sixth, which monetary incentive system, linear (group equal-share or individual payout), positive acceleration (group equal-share or individual payout), negative acceleration (group equal-share or individual payout), is better at managing performance improvements? Seventh, which monetary incentive system, linear (group equal-share or individual payout), positive acceleration (group equal-share or individual payout), negative acceleration (group equal-share or individual payout), is most cost effective?

CHAPTER II

METHOD

Subjects

The investigator received permission from the Human Subjects Institutional Review Board (HSIRB) of Western Michigan University to employ human subjects for the completion of this study. A copy of the HSIRB's approval form is included as Appendix A.

Eighteen subjects were recruited from psychology classes at a large midwestern university. In each class, the investigator read a recruitment script which informed students of the purpose of the study, described the experimental task and detailed participation requirements. In addition, the voluntary nature of participation, the right to withdraw at any time without any penalty, and the measures taken to protect the privacy of subjects were emphasized. Subjects were also told that they would be paid for their participation (compensation would be determined by the subject's performance) and that subjects completing the study would receive a fifteen dollar bonus plus an additional ten dollars for participation in a debriefing session. Interested subjects were asked to write their name and telephone number on a sheet of paper and to indicate which of three experimental session times they preferred. Potential subjects were also told to expect a telephone call from the investigator to schedule a recruitment interview. The recruitment script is presented in Appendix B.

The recruitment interview was a four-step process. The initial step involved screening subjects on three criteria: (1) availability during the specified work times for

the duration of the study, (2) self-reported financial need (to assess potential sensitivity to the reward value of the monetary incentives), and (3) self-reported absence of personal friends who had volunteered for the study (to avoid confounding of results from extra experimental competitive contingencies). Subject availability was assessed by verbally verifying that the volunteers were, in fact, available at the times they indicated on the initial sign-up form. Financial need and knowledge of personal friends who had volunteered for the study were assessed by having volunteers complete an eight item screening questionnaire. The questionnaire is presented in Appendix C. Volunteers who were unavailable during the specified dates and times for the duration of the study were eliminated from the subject pool prior to administering the questionnaire. Of the remaining pool, subjects who expressed financial need were included in the study. If any of these subjects identified a friend who had volunteered for the study, and who had been selected based on the screening criteria, the friend would be assigned to a different experimental group.

Interested subjects who passed the initial screening participated in the second step of the recruitment interview which involved a demonstration of the experimental task by the investigator. Subjects were told that participation in the study required them to make pop bead widgets during twenty-five, 15-minute sessions. They were then asked if they were still interested in participating. Eighteen subjects indicated they were interested and were passed on to the third step.

During the third-step of the recruitment interview, the eighteen subjects were given an informed consent form and asked to read it and to indicate their acceptance of the conditions of the study by signing the form. All subjects signed the form. A copy of the informed consent form is included as Appendix D.

The final step involved giving each subject a sheet of paper indicating the date and time of the first experimental session. The sheet also contained the name and

telephone number of the investigator. Subjects were asked to contact the investigator if the subject decided to withdraw from the study prior to the first experimental session.

While recruitment was conducted to target both women and men, only women passed the three screening criteria. Therefore, all the subjects for this study were women, yet, there was diversity among the eighteen women. Two subjects were international students, two were occupational therapy majors, two were business majors, eight were psychology majors and six subjects were undecided about their major.

Two subjects withdrew during the study. Even though subjects indicated their availability for the duration of the study, one subject withdrew after the twelfth session citing conflicts between experimental sessions and academic commitments. Another subject withdrew after the eighth session because of a chronic illness. The remaining sixteen subjects completed the study.

Task Description and Setting

The performance task consisted of subjects constructing "widgets" from colored, plastic pop beads. This task was employed in a series of four studies on incentive pay systems conducted by Smoot and Duncan (1997), and the replication of the task in the present study provided consistency when conducting an overall evaluation of the findings of all studies in the series. A pop bead is a spherical object approximately 2.5 centimeters in circumference with a small hole on one side and a small nipple on the other side. A widget is constructed by joining the beads together into a circle. The beads are joined together by inserting the nipple of one bead into the hole of another bead. A correctly made widget consists of 16 beads, 8 white, 4 blue, and 4 purple. Each subject, whether working in the individual or group coaction setting, received 3 containers of pop beads. However, to track individual performance

during the group coaction flat pay condition (Phase B) and group coaction incentive pay condition (Phase C), without subjects being aware, the purple beads were inconspicuously coded. A small dot of permanent paint was placed on the nipple of each bead. Each subject in the group was assigned a different paint color (blue, green or orange).

The present study was conducted in an experimental lab. During the group coaction conditions, subjects worked around a large table. Subjects working in the individual conditions worked at a table in a laboratory cubicle or at a work session isolated from other work stations by wooden partitions.

Dependent Variables

The primary dependent variable was the number of correctly made widgets in each work session within each pay condition. A secondary dependent variable was the cost-per widget in each pay condition. According to Poling, Smith, and Braatz (1993), cost-benefit analyses are useful in determining the effectiveness of the intervention and should be included in all applied investigations. The inclusion of a cost-benefit analysis also seems appropriate when advocating the use of individual monetary incentive pay plans as solutions to productivity problems and the declining position of the United States in the world market. This necessity for cost-benefit analyses of interventions is supported by Blinder (1990) who states:

> If we could figure out a way to make labor 10 percent more efficient, so that an hour of labor time would accomplish what now takes 66 minutes, output per hour of work would rise by about 7 percent with no increase in capital (p. 2).

The results of a questionnaire administered to subjects at the conclusion of the study, during a formal debriefing session, comprised a third dependent variable. The debriefing script is presented in Appendix E. A copy of the questionnaire is included as Appendix F. Analysis of subject responses on the questionnaire was intended to

serve four purposes: (1) to yield a measure of social validity with respect to the research methodology employed in the present study, (2) to provide a manipulation check, (3) to provide supplemental data to the empirical evidence, and (4) to provide a measure of the extent to which subjects viewed the experimental situation as a simulated work environment. The analysis of social validity could be useful to making refinements in future replications and extensions of the present study. With respect to the manipulation check, responses provide a means for determining whether subjects were aware that individual performance was being tracked during the group coaction conditions and that one purpose of the study was to investigate social loafing behavior. If subjects were aware, then any changes in productivity during the intervention phases cannot be attributed solely to the independent variable(s) of interest. In terms of the supplemental data, it was believed that the self-report data regarding preference for working alone or in groups, characteristics of the pay system and usage of earnings (compared to the financial need data obtained during the subject screening process) would aid in the detection of motivation level differences between subjects. Given that the external validity of the results of the present study are, to some extent, dependent upon a laboratory analogue of the real world of work, assessing the degree to which subjects considered their participation as real work in a real work setting was important.

Independent Variables

The independent variables were the work setting and the system by which workers were paid. The work setting variable consisted of subjects working alone and in groups of three. Because the present study was a systematic extension of the previous incentive pay system studies the pay systems were identical to those employed in the Smoot and Duncan (1997) studies. The pay system variable consisted of four

pay systems each with an individual and group equal-share payout: (1) flat rate per work session, (2) linear incentive, (3) positively accelerating, and (4) negatively accelerating. In addition to being described below, the pay scales for the three incentive systems are presented in Appendix G and the pay curves associated with the three incentive systems are graphically illustrated in Figure 1.

Flat Pay Per Work Session

Each subject received $2.00 per work session in Phase A (individual work setting) provided the subject produced at least 10 correct widgets, and in Phase B (group coaction setting) provided the total group productivity equaled at least 10 widgets per group member. For example, when working in the individual setting if the subject did not produce at least 10 widgets the subject received no pay for the session. When working in the group setting in phase B, the total productivity for the group had to equal at least 30 widgets for any group member to be paid for the session. The group pay contingency was included in the Phase B flat pay condition for two reasons: (1) to create the contingency arrangement typically present when social loafing behavior, as described by Latane' et al. (1979), occurs; and (2) to provide appropriate comparison data to evaluate the benefits of group payouts within the three incentive pay systems.

Flat pay of $2.00 per session during Phases A and B, which were compared to determine if social loafing occurred, was used to hold pay constant between the two phases and among subjects. The existence of differential pay in either phase would likely have been confounded with the performance data and would have rendered the measures of social loafing behavior useless.

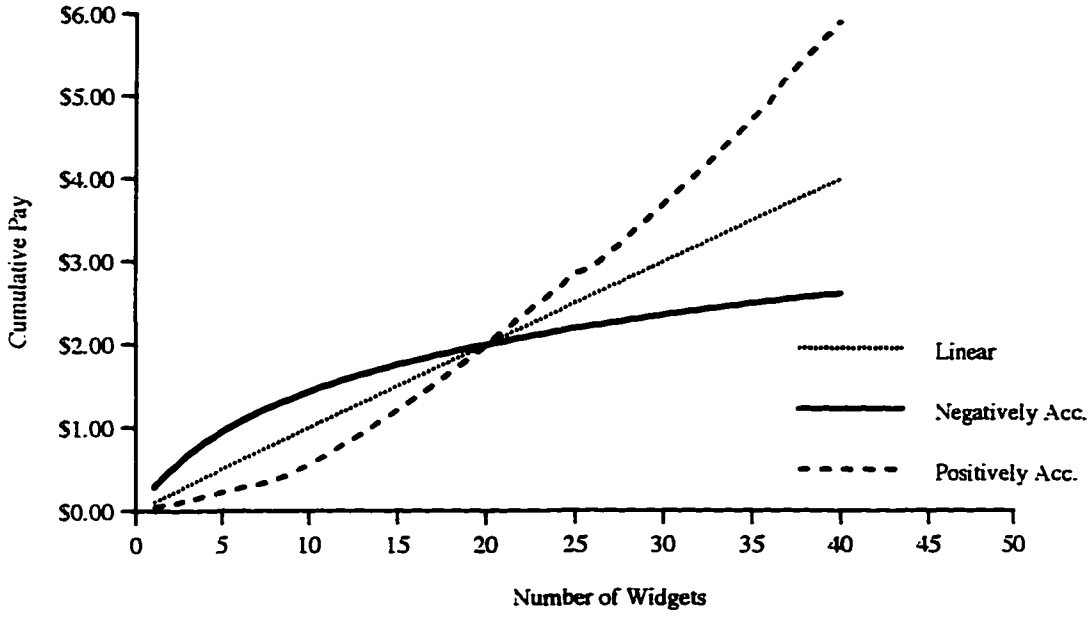

Figure 1. Incentive Pay System Curves.

Linear Incentive Pay System

In Phases C and D subjects in two of the six groups were paid under the linear incentive pay system and received $.10 for each correctly constructed widget. In the Smoot and Duncan (1997) studies, the linear pay of $.10 per widget proved to be moderately effective in increasing widget production, therefore there was reason to believe that the linear incentive system would reduce or eliminate social loafing behavior. In the Phase D group coaction setting, subjects were paid an equal share of the group's total earnings provided that total group productivity averaged at least 10 widgets per subject. Given that social loafing is characterized by behavior occurring when individuals work in a coaction environment, the inclusion of this group pay

contingency was essential to determining the benefits of having individuals work in a coaction situation when they were paid group contingent incentives. In the Phase C alone setting, subjects received incentive pay based on individual performance provided the subject produced at least 10 widgets.

Positively Accelerating Pay System

Subjects in two other groups were paid under the positively accelerating pay system during Phases C and D. The positively accelerating pay curve is based on gradual increases in the value of each additional widget and, therefore, subjects received somewhat more for each additional widget they produced. For example, the tenth widget may be worth $.06 and the eleventh worth $.063. The Phase C and D payout arrangements were identical to those for the linear pay system.

Negatively Accelerating Pay System

Subjects in the final two groups were paid under the negatively accelerating pay system during Phases C and D. The negatively accelerating pay curve is based on gradual decreases in the value of each additional widget and, therefore, subjects were paid somewhat less for each additional widget they produced. For example, the tenth widget may be worth $.06 and the eleventh worth $.057. The individual and group payouts under the negatively accelerating system were the same as the payout arrangements for the other incentive pay systems.

The 10-widget minimum, which was required in all pay systems, was determined from the results of the Leary et al. (1990) study which employed the same widget-making task used in the present study. Subjects, without any experience in constructing widgets from pop beads, averaged 16 to 24 widgets per session over the first five sessions of the study. Therefore, it was determined that any subject should be

able to complete at least 10 widgets per session beginning with the first session of the study.

Minimum productivity requirements seem to have become a standard in monetary incentive research. For example, Stoneman and Dickinson (1989) required subjects to assemble a minimum of 58 parts to receive base pay, Frisch and Dickinson (1990) set a minimum work level of 50 quality parts, and Dickinson and Gillette (1993) established minimum performance as 1000 processed checks per work session.

In addition, the three incentive pay systems were designed to pay $2.00 for twenty widgets. This was done to establish equity, at the average performance level, across the flat and incentive pay systems. Therefore, subjects making twenty widgets, regardless of pay system, would be paid $2.00. The twenty-widget average performance level came from the results of the Leary et al. (1990) study which indicated that for most subjects twenty widgets was average. Also, this design characteristic was consistent with what was done in the Dickinson and Gillette (1993) where average performance of 1300 checks per session paid the same amount across the base pay and incentive systems.

Experimental Design

A within-subject, multiple-baseline design with counterbalancing (Barlow & Hersen, 1984; Komaki, 1982), see Figure 2, was adopted to assess the independent variables. The within-subject manipulation consisted of exposing all subjects to all levels of the independent variable and tracking performance within and across all conditions. Specifically, the multiple-baseline manipulation involved temporally staggering the introduction of the next phase in the sequence across the two yoked groups after the stability criteria were achieved in the previous phase. The multiple baseline configuration was included so that an accurate assessment of the intervention

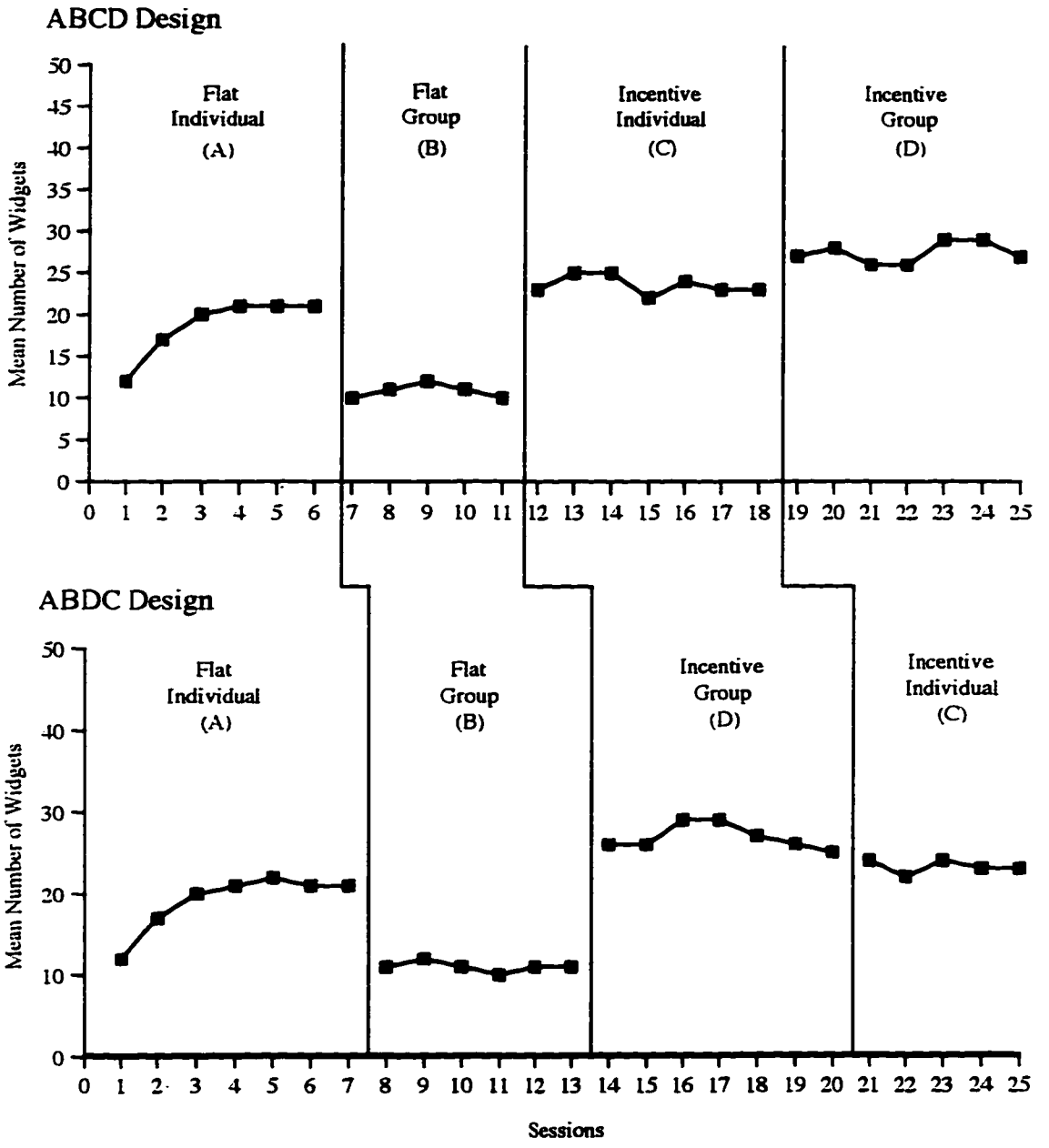

Figure 2. Experimental Designs.

could be made. If performance changes after, and not prior to, the intervention phase and the change occurs for both groups at different times, then the evidence supporting the effects of the intervention are more compelling (Johnston & Pennypacker, 1980).

Counterbalancing was achieved by reversing the sequence of the introduction of the incentive pay phases across the six groups. For example, with respect to the two linear incentive groups, the Phase C group equal-share incentive condition was introduced immediately after Phase B for one group; whereas the Phase D individual incentive condition was introduced immediately after Phase B for the other group. The counterbalancing configuration was included for the incentive phases to prevent threats to internal validity from intervention sequence effects (Komaki, 1982). Comparison of the Phase A and B manipulations yielded a measurement of social loafing consistent with the Latane' et al. (1979) definition of social loafing as diminished productivity when individuals are placed in a coaction environment after working alone. Therefore, Phases A and B were not counterbalanced.

Prior to the initial work session, subjects were assigned to one of six three-member experimental groups. Assignment to the groups was dictated by the time of day that the subject was available for the study, therefore, random assignment to the groups was not possible. The groups were randomly assigned to one of the three incentive pay conditions which resulted in the linear groups being run at 9:00 a.m., positively accelerating groups being run at 10:00 a.m., and negatively accelerating groups being run at 11:00 a.m. on Monday, Tuesday and Wednesday.

The experiment consisted of four phases with Phases B, C and D comprising the intervention conditions. Phase A was the baseline condition in which subjects worked alone and received flat pay of $2.00 per session. All subjects began in Phase A and changed to the next phase when subject performance met the stability criteria. The stability criteria, which consisted of a minimum number of sessions within the

condition and a performance stability criterion, was applied to all experimental phases. Previous studies by Smoot and Duncan (1997) showed that performance on the widget-making task typically stabilized within five to seven experimental sessions regardless of the pay system in effect. Therefore, subjects in the present study were required to complete at least five sessions under each pay system.

In addition, group performance was considered to be stabilized when there was no greater than 5% variability across the last 2 data points within the phase. This stability criterion was consistent with that applied in the previous Smoot and Duncan (1997) studies and similar to that employed in the Dickinson (1991) study on monetary incentives. This criterion was applied to the group productivity rather than that of individual subjects because of the need to move all subjects assigned to a particular group to the next phase simultaneously. So, for example, even though the 5% stability criterion was not met by all members of linear group 1 during Phase C the group's performance met the stability criterion.

The 5% stability criterion was adjusted during the course of the study to include an accommodation for downward trends over the last 2 sessions. Given the need to have at least 5 sessions within each experimental condition, in some instances the introduction of the next condition could not be delayed beyond a certain number of sessions. Therefore, if the group's productivity did not meet the 5% stability criterion but did show a downward trend the next condition was introduced.

Phase B consisted of the subjects being moved from the alone work setting into a group coaction work setting in which they were paid a flat rate for the session contingent upon the total group's productivity reaching the minimum performance level. While productivity was reported to subjects as the group's total productivity, individual performance was tracked covertly so that social loafing comparisons could be made. The average number of widgets produced by each subject and the group in

Phase B were compared to the average number produced by each subject and the group in Phase A to provide an answer to research question #1: "Does social loafing occur when a group of three workers engaged in a simple construction task are paid a flat, hourly-type rate?"

Phase C and D represented the incentive pay conditions. In Phase C subjects worked alone and were paid monetary incentives based solely on individual performance. Hereafter, Phase C is referred to as the incentive individual condition. This pay condition was included to assess the effects of individual incentives on performance when compared to performance under a flat individual pay system. A comparison of productivity during Phase A and Phase C provided an answer to research question #4: "If social loafing occurs, what effect will individual monetary incentives have on social loafing behavior when incentive pay is based solely upon individual widget production?" The same comparison provided an answer to research question #5: "If social loafing does not occur will individual incentives have any effect on individual performance beyond that observed when subjects received flat pay while working alone?"

For Phase D, subjects worked in the group coaction setting and received an equal-share of the group's total incentive pay. As was the case with Phase B, widget productivity was reported to subjects as the group's total effort, however, each subject's productivity was tracked covertly to provide data on individual performance. Hereafter, Phase D is referred to as the incentive group condition. A comparison of productivity during Phase B and Phase D provided an answer to research question #2: "If social loafing occurs what effects will group monetary incentives have on social loafing behavior when the incentives are paid as an equal-share of the group's total earnings?" In addition, the same comparison provided an answer to research question #3: "If social loafing does not occur will equal-share group incentives have any effect

on individual performance beyond that observed when subjects received flat pay while working in a group coaction setting?"

Research question #6 was "Which monetary incentive system, linear (group equal-share or individual payout), positively accelerating (group equal-share or individual payout), negatively accelerating (group equal-share or individual payout), is better at managing performance improvements?" This question was answered through comparisons of average widget productivity during the individual and group conditions.

Research question #7 addressed the cost effectiveness issue by asking, "Which monetary incentive system, linear (group equal-share or individual payout), positive acceleration (group equal-share or individual payout), negative acceleration (group equal-share or individual payout) is most cost effective?" An answer was provided by comparing the cost per widget for each pay system.

Procedure

Because the overall purpose of this study was to investigate the effects of monetary incentives on social loafing behavior characteristic of real world work environments, the laboratory environment was designed to resemble, as much as possible given the physical and budgetary constraints of the present research, the real world of work. The simulation consisted of arranging eight variables that are typically found in a work setting. First, subjects were required to report for work at the same specified time each day and were required to produce a minimum level of work in order to be paid. These requirements are typical of any employment setting where maintaining a certain level of productivity is necessary to continued employment. Second, failure to report to work resulted in no pay for the day. This contingency arrangement was similar to that found in a "paid-by-the hour" or "paid-by-the-piece"

employment situation. Third, the production task of constructing widgets was not unlike piece work. Fourth, subjects arriving late to work were permitted to enter the work session and were not systematically penalized for tardiness nor were they given extra time. However, there was a naturally occurring penalty in that subjects arriving late typically produced fewer widgets, thereby, earning less pay. In the group flat pay and incentive conditions, tardiness translated to lower overall group productivity and less or no pay for each group member.

The fifth component of the simulation was allowing subjects to engage in alternative activities and some activities were arranged by the investigator. This aspect of the simulation was included because in a real work place people typically have access to activities other than those associated with the work task. Another reason is that Dickinson and Gillette (1993) have suggested that the inclusion of competitive activities allows for a more accurate evaluation of the effectiveness of incentive pay systems. Therefore, subjects were not prohibited from engaging in alternative activities and were permitted to bring items such as reading materials and food to work sessions. In addition, the investigator placed magazines, the daily newspaper and small games at each work station and a telephone was easily accessible to all subjects. Also, snacks were provided and subjects could partake of coffee, juice and cookies before, during and after each work session. Sixth, subjects were asked to sign a form verifying the number of widgets produced and the amount earned per work session. This verification served much the same purpose as an employee's signature on a time card. Seventh, subjects were paid weekly (or at the end of an experimental condition) and were asked to verify receipt of their pay. Eighth, subjects and research assistants were not prohibited from interacting with each other. In a typical work place, workers interact with each other and with supervisors.

The investigator was assisted by three two-member teams comprised of advanced psychology undergraduates who were required to successfully complete a one-hour training session. During the training session assistants were familiarized with the experimental task, subject instructions, pay system instructions, data collection procedures, subject pay calculation, and subject payment procedures. Standardization and consistency of instruction and treatment delivery were also emphasized. Because prior studies using pop bead widgets have shown that a seventeen-bead widget is frequently counted as correct (a correct widget has sixteen beads) when counting quickly, research assistants received training in counting-techniques. These previous studies yielded three simple methods for spotting incorrectly constructed widgets: (1) disconnecting the widget prior to counting, (2) disconnecting all widgets between the fourth and fifth white beads, and (3) laying all disconnected widgets side-by-side in the same order of color. The training consisted of the investigator constructing a number of correct and incorrect widgets, demonstrating the three counting-techniques, and then observing the research assistants during a simulation of two work sessions. When the performance by all assistants was accurate and thorough, the investigator determined they were adequately prepared to conduct the experimental sessions. To further ensure the integrity of the interventions, the investigator was present at all experimental sessions conducted by the research assistants.

On the first day of the study all subjects were read standard instructions on how the work sessions would be conducted and on how subjects would be paid. This was followed by a demonstration of the construction of a correct widget. Subjects indicated that they clearly understood the procedures and the performance task. Immediately prior to the beginning of each experimental session the research assistant read a description of the pay system in effect for the session and asked if subjects had any questions regarding the pay system. A copy of the pay condition scripts are presented

in Appendix H. To protect the integrity of the group pay manipulation during the group equal-share condition subjects were instructed to place all widgets in a pile in the middle of the work table. In addition, during the incentive pay conditions subjects were given a copy of the relevant pay scale. Given that subjects in the linear pay condition could easily keep track of their earnings throughout the session, allowing subjects in the positively and negatively accelerating pay conditions to see their pay scale held constant any self-administered feedback about productivity and earnings. Finally, subjects were instructed to begin working and the research assistant immediately started a timer for each group. At the end of 15 minutes the research assistant instructed all subjects to stop working and the research team made a visual inspection to assure that all subjects did so.

At the conclusion of each experimental session, research assistants performed the data collection activities. Independent verification of productivity levels and earnings by each member of the research assistant team was performed to assure interobserver agreement. Upon entering the experimental room the research assistant retrieved the pay scale sheets and, then, in the presence of the subjects counted the number of correctly made widgets. At that point the second member of the research assistant team repeated the procedure by independently counting the widgets. When the two assistants reached agreement on the number of correctly made widgets, the number of widgets was recorded on the "group productivity and pay record" (see Appendix I) during the group payout conditions and on the "individual productivity and pay record" (see Appendix J) during individual payout conditions.

A similar procedure was followed when calculating and recording earnings for the session. After the research assistants reached agreement on the productivity level, one assistant consulted the appropriate pay scale to determine the amount of pay for each subject and, then, obtained agreement from the other assistant. The subjects'

earnings were recorded on the appropriate productivity and pay record. Prior to dismissing the subjects, the assistant obtained each subject's signature on the form verifying agreement.

Because tracking of individual productivity during group conditions was performed covertly an additional data collection step was necessary. After subjects were dismissed, research assistants determined the individual productivity data for subjects in the group coaction conditions. One assistant counted the number of widgets made by each subject by inspecting the code (dot of paint) on the purple pop beads. The other assistant independently repeated this procedure. When agreement between the two assistants was reached the number of widgets was recorded on the individual productivity and pay form.

Subjects received cash and typically were paid weekly. After the Wednesday work session, the primary investigator summarized each subject's weekly productivity data and earnings and recorded them on the "pay summary form" (see Appendix K). Envelopes containing the subject's earnings and the pay summary form were prepared for distribution prior to the beginning of the following Monday work session. Subjects were asked to count their earnings and verify receipt by initialing the pay summary form. When subjects were absent from the Monday work session, the subject's pay was held until she returned to work.

A deviation from the weekly pay schedule occurred when pay conditions changed during, and not at the end of, any week. To avoid any confounding of results that could occur from including money earned in two different pay conditions in the same "paycheck," subjects were paid prior to the beginning of the first experimental session in the new pay condition.

An additional data collection activity involved research assistants systematically observing subjects and recording any instances of non-widget making activities.

Guerin (personal communication, December 15, 1995) has suggested that the reason social loafing experiments have isolated group members from each other is to eliminate social interaction as a confounding variable. Guerin's hypothesis is that engaging in behaviors other than the task at hand may interfere with performance and could account for any performance decrements in the flat group condition. As such, any decrement in group performance can not be attributed to social loafing. Given that simulation of the work context was an important aspect of the current study, the elimination of contact with other people, an environmental variable that is always present in the work place, would have jeopardized the success of the simulation and the generalization of results. Thus, a better choice was to track and account for the potential influence of social interaction with others.

Each instance of off-task behavior was recorded on the "Off-Task Behavior Form" (see Appendix L). Documentation included a detailed description of the off-task behavior, the point in the 15-minute session at which the behavior occurred, and the frequency of occurrence.

At the end of each experimental session, all data collection forms were reviewed by the investigator for accuracy and thoroughness. Any deficiencies were discussed with the appropriate research assistant and corrections were made prior to the next experimental session. In addition, all data collection forms were maintained by the investigator to ensure the privacy of the subjects.

CHAPTER III

RESULTS

Screening Questionnaire

The primary purpose of the screening questionnaire was to evaluate the financial need of subjects. Responses to the screening questionnaire indicated that the eighteen subjects "needed" additional money and that their research earnings would supplement financial aid and job earnings. Subjects indicated that the money they earned during the study would be used to pay living expenses and purchase textbooks.

Interobserver Agreement

Interobserver agreement was 100% for each work session. The study was designed so that researchers worked in pairs and both researchers had to agree on the number of correctly made widgets and the amount of money that was earned during each session.

Widget Productivity Results

The productivity results are presented in the context of answers to research questions 1 through 6. Widget productivity was analyzed by examining the collective effort of each group and by looking at the individual productivity of all subjects. An alpha level of .05 was used for all statistical tests.

Figures 3 through 15 display mean widget productivity data for the six groups and the eighteen subjects. Because subject 18 dropped out of the study early in the flat

group condition, the subject's data were not included in the data analysis. The data for subject 6, who dropped out of the study during the first incentive condition, were included in the flat individual versus flat group comparisons. Subject 6's data were eliminated from further analysis. Comparisons of performance means and absolute and percent changes in productivity across pay systems appear in Tables 1 through 6.

Research Question 1

The first research question "Does social loafing occur when a group of three workers, engaged in a simple construction task, are paid a flat rate?" was answered by comparing individual productivity during the flat individual condition with productivity during the flat group condition, irrespective of group assignment. There is no strong evidence for the occurrence of social loafing behavior in the present study. As can be seen in Figures 3 through 6 (see Table 1 for group means and absolute changes), mean widget productivity during the flat conditions did vary across the six groups with four groups producing more widgets during the flat individual condition and two groups performing better during the flat group condition. Further, it can be seen in Figure 7 (see Figures 8 through 13 for session-to-session data) that productivity also varied across the seventeen subjects with some generating more widgets in the individual condition and some performing better in the group condition. However, the comparison of subject means, appearing in Table 2, showed the differences were not statistically significant, $t(13) = .35$, $p = .73$.

The statistical significance test for social loafing was performed after the data for three subjects (numbers 9, 16, and 17) were eliminated. For clarification, the differences between means were not significant with those three subjects included, $t(16) = .44$, $p = .67$. Subject 9 (refer to Figure 10) was eliminated because the subject was late to three sessions during the flat group condition which resulted in few widgets

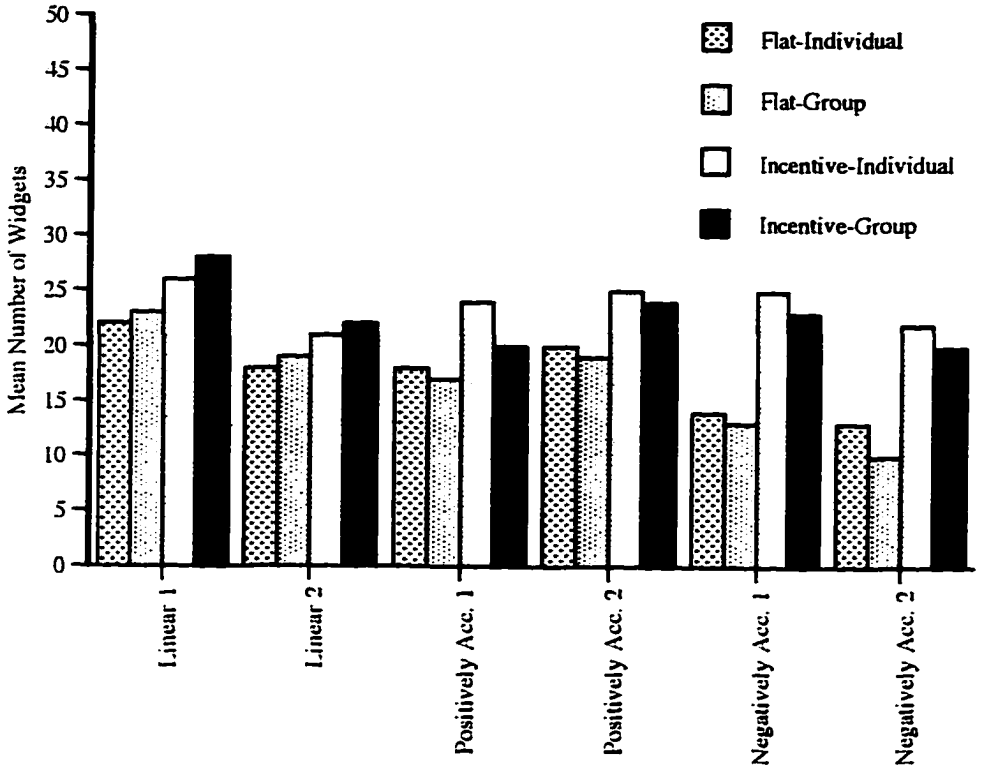

Figure 3. Mean Widget Production Across Groups and Pay Systems.

for the session. Therefore, lower productivity during the flat group condition was unrelated to social loafing. Subjects 16 and 17 (refer to Figure 13) were eliminated because their low productivity in the flat group condition appears to have little to do with social loafing. It seems that their minimum performance was a reaction to the 10-widget minimum requirement to receive payment for the session.

The best that can be said about social loafing is that some subjects performed somewhat better during the flat individual condition while others performed somewhat

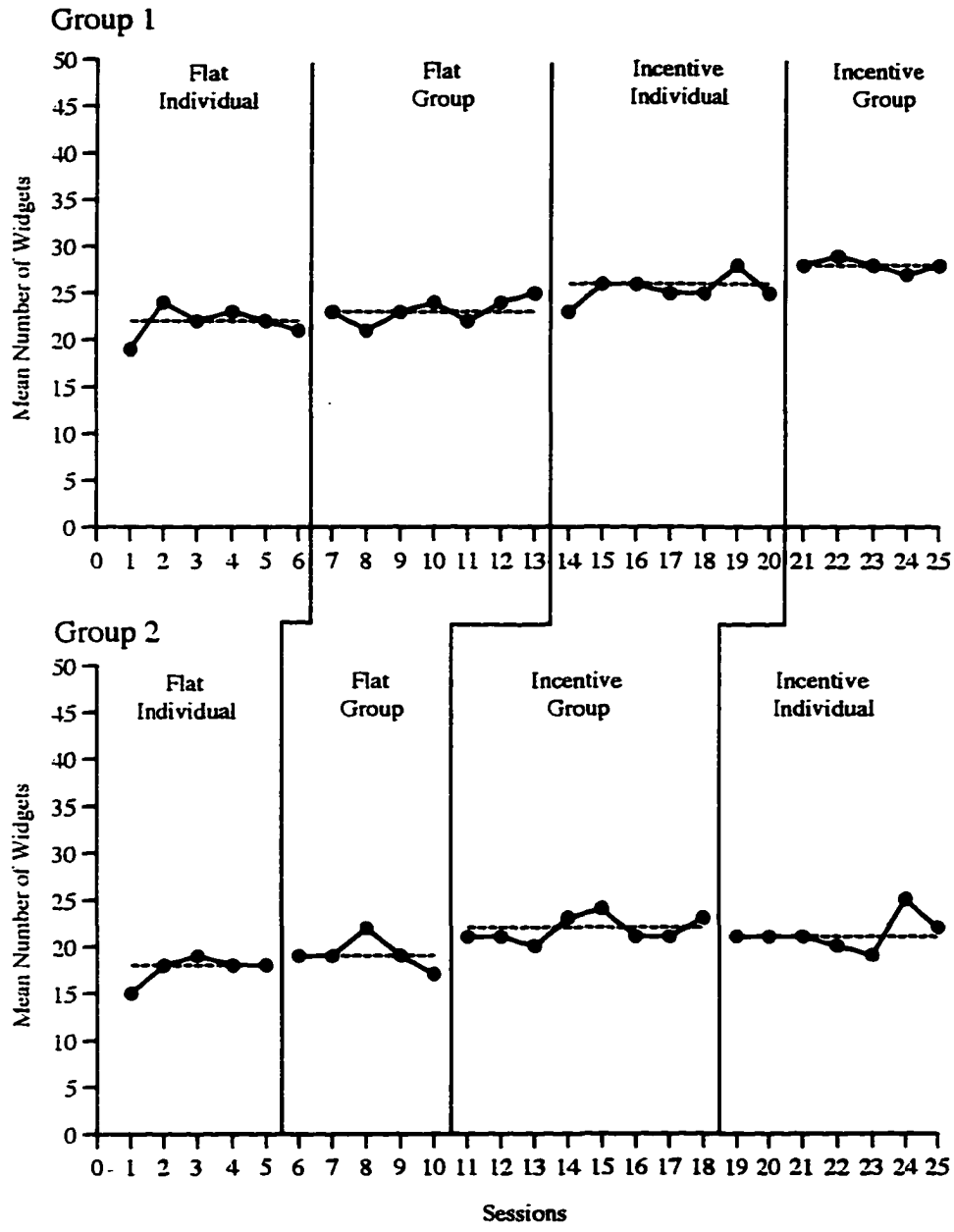

Figure 4. Mean Widget Production for Groups Paid Under the Linear System.

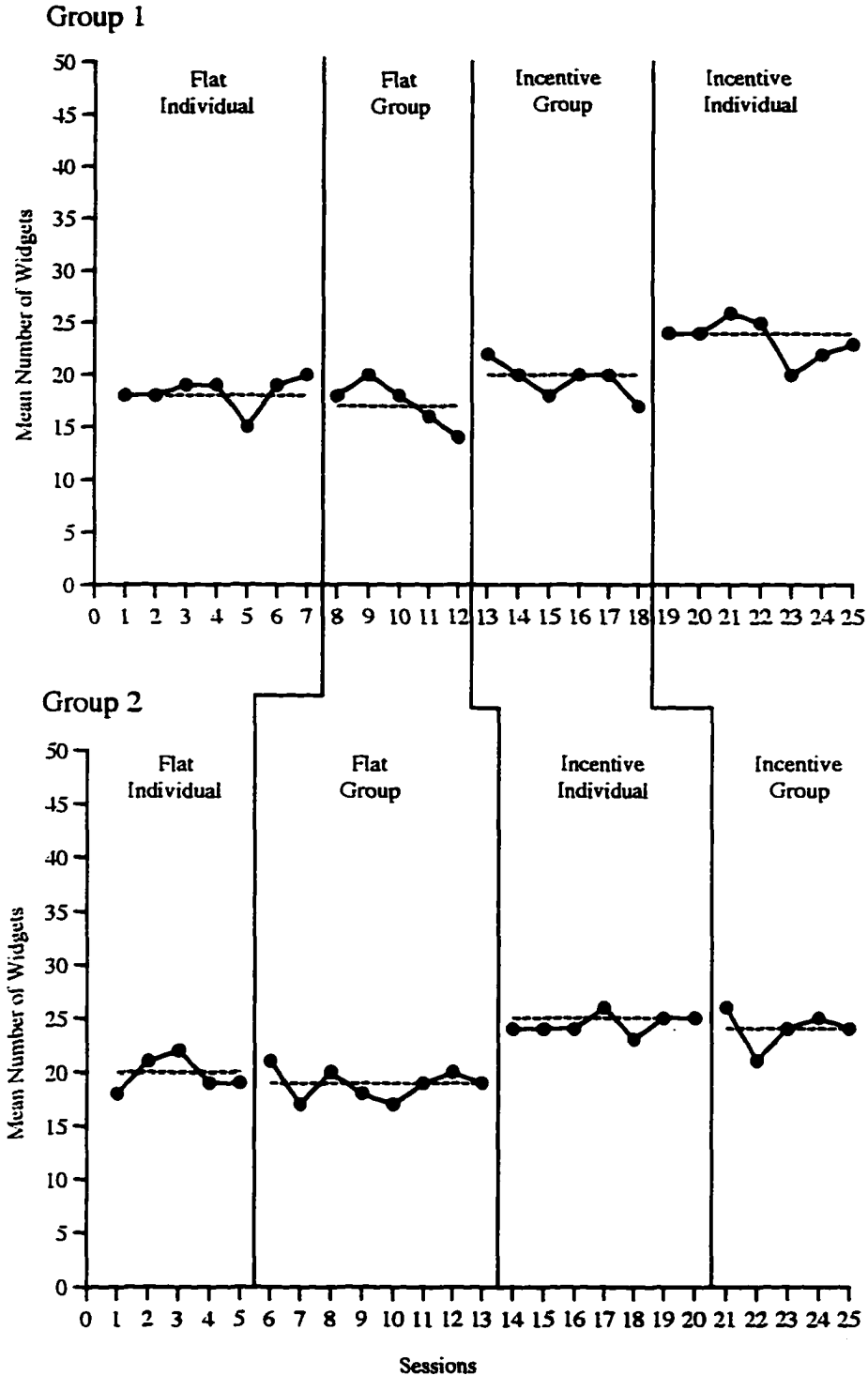

Figure 5. Mean Widget Production for Groups Paid Under the Positively Accelerating System.

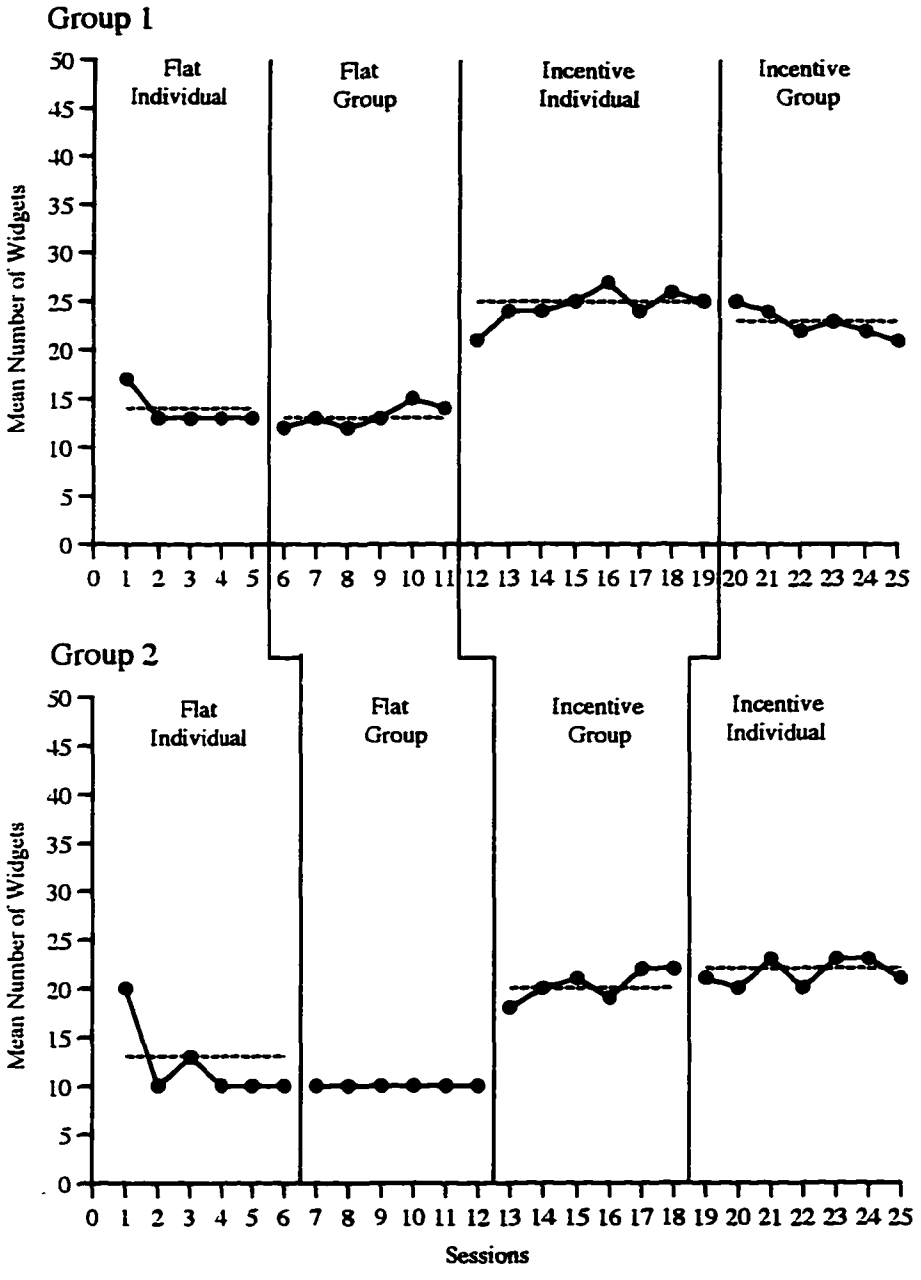

Figure 6. Mean Widget Production for Groups Paid Under the Negatively Accelerating System.

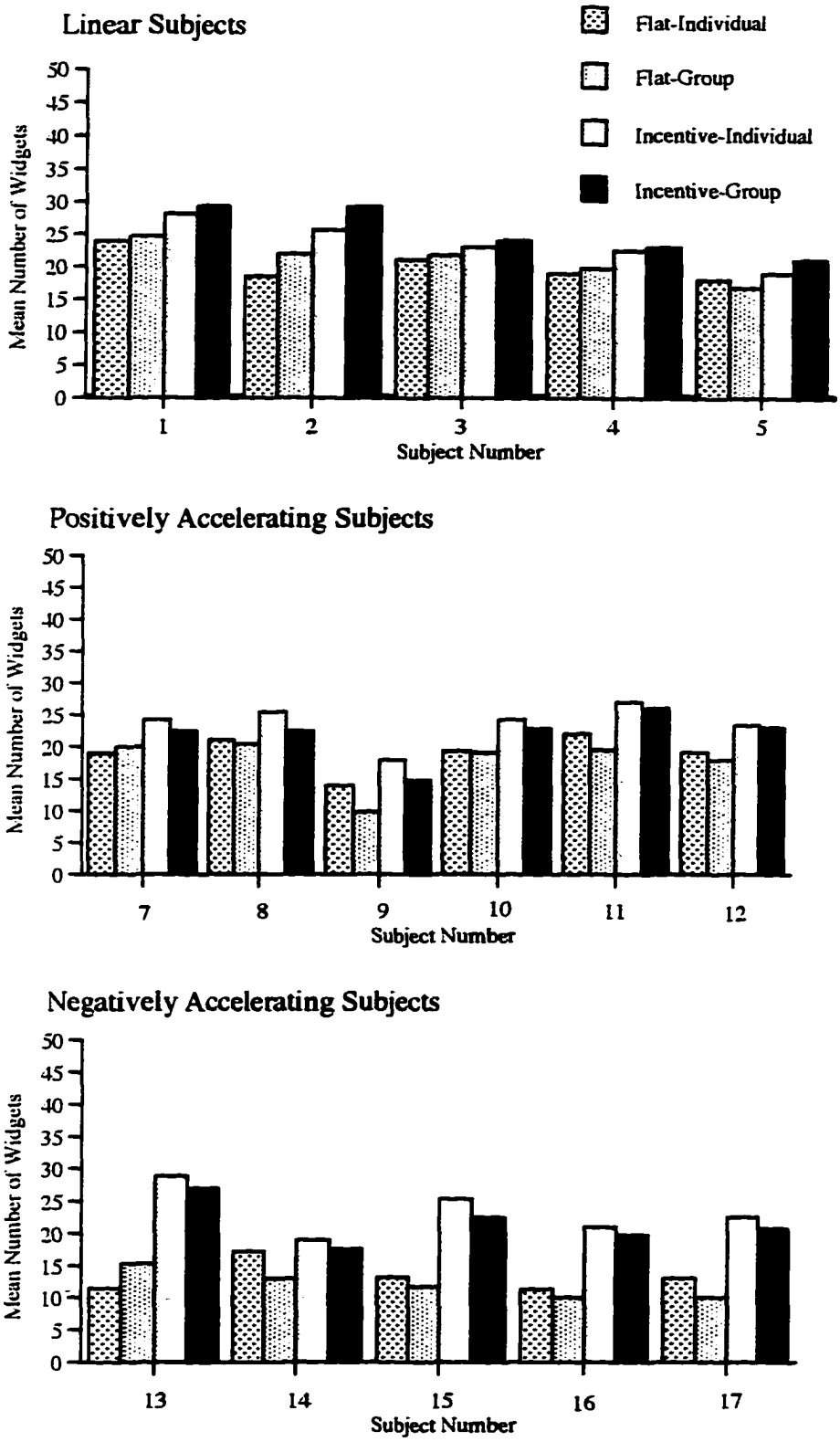

Figure 7. Mean Widget Production for All Subjects Across All Conditions.

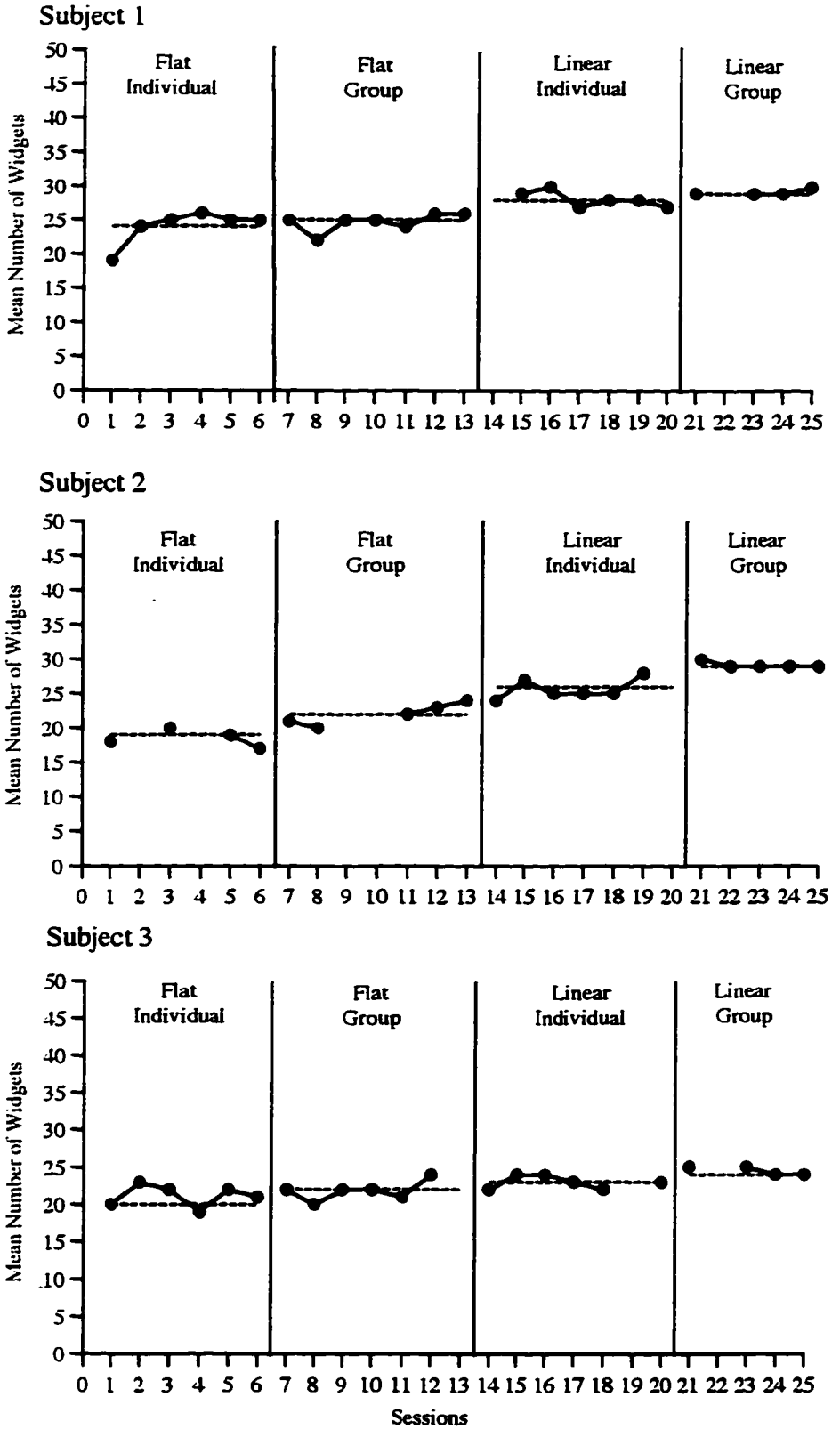

Figure 8. Mean Widget Production for Linear Group 1 Subjects.

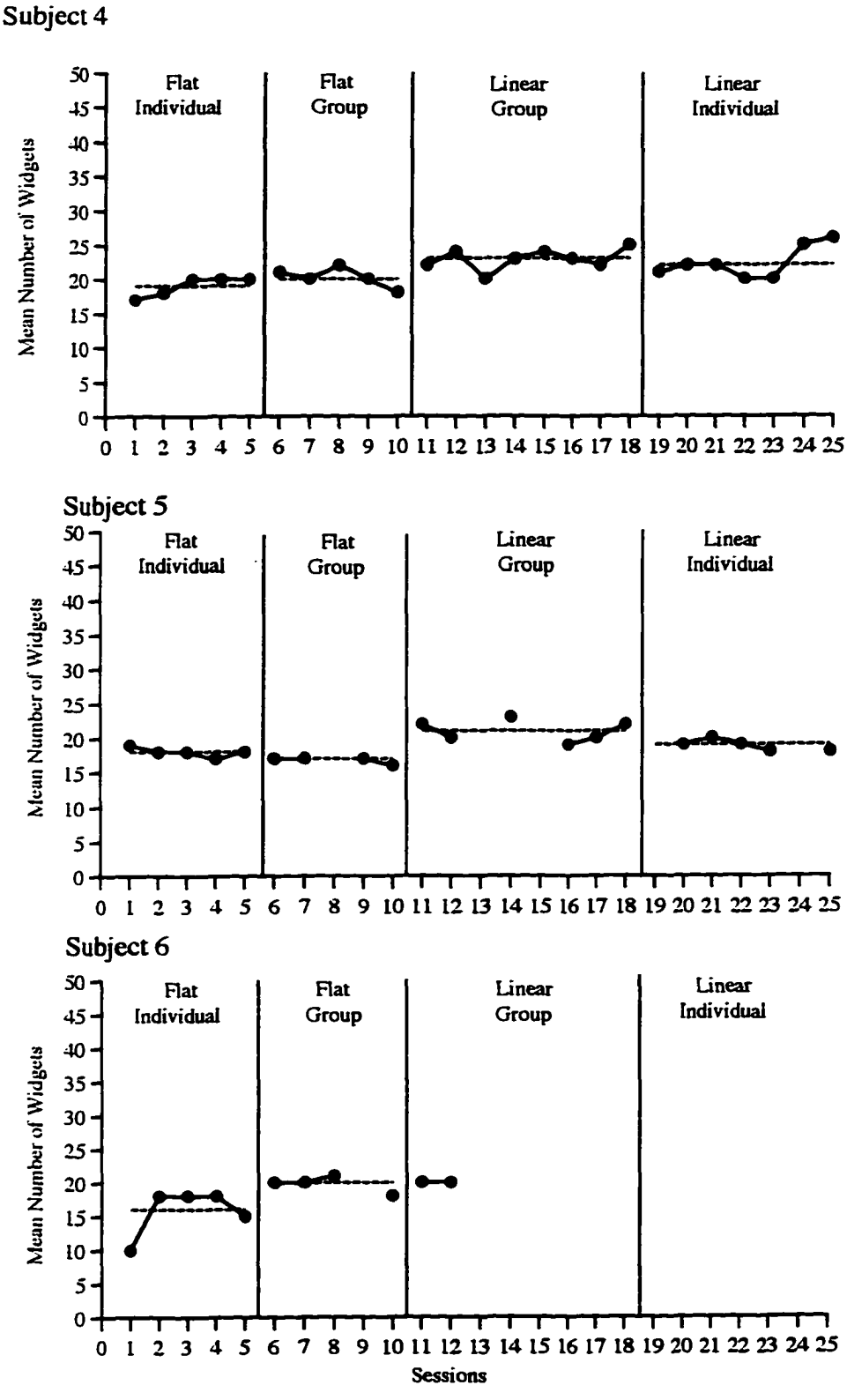

Figure 9. Mean Widget Production for Linear Group 2 Subjects.

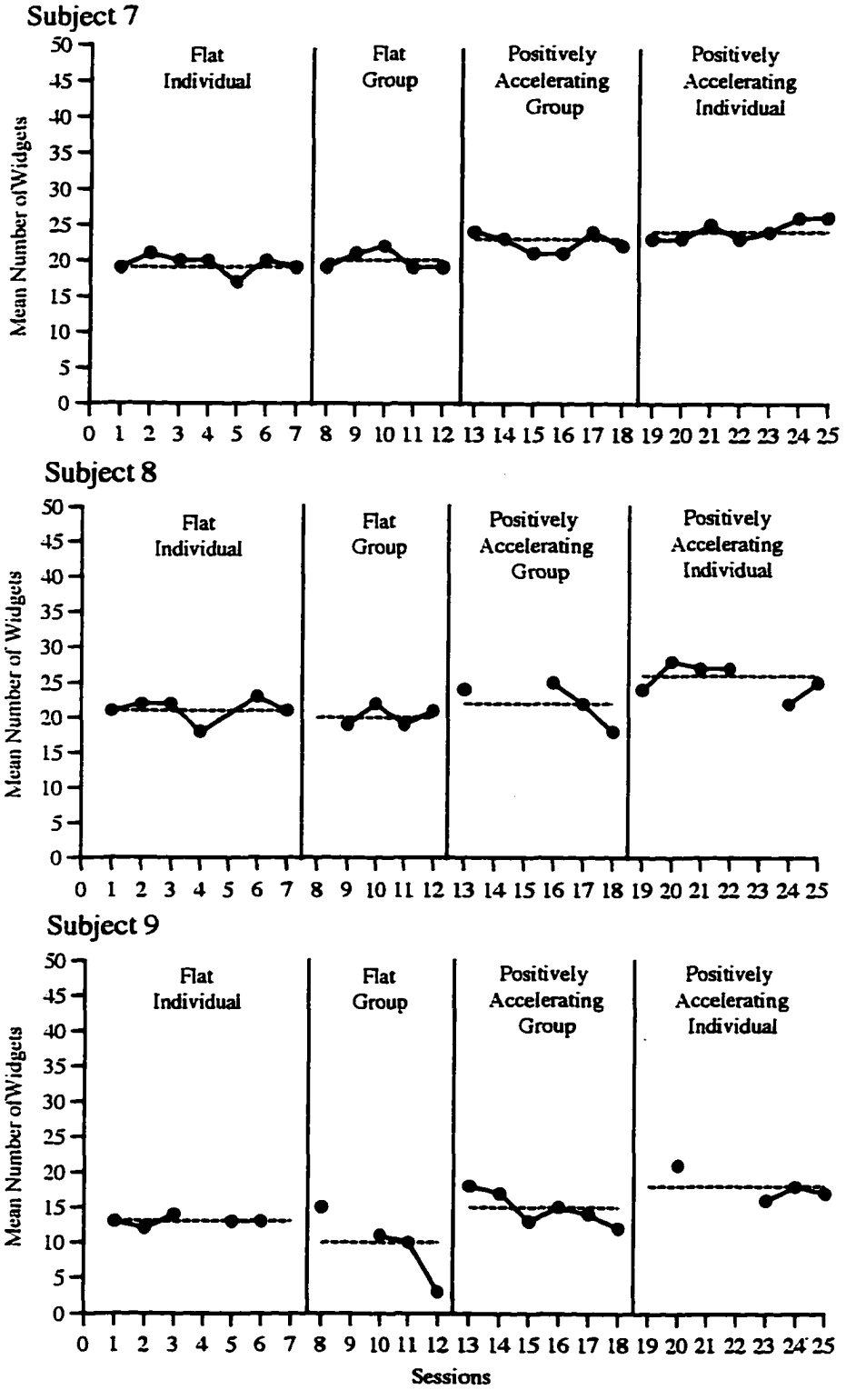

Figure 10. Mean Widget Production for Positively Accelerating Group 1 Subjects.

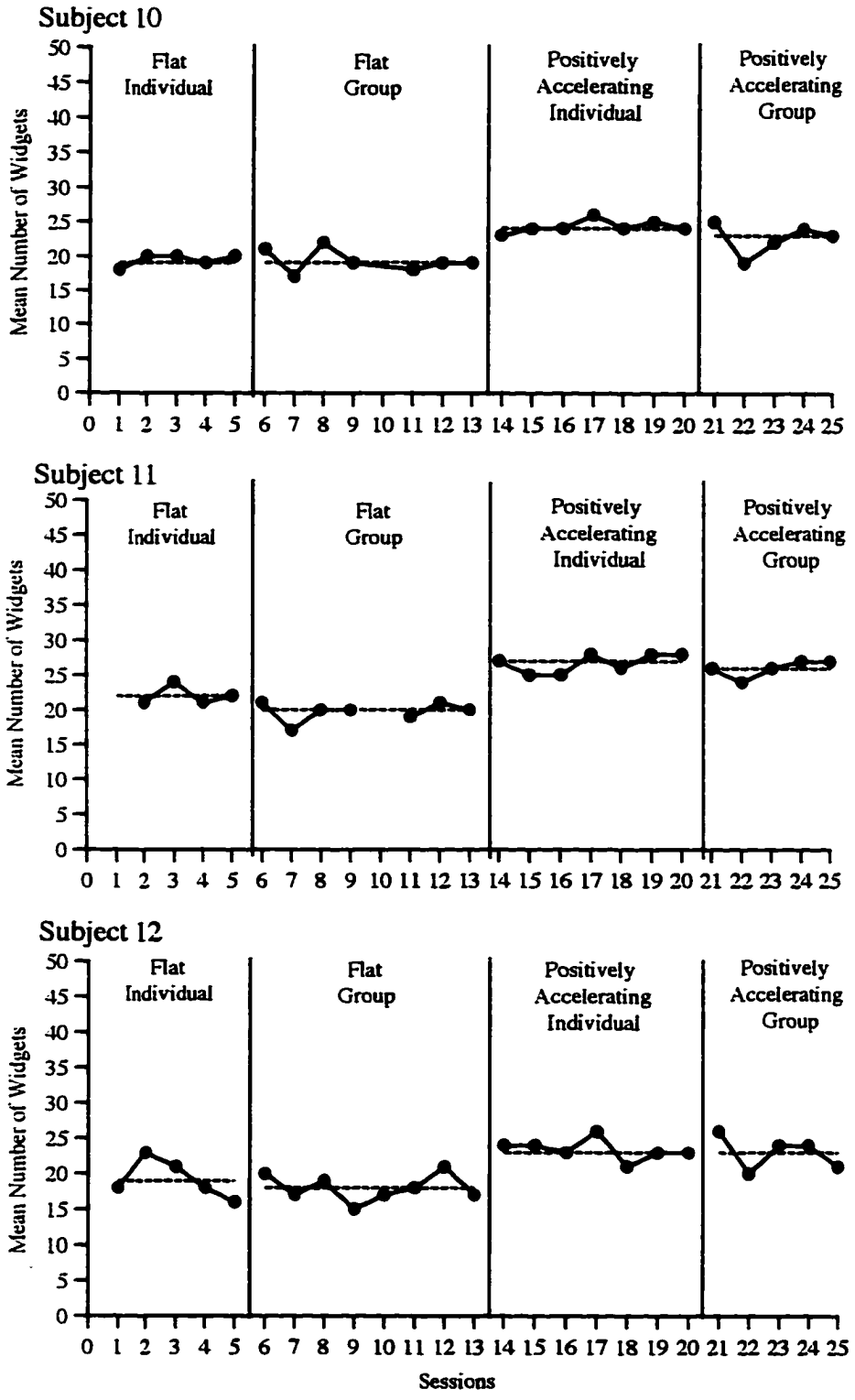

Figure 11. Mean Widget Production for Positively Accelerating Group 2 Subjects.

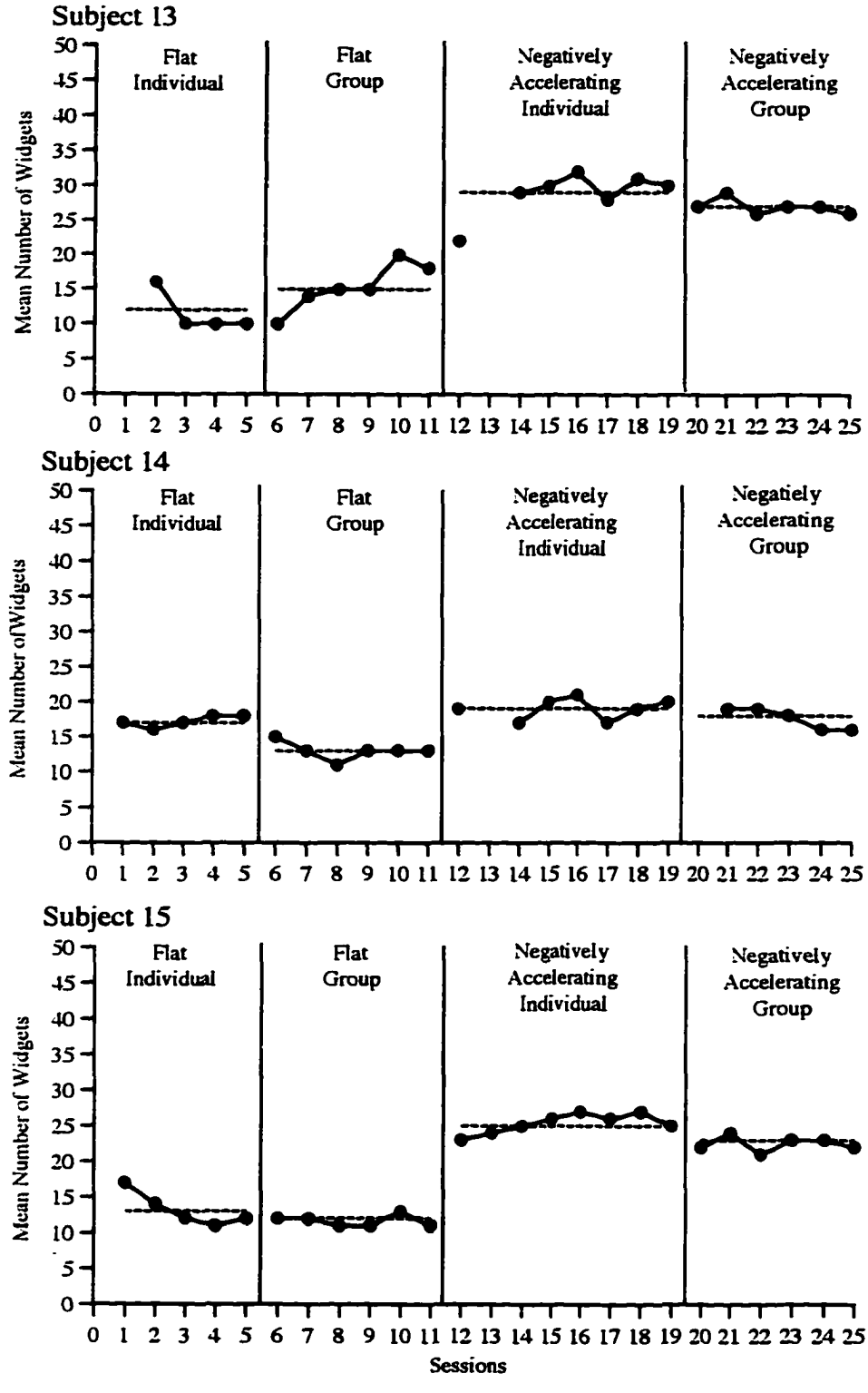

Figure 12. Mean Widget Production for Negatively Accelerating Group 1 Subjects.

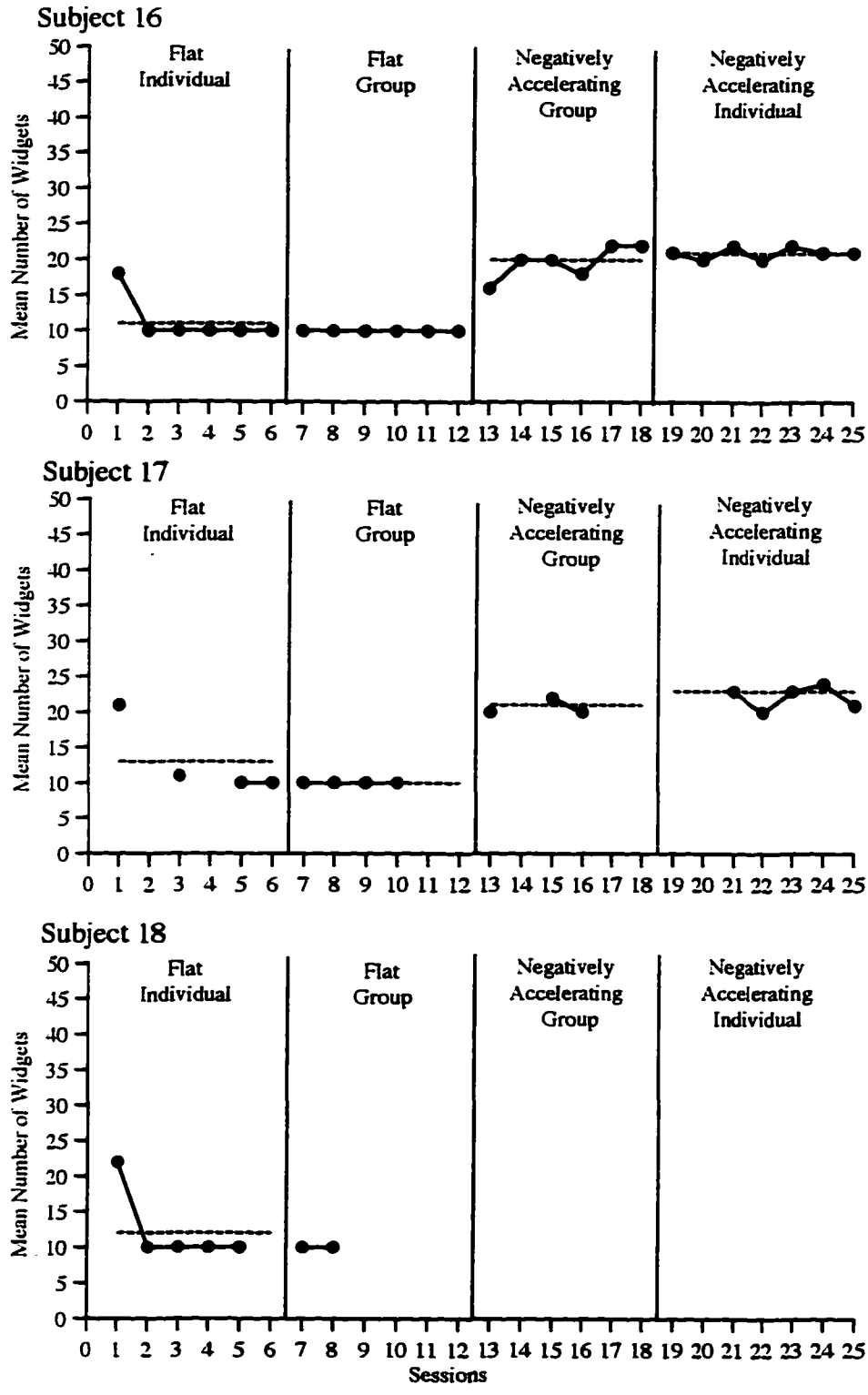

Figure 13. Mean Widget Production for Negatively Accelerating Group 2 Subjects.

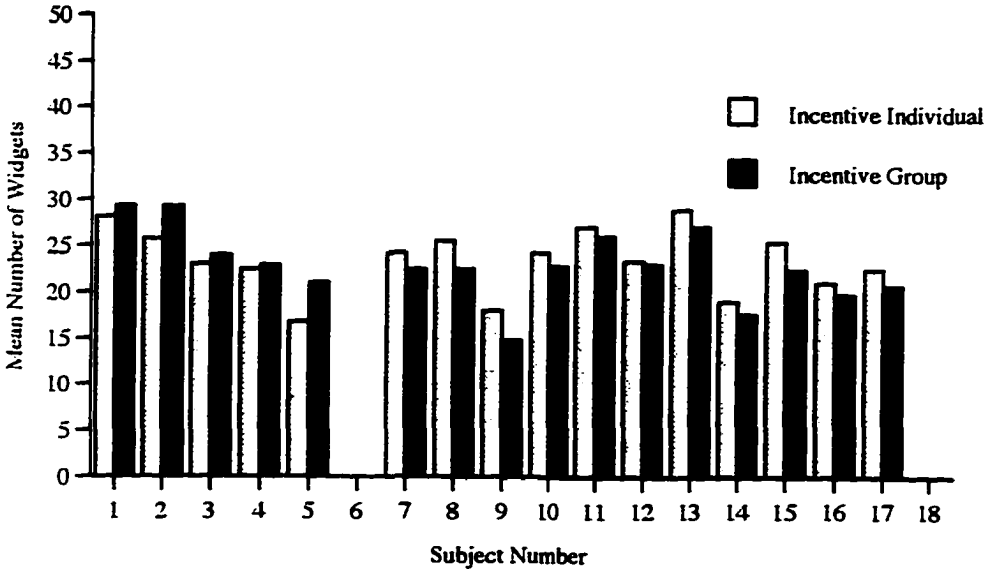

Figure 14. Comparison of Mean Widget Production for All Subjects During the Individual Incentive and Group Incentive Conditions.

better during the flat group condition. Therefore, the data do not support the contention of Latane' et al. (1979) that social loafing occurs in groups as small as three.

Research Question 2

The second research question, "If social loafing occurs, what effect will group monetary incentives have on social loafing behavior when the incentives are paid as an equal share of the group's total earnings?", is irrelevant given that social loafing was not observed.

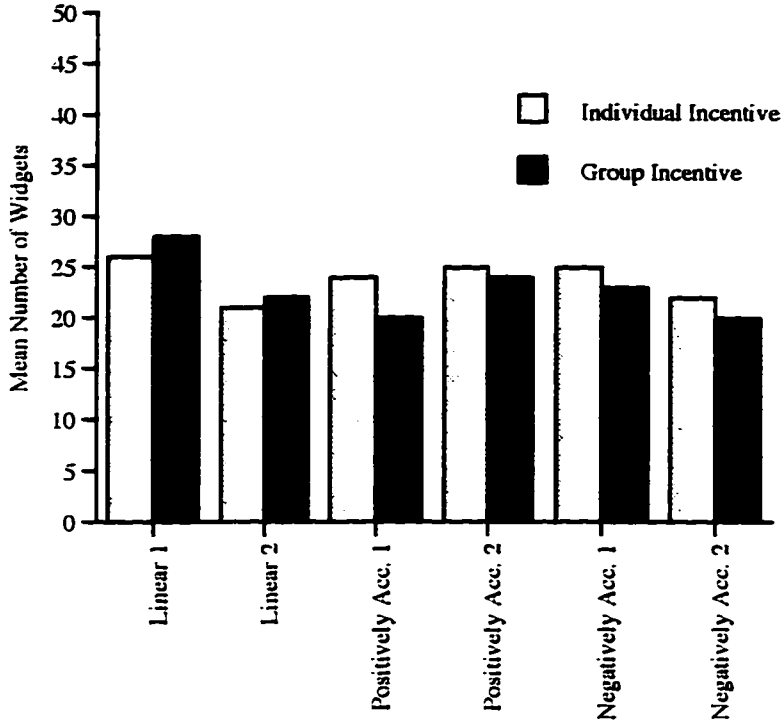

Figure 15. **Comparison of Mean Widget Production for Groups During the Individual Incentive and Group Incentive Conditions.**

Research Question 3

The third research question, "If social loafing does not occur will equal share group incentives have any effect on individual performance beyond that observed when subjects received flat pay while working in a group coaction setting?", was answered by comparing the flat group condition with the incentive group condition. The comparisons were made for groups and individual data. While the data for subjects 9, 16, and 17 were eliminated from the social loafing analysis, they were included in the analysis of the incentive pay systems.

Table 1

Absolute Change in Mean Widget Production Between the Flat Individual and Flat Group Conditions

Group	Mean Flat Individual	Mean Flat Group	Absolute Change
Linear #1	21.6	23	1.4
Linear #2	17.8	19	1.2
Positively Accelerating #1	18.2	16.9	-1.3
Positively Accelerating #2	20.1	19.1	-1
Negatively Accelerating #1	13.7	13.3	-0.4
Negatively Accelerating #2	12.9	10	-2.9

Generally, the answer to research question 3 is that the incentive group pay systems generated higher widget productivity than did the flat group pay system. The differences between means were statistically significant for all three incentive pay systems. In addition, the evidence supporting the superiority of the incentive group system over the flat group system is made stronger by the fact that all subjects posted higher means during the incentive condition. The differences between the subject means were statistically significant, $t(15) = 7.15$, $p = .000$. The details of the

Table 2

Absolute Change in Mean Widget Production Between the Flat Individual and Flat Group Conditions for all Subjects

Subject	Mean Flat Individual	Mean Flat Group	Absolute Change
1	24	24.7	0.7
2	18.5	22	3.5
3	21.1	21.8	0.7
4	19	19.8	0.8
5	18	16.8	-1.2
6	15.8	19.8	4
7	19	20	1
8	21.1	20.5	-0.6
9	13	9.8	-3.2
10	19.4	19.1	-0.3
11	22	19.6	-2.4
12	19.2	18	-1.2
13	11.5	15.3	3.8
14	17.2	13	-4.2
15	13.2	11.7	-1.5
16	11.3	10	-1.3
17	13	10	-3

Table 3

Absolute and Percent Change in Mean Widget Production Between the Flat Individual and Incentive Group Conditions

Group	Mean Flat Group	Mean Incentive Group	Absolute Change	Percent Change
Linear #1	23	27.8	4.8	21%
Linear #2	19	21.8	2.8	15%
Positively Accelerating #1	16.9	19.6	2.7	16%
Positively Accelerating #2	19.1	23.9	4.8	25%
Negatively Accelerating #1	13.3	22.7	9.4	70%
Negatively Accelerating #2	10	20	10	100%

differences are presented in the following discussion and in Figures 4 through 6 and 8 through 13. Tables 3 and 4 list the relevant group and subject means.

Linear Data

For both linear groups (see Figure 4) productivity was significantly better when subjects worked under the linear group pay system. For group 1 mean widget productivity increased from 23 to 27.8 and for group 2 the increase was from a mean

Table 4

Absolute and Percent Change in Widget Production Between the Flat Individual and Incentive Group Conditions for All Subjects

Subjects	Mean Flat Group	Mean Incentive Group	Absolute Change	Percent Change
1	24.7	29.3	4.6	19%
2	22	29.2	7.2	33%
3	21.8	24	2.2	10%
4	19.8	22.9	3.1	16%
5	16.8	21	4.2	25%
7	20	22.5	2.5	13%
8	20.5	22.5	2	10%
9	9.8	14.8	5	51%
10	19.1	22.8	3.7	19%
11	19.6	26	6.4	33%
12	18	23	5	28%
13	15.3	27	11.7	76%
14	13	17.6	4.3	33%
15	11.7	22.5	10.8	92%
16	10	19.7	9.7	97%
17	10	20.7	10.7	107%

Table 5

Absolute and Percent Change in Mean Widget Production Between the Flat Individual and Incentive Individual Conditions

Group	Mean Flat Individual	Mean Incentive Individual	Absolute Change	Percent Change
Linear #1	21.6	25.6	4	19%
Linear #2	17.8	20.8	3	17%
Positively Accelerating #1	18.2	23.3	5.1	28%
Positively Accelerating #2	20.1	24.2	4.1	20%
Negatively Accelerating #1	13.7	25.5	11.8	86%
Negatively Accelerating #2	12.9	21.5	8.6	67%

of 19 widgets to a mean of 21.8. Pooling the two groups, this difference was statistically significant, $t(4) = 5.03$, $p = .007$. Mean productivity improvements for subjects 1 through 5 (see Figures 8 and 9) ranged from 2.2 to 7.2 widgets.

Positively Accelerating Data

As can be seen in Figure 5, group 1's productivity improved from a mean of 16.9 during the flat group condition to a mean of 19.6 during the positively accelerating

Table 6

Absolute and Percent Change in Mean Widget Production Between the Flat Individual and Incentive Individual Conditions for All Subjects

Subjects	Mean Flat Individual	Mean Incentive Individual	Absolute Change	Percent Change
1	24	28.1	4.1	17%
2	18.5	25.7	7.2	39%
3	21.1	23	1.9	9%
4	19	22.5	3.5	18%
5	18	19	1	6%
7	19	24.3	5.3	28%
8	21.1	25.5	4.4	21%
9	13	18	5	39%
10	19.4	24.3	4.9	25%
11	22	27	5	23%
12	19.2	23.4	4.2	22%
13	11.5	28.9	17.4	151%
14	17.2	19	1.8	11%
15	13.2	25.4	12.2	92%
16	11.3	21	9.7	86%
17	13	22.5	9.5	73%

group condition. Similarly, group 2 generated more widgets in the incentive condition, mean of 19.1 compared to a mean 23.9. Pooling the two groups, this difference was statistically significant, $t(4) = 5.99$, $p = .002$. Mean productivity improvements for subjects 7 through 12 (see Figures 10 and 11) ranged from 2 to 6.4 widgets.

Negatively Accelerating Data

The largest productivity improvements occurred for the groups paid under the negatively accelerating group system (see Figure 6). Group 1's productivity increased from a mean of 13.3 during the flat group condition to a mean of 22.7 during the incentive group condition. Group 2's productivity increased by an average of 10 widgets improving from a mean of 10 widgets during the flat condition to a mean of 20 widgets during the incentive condition. Pooling the two groups, this difference was statistically significant, $t(4) = 7.13$, $p = .002$. All subjects (see Figures 12 and 13) performed better during the incentive condition with improvements ranging from a mean of 4.3 to a mean of 11.7 widgets.

Research Question 4

The fourth research question, "If social loafing occurs what effect will individual monetary incentives have on social loafing behavior when incentive pay is based solely on individual widget production?", is irrelevant because social loafing did not occur.

Research Question 5

The fifth research question, "If social loafing does not occur will individual monetary incentives have any effect on individual performance beyond that observed when subjects received flat pay while working alone?", was answered by comparing

productivity during the flat individual and incentive individual conditions. The answer to the question has two parts. First, all subjects, irrespective of incentive system assignment, performed at higher levels when paid under the incentive individual systems and the differences between means were statistically significant, $t(15) = 5.67$, $p = .000$. Second, the mean differences for each incentive pay system were statistically significant. Productivity differences are highlighted in the following discussion. Refer to Tables 5 (group data) and 6 (subject data) for relevant productivity means and differences.

Linear Data

As is depicted in Figure 4, the linear groups posted similar productivity improvements. For group 1 mean widget production increased from 21.6 during the flat condition to 25.6 during the incentive condition. Mean widget productivity for group 2 increased from 17.8 during the flat condition to 20.8 during the incentive condition. Pooling the two groups, the difference was statistically significant, $t(4) = 3.31$, $p = .03$. Improvements for the five subjects (see Table 6 and Figures 8 and 9) ranged from a mean of 1 to 7.2 additional widgets when paid individual incentives.

Positively Accelerating Data

Slightly higher improvements were observed in the positively accelerating groups (refer to Figure 5). Group 1's performance increased from a mean of 18.2 widgets during the flat condition to a mean of 23.3 widgets during the incentive condition. As for group 2, performance improved from a mean of 20.1 in the flat condition to a mean of 24.2 in the incentive condition. Pooling the two groups, this

difference was statistically significant, $t(5) = 28.35$, $p = .000$. Subject (see Figures 10 and 11) performance improvements ranged from a mean of 4.4 to 5.3 widgets.

Negatively Accelerating Data

The highest performance increases were observed in the negatively accelerating groups. For group 1 widget productivity increased from a mean of 13.7 during the flat condition to a mean of 25.5 during the incentive condition. For group 2, mean productivity increased from 12.9 widgets in the flat condition to 21.5 widgets in the incentive condition. Pooling the two groups, this difference was statistically significant $t(4) = 4.01$, $p = .016$. Improvements in subject (see Figures 12 and 13) scores ranged from a mean of 1.8 widgets to 17.4 widgets.

Research Question 6

The sixth research question is "Which incentive pay system is better at managing performance improvements?" This question was included for two reasons. One, knowing which is generally better, individual or group payouts, is important when making decisions about the type of incentive payout to use. Two, given choices between incentive systems, it is useful to know which of the systems has, historically, been the most effective at improving and controlling performance. To answer the question in general, individual data was analyzed. The group data were analyzed to answer the more specific question about each incentive pay system.

Individual versus Group Payout Comparisons

With respect to the payout arrangement, the productivity for eleven subjects was better during the individual incentive condition and the productivity for five subjects was better during the group incentive condition (see Figure 14). When those

data are analyzed, irrespective of incentive system assignment, the mean differences between the two incentive conditions are not statistically significant, $t(15) = 1.59$, $p = .13$.

This conclusion was re-examined in light of a problem encountered with the calculation of group earnings for negatively accelerating group 1. The group payout was flawed in that subjects actually earned less in the group condition than they did during the individual condition when they made the same number of widgets. For example, 20 widgets under the individual system paid $2.00 while an average of 20 widgets during the group system paid $1.54. This occurred because of the incorrect calculation of total group earnings.

With the elimination of the data for subjects 13 through 15 the picture changes. Eight subjects performed somewhat better during the individual incentive condition while five subjects performed better during the group incentive condition. The statistical significance test was rerun and the differences are still not significant, $t(12) = .83$, $p = .42$. Therefore, there is no strong evidence to suggest that one payout arrangement is better then the other.

Incentive System Comparisons

A comparison of the individual and group incentive conditions (refer to Figure 15) for the pay systems revealed the differences to be statistically significant for both the linear and positively accelerating systems, but in opposite directions. For the linear system, productivity during the incentive group condition was higher for both groups. Pooling the two groups, this difference was statistically significant, $t(4) = 3.03$, $p = .039$. Productivity was higher during the incentive individual condition for both positively accelerating groups and the mean difference was also statistically significant, $t(5) = 4.03$, $p = .010$.

The negatively accelerating data were not included in this analysis which compares the incentive systems to draw conclusions. In addition to the calculation problem discussed above, the three subjects (numbers 13, 14, & 15) in negatively accelerating group 1 indicated on the exit questionnaire that they were displeased with the lower pay in the group condition. Given that group 1 began in the individual incentive condition and then went to the group condition, this sequence allows for direct comparisons of later earnings in the group condition to earlier earnings in the individual condition. Therefore, the lower performance of subjects 13 through 15 during the group condition may have been influenced by the "unfairness" of the earnings.

Before leaving the productivity discussion the effects of intervention sequencing needs to be examined in order to discount such effects as variables influencing the observed performance levels. Because of the necessity to investigate social loafing behavior within the Latane' et al. (1979) paradigm, the introduction of the flat individual and flat group conditions could not be counterbalanced. Therefore, it is impossible to remove sequence effects from the social loafing data. It is quite possible that the order of the flat pay conditions impacted in some way upon the group performance. The subject data suggest the absence of sequence effects given that seven subjects performed better in the group condition whereas ten subjects performed worse.

As can be seen in Figures 4 through 6, the sequence of the introduction of the incentive conditions was counterbalanced and the group means suggest that productivity changes were not influenced by the intervention sequence. While linear group 1 produced more widgets during the second incentive condition, linear group 2 generated more widgets during the first incentive condition. Positively accelerating group 1 generated fewer widgets during the first incentive condition, whereas group 2

performed at a lower level during the second incentive condition. The negatively accelerating groups produced contrasting trends as well, with group 1 posting better performance during the first incentive condition and group 2 doing better in the second incentive condition.

Cost Per Widget Data

Research question 7, "Which monetary incentive system is most cost effective?", was answered by comparing the mean cost per widget during the flat conditions with the cost during incentive conditions. Figure 16 provides across system comparisons for the six groups and Tables 7 and 8 display cost per widget and change data.

Linear Data

A comparison of the cost per widget during the flat individual condition with the cost during the incentive individual condition shows that cost during the incentive condition was minimally higher for group 1 and slightly lower for group 1. Cost per widget increased from $.093 to $.10 for group 1; whereas the cost decreased from $.112 to $.10 per widget in the incentive condition for group 2.

The comparisons between the flat group and incentive group systems also reveal mixed results. For group 1 cost increased from $.087 per widget in the flat condition to $.10 per widget in the incentive condition. For group 2 cost per widget decreased from $.106 in the flat condition to $.10 in the incentive condition.

These group data simply do not indicate that one linear system is superior over the other in terms of cost effectiveness. However, comparisons of the individual subject data provide a basis for some general, yet conditional, conclusions about the cost effectiveness of the linear systems. If a worker is producing at a fairly high rate

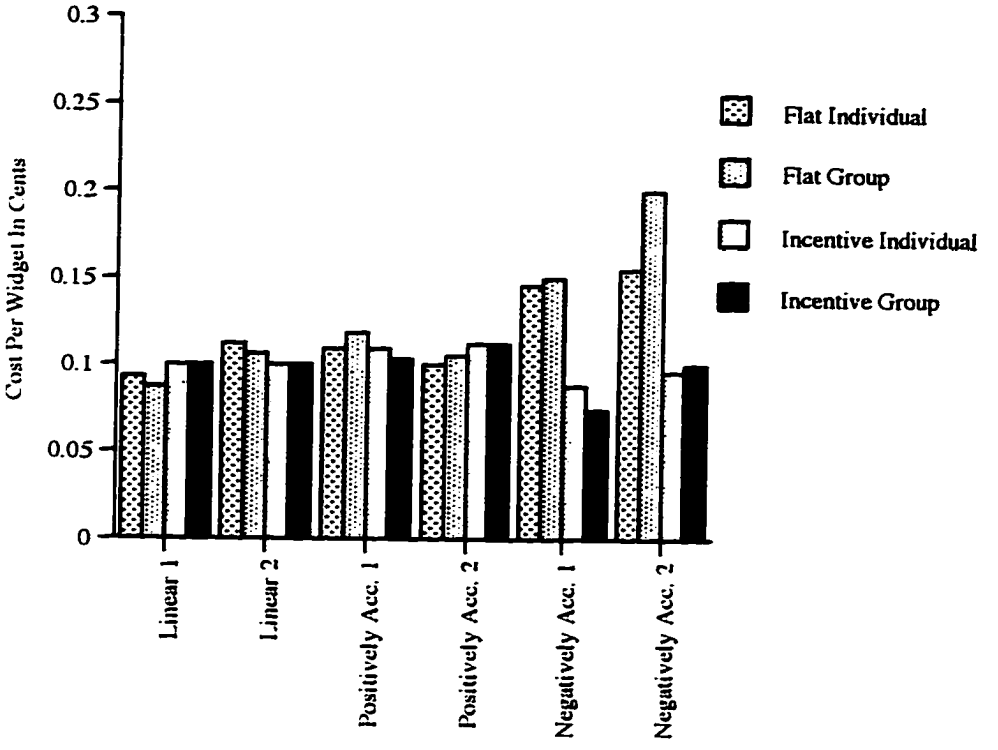

Figure 16. Cost Per Widget Comparisons Across All Groups and Pay Systems.

under a flat or hourly pay system, as was the case with subject 1 (see Figure 8), the linear system may not produce any cost savings. For subject 1 mean widget cost was $.083 under the flat individual condition and $.081 under the group condition. If the worker in the real organization is like subject 1, no savings are realized by installing a linear system. To the contrary, the benefit of the linear pay system is seen in the situation where the worker is a low to moderate performer when paid a flat rate, as was the case with subject 5 (see Figure 9). For subject 5 the cost per widget was $.111

Table 7

Summary of Mean Widget Production and Cost Per Widget

Group	Flat Individual	Flat Group	Incentive Individual	Incentive Group
Linear #1	M=21.6 CPW=.093	M=23 CPW=.087	M=25.6 CPW=.10	M=27.8 CPW=.10
Linear #2	M=17.8 CPW=.112	M=19 CPW=.106	M=20.8 CPW=.10	M=21.8 CPW=.10
Positively Accelerating #1	M=18.2 CPW=.109	M=16.9 CPW=.118	M=23.3 CPW=.109	M=19.6 CPW=.103
Positively Accelerating #2	M=20.1 CPW=.10	M=19.1 CPW=.105	M=24.2 CPW=.112	M=23.9 CPW=.112
Negatively Accelerating #1	M=13.7 CPW=.146	M-13.3 CPW=.15	M=25.5 CPW=.088	M=22.7 CPW=.074
Negatively Accelerating #2	M=12.9 CPW=.155	M=1- CPW=.20	M=21.5 CPW=.096	M=20 CPW=.10

during the individual condition and $.118 during the group condition. In that case, per widget savings will occur under a linear pay system when the worker makes more widgets than were made while paid a flat rate.

Positively Accelerating Data

As was the case with the linear pay system, the cost per widget results across the two positively accelerating groups are not consistent. For group 1 the average cost

Table 8

Comparisons of Absolute and Percent Change in Cost Per Widget Between Individual and Group Incentive Pay Systems

Group	Absolute Change Individual Incentive Over Flat Individual	Percent Change Individual Incentive Over Flat Individual	Absolute Change Group Incentive Over Flat Group	Percent Change Group Incentive Over Flat Group
Linear #1	0.007	8%	0.013	15%
Linear #2	-0.0012	-11%	-0.006	-6%
Positively Accelerating #1	0	0%	-0.015	-13%
Positively Accelerating #2	0.012	12%	0.007	7%
Negatively Accelerating #1	-0.058	-40%	-0.076	-51%
Negatively Accelerating #2	-0.059	-38%	-0.1	-100%

per widget of $.109 was the same for the flat and incentive individual conditions; whereas the cost increased during the incentive group condition from $.118 to $.133. The results for group 2 show that cost per widget increased in both incentive conditions. During the flat individual condition cost per widget was $.10 and it increased to $.112 during the incentive condition. Similarly, cost increased from $.105 in the flat group condition to $.139 during the incentive group condition.

Based on the current productivity data it is clear that no cost benefits were derived from the positively accelerating systems. Although, it is possible to gain savings from the positively accelerating systems when worker productivity under a flat system is fairly low. For instance, subject 9 produced a mean of 13 widgets during the flat individual condition which resulted in a cost per widget of $.154. Under the positively accelerating system 13 widgets would cost $.072 each, a 53% savings. Of course, the opposite occurs with workers producing at a fairly high rate under a flat pay system. There were no high performers in the current study so a hypothetical analysis is appropriate. Given the situation where the worker makes an average of 25 widgets under the flat pay system the cost per widget is $.08 compared to a per widget cost of $.114 for 25 widgets under the positively accelerating system.

Negatively Accelerating Data

Because of the problem with the pay calculations for group 1, only the data for group 2 were employed to answer research question 7. Substantial cost reductions were obtained during the incentive pay conditions when the mean cost per widget decreased from $.155 during the flat individual condition to $.096 during the incentive individual condition. Cost per widget decreased from $.20 during the flat group condition to $.10 during the incentive group condition.

As was the case with the linear system, the cost benefit of the negatively accelerating system is only realized when worker performance under the flat pay system is low. For example, the worker who makes 15 widgets under the flat pay system generates a cost per widget of $.133. The same number of widgets under the negatively accelerating system costs $.117 each. Greater benefit is also derived when the low performer under the flat system can be motivated to generate higher

productivity under the incentive system. For example, a 10-widget increase over the 15 made under the flat pay system will result in a mean widget cost reduction to $.088.

Collectively, the cost per widget data suggest that no one of the incentive systems included in this study is superior to any other. While the negatively accelerating system resulted in substantial cost savings, the data are based on the performance of two subjects.

The data also suggest that absolute cost per widget under the incentive system compared to the cost under the flat system is not always the best indicator of the value of the incentive system. Other factors to consider are the productivity costs associated with high and low performers when they are paid under flat and incentive systems. It would seem that, generally, savings will not be derived from incentive systems when productivity is high under a flat system.

Productivity Data and Cost Per Widget Data

An unplanned research question, "Considering productivity and cost together, which of the three incentive systems is the best choice?", was included during the course of the study. This question was added because organizations are interested in the relative and absolute value of the incentive pay system in terms of changes in productivity and cost. In other words, the question "How much more can I expect to see in productivity gains and how much is it going to cost me?" is frequently asked when organizations are considering the merits of incentives. The data relevant to this research question can be found in Tables 3 and 5 which list the percent change in productivity across the flat and incentive conditions and in Tables 7 and 8 which summarize the cost per widget and productivity data.

A review of the productivity and cost data for each system reveal that a definitive answer to this question is not supported by the data. Looking at the linear

groups, it can be seen that group 1's performance during the incentive group condition increased by 21% while cost increased by 15%. For group 2 productivity increased by 15% while cost decreased by 6%. Turning to the individual condition comparisons, group 1 posted a 19% improvement in productivity during the incentive individual condition and cost increased by 8%. While the productivity of group 2 increased by 17%, cost decreased by 11%.

The positively accelerating systems consistently generated moderate increases in performance, however the cost per widget changes varied in direction. For group 1 productivity during the incentive group condition increased by 16% over the flat group condition while cost per widget decreased by 13%. Group 2 posted a 16% productivity increase and a 7% cost increase. Looking at the individual condition comparisons, for group 1 productivity improved by 28% during the incentive condition with no change in cost. For group 2 productivity increased by 20% while cost increased by 12%.

The best that can be said is that both the linear and positively accelerating systems have the potential to generate moderate increases in productivity while producing decreases in cost. A factor which makes the linear system more attractive than the positively accelerating system is that the organization can reliability predict the cost of productivity fluctuations under the linear system.

Off-Task Behaviors

Off-task behaviors were defined as any behavior other than active widget making. Off-task behaviors observed during the course of the study were reading magazines, newspapers and textbooks, studying notes, counting widgets, playing with pop beads, playing with koosh balls, eating and drinking, getting snacks and drinks from the break area, fingernail repair and talking. Given that social loafing did not

occur Guerin's hypothesis, that the occurrence of social interaction and other off-task behaviors makes it impossible to accurately evaluate social loafing, could not be tested.

Questionnaire Results

The initial five questions were designed to assess intervention integrity. Four subjects indicated that they were aware the purpose of the study was to investigate the effects of monetary incentives on social loafing behavior. Two subjects knew the purpose prior to starting the study, one subject learned the purpose during the flat individual condition and one became aware of the purpose during the incentive group condition. Subjects did not indicate how they became aware of the purpose of the study.

Six of seventeen subjects indicated they were aware that the experimenters were tracking individual performance during the flat group condition. This is a particularly important variable given that individual performance during the group condition may have been influenced by the potential for individual evaluation. Social loafing researchers (e.g., Brickner et al., 1986; Harkins, 1987; Williams et al., 1981) have consistently shown that social loafing behavior is prevented or eliminated by the introduction of individual identification and evaluation when people are working collectively in groups. Three linear subjects, numbers 2, 3, and 4, and three negatively accelerating subjects, numbers 13, 16, and 17, indicated that they were aware of the individual tracking. Subjects 2, 3, 4, and 13 performed better during the flat group condition. It is possible that tracking of individual performance controlled social loafing behavior for these subjects.

In light of this awareness of individual performance tracking during the flat group condition, the significance test for social loafing was recalculated. The data for subjects 2, 3, 4, and 13 were excluded along with the data for subjects 9, 16, and 17,

which were excluded from the original calculation of social loafing. The differences were still statistically insignificant $t(9) = .82$, $p = .43$.

One question "If this research had been conducted at your place of work, would you have approved of the use of our research methods to conduct this study?" was included as a measure of social validity. Fourteen subjects approved of the methodology and two disapproved. The two subjects who indicated they did not approve of the methodology were members of the negatively accelerating group 1 who were affected by the error in calculation of earnings under the group payout.

Another question "Did this research project seem like a work simulation to you?" was included to assess the effectiveness of the laboratory simulation. Thirteen of the sixteen subjects indicated that the simulated work environment seemed like that of a real work place.

Two questions focused on subject preference for working alone (individually) or collectively (group). Prior to the study, it was hypothesized that individuals who preferred working alone would produce fewer widgets when working collectively. Conversely, it was proposed that individuals who preferred to work collectively with others would perform at a lower level during the individual work conditions. To the question "Do you generally like working in groups where each group member shares responsibility for completing the project?" nine subjects responded yes and seven subjects responded no. Responses were the same to the question "In a work situation do you prefer to work alone or do you prefer to work with a group of people?"

Consideration of the individual responses to these two questions, in the context of widget productivity, show that the proposed hypotheses were supported by the performance data of eight subjects and not supported by the performance data of eight subjects. Starting with the linear groups, subjects 2, 3, and 5 indicated they preferred working in groups. Yet, subject 5's productivity was lower during the flat group

condition while subjects 2 and 3 performed better when working in a group. And, subjects 1 and 4 indicated they preferred working alone but both performed better during the flat group condition than during the flat individual condition. For the positively accelerating groups, subjects 7, 10, and 12 preferred working in groups yet their widget productivity was lower during the flat group condition. On the other hand, subjects 8, 9, and 11 indicated they preferred working alone and their performance was lower during the flat group condition, thereby, supporting the hypotheses. Three subjects in the negatively accelerating groups support the hypotheses and two fail to support. Subjects 15 and 17 reported a preference for working alone and both subjects performed at a lower level during the flat group condition; subject 13 preferred to work collectively and she performed better during the flat group condition; subjects 14 and 16 expressed a preference for working collectively yet both produced fewer widgets during the flat group condition.

The question "If you were working a full-time job and were not in college how would you prefer to be paid: flat rate for each hour you work, incentives based on an equal share of a group's total earnings, or incentives based solely on what you personally produce?" was designed to assess pay system preference. Twelve subjects preferred being paid incentives delivered contingent upon individual performance only. Four subjects, all in the negatively accelerating groups, indicated a preference for a pay system where earnings were based on a flat rate per hour of work. The preference of the negatively accelerating subjects 13 through 15 may be more a reflection of their dissatisfaction with the incentive group payout then dissatisfaction with group payouts in general.

Another question associated with pay system preference was "Was there anything about the incentive pay system you were paid under that was aversive (unpleasant) to you?" The three negatively accelerating group 1 subjects stated "When

we were paid group pay we made a lot more widgets and got worse than when we made less widgets by ourselves." These responses were not unexpected given the calculation error which will be covered in detail in the discussion section that follows the results chapter.

The final question was "How did you use the money you earned from this study?" The responses to this question are important given that prior pay for performance laboratory simulations have been criticized on the basis that the earnings were discretionary money. More specifically, the criticism has been that the productivity of college student subjects is not influenced by the contingencies (e.g., need for continued employment, need to produce income to support oneself or family) that typically affect the "real world" workers. Subjects reported that they used their earnings to purchase groceries, textbooks and automobile gas, to pay parking fees and fines, telephone bills, and electric bills, and to cover emergencies associated with trips home, etc.

CHAPTER IV

DISCUSSION

The results of the present study are important for several reasons. First, this is the first study to investigate the social loafing phenomenon in the context of a simulated work place environment. The fact that social loafing behavior was not observed does not significantly diminish the usefulness of the data because the productivity data in combination with the self-report data provide clues as to the controlling variables of social loafing. Second, the study provided strong evidence that individual and group incentives reliability generate higher performance levels than do flat pay systems. Finally, the data indicate that performance was differentially affected by the linear and non-linear incentive pay systems. A detailed treatment of these conclusions and other important issues is provided in the following.

The primary objective of the current study, to determine whether social loafing behavior occurs in a work place context when people are engaged in a real work-like task, was accomplished. A criticism of social psychology investigations of social loafing is that simulated work environments have not been arranged and the resultant findings are of little use given that they do not generalize to populations outside the laboratory. Verbal responses to exit questionnaire items suggest that the laboratory simulation in the current study was successful in creating an environment subjects would expect in a real-world work setting.

Another criticism related to the issue of external validity is that many of the performance tasks (e.g., shouting rah rah, clapping hands, blowing air into a tube) employed in the social loafing studies are unlike tasks that people engage in on a regular

basis. Further, the occurrence of performance decrements when performing such tasks may have been more a function of fatigue due to the physical demands of the task. It is also quite possible the potential for social disapproval accounted for diminished performance in the coaction environmental. For example, shouting rah rah as loud as possible in a context where shouting seems inappropriate could result in low shouting effort. The widget-making task in the current study was designed to overcome this weakness. Making widgets is much like a piece work activity because it requires physical effort to combine parts into a finished product.

While social loafing was not observed in this study, perhaps the findings have moved the OBM field closer to identifying the controlling variables of social loafing behavior in a work environment. Social psychologists (Brickner et al., 1986; Harkins, 1987; Kerr & Bruun, 1981; Williams et al., 1981) have consistently shown that social loafing does not occur when there is the potential for individual identification and evaluation when working coactively in a group. In the current study, four of the seven subjects who performed better during the flat group condition reported being aware that individual performance was being tracked during the flat group condition. Therefore, it is possible that the potential for individual evaluation controlled social loafing behavior for those four subjects.

Another controlling variable of social loafing may be the matching of preference for certain work settings to the individual (e.g., if the worker prefers to work with others, place the worker in a work group). Guerin (1993) has suggested that the restructuring from an individual work setting to a group work setting constitutes a change in the contingencies to which workers are exposed. For individuals who have a history of reinforcement associated with working alone this change results in a loss of conditioned reinforcers. The absence or withdrawal of conditioned reinforcers might account for the diminished performance labeled social loafing. If Guerin's contention

is correct, then it may well be that individuals who have a history of reinforcement associated with working in groups do not loaf in the group context. The self-report data suggest that work environment preference may impact upon performance. Three subjects who indicated a preference for working with others performed better during the flat group condition, whereas, five subjects who indicated a preference for working alone performed better during the flat individual condition.

Latane' et al. (1979), in their original social loafing study, drew conclusions that support Guerin's notion of the causes of social loafing. They concluded that social loafing was a function of group contingencies, though they did not identify what those contingencies looked like. The productivity and self-reports taken together point out that the influence of individual history with respect to work setting should be considered a potential determinant of performance decrements and should be investigated empirically. An improvement on the current design may lead future researchers to more useful data with respect to the controlling variables within the group context. The use of a reversal design where subjects go back to performing in the flat individual condition immediately after the conclusion of the flat group condition can more effectively isolate the variables associated with the group context.

It is also possible that in the current study the potential for performance evaluation and matching of preference for work setting may have combined to control social loafing behavior. Three of the subjects who performed better in the flat group condition and, subsequently reported they were aware that individual performance was being tracked during the flat group condition, also reported a preference for working in groups.

Linked to the social loafing phenomenon is the issue of teamwork as a solution for America's productivity problems. It has been suggested that teamwork may not be a good solution given the potential for social loafing behavior. The present findings

provide no empirical evidence that social loafing is, in fact, a threat to the efficacy of teamwork interventions. What the data suggest is that both performance improvements, as was observed in the linear groups, and decrements, as was seen in the positively and negatively accelerating groups, can occur when people work in groups of three.

While it is certainly important to know that performance improvements can be obtained for small groups paid a flat rate, it is equally important to be aware that substantial decrements can occur under similar circumstances. Productivity deficits among the subjects in this study ranged from 2% to 24%. The practical implication of a sustained productivity loss of 24% is that the organization will very likely cease to be viable. Given this scenario, it seems that future investigations of social loafing should look at the variables that influence magnitude of decrements.

The second primary objective, to investigate the effects of linear and non linear incentive systems with individual and group payouts on performance, was achieved and the results provide strong empirical support for the superiority of incentive pay over flat pay. The three incentive pay systems consistently generated higher levels of widget production in both the individual and group payouts. This finding was not unexpected and is consistent with the line of pay for performance research that preceded this study.

In addition, while the productivity data clearly favor the incentive systems over the flat pay systems, the data do not support the superiority of one payout arrangement over the other. Rather, it seems as though performance improvements can be obtained with both individual and group payouts. This finding does not support the Agnew et al. (1991) contention that incentives must be based on individual performance to be optimally effective.

The final general finding with respect to the incentive pay systems was that performance was differentially effected by the three incentive pay systems. The differential effects occurred in that (a) the positively accelerating system generated somewhat higher performance improvements than did the linear system, and (b) the positively accelerating system generated higher productivity within the individual payout arrangement while the linear system had a similar effect under the group payout arrangement. This finding is consistent with the Smoot and Duncan (1997) results.

A determination of the usefulness of an incentive pay system to an organization can not be solely based on what the system does to productivity levels. What must also be considered is the system's ability to (a) maximize performance while minimizing cost, (b) to quickly generate performance improvements, and (c) to maintain stable performance over time. Neither the linear nor the positively accelerating system has an advantage in terms of maximizing productivity and minimizing cost. Both systems are equally effective in generating moderate improvements in performance and both have the potential to generate sufficient productivity gains to effect cost savings over a flat pay system. As for generating quick improvements in performance, the positively accelerating system is superior. For both groups there was a clear and substantial separation between the last data point in the flat pay condition and the first data point in the first incentive pay condition. On the third criterion, maintaining stable performance over time, there is no clear advantage gained from either system.

The data for the negatively accelerating groups were not included in the prior discussion of the best incentive pay system because of the problem with incorrect calculation of earnings during the group payout condition. However, even though the productivity data, in and of themselves, should be viewed with a "cautious eye," the data have instructive value to pay system designers. The verbal responses of three of the subjects assigned to negatively accelerating group 1 suggest that the subjects were

dissatisfied with the group payout, which is reasonable considering that subjects made less during the group payout than they did during the individual payout for the same number of widgets. However, the difference in mean productivity during the individual incentive and group incentive conditions was only 2 widgets. More interestingly, the three subjects performed substantially better during the incentive group condition then during the flat group condition.

The question that arises from the situation detailed above is "what accounts for significant improvements in performance when the incentive pay system appears inequitable to the workers?" Very likely, what has been seen in other incentive studies (e.g., Dickinson & Gillette, 1993; Frisch & Dickinson, 1990; Smoot & Duncan, 1997) was observed in the present study. That is, the pay-performance contingency is more important than the magnitude of the incentive. To illustrate, while the negatively accelerating subjects' actual total earnings per session in the group condition were below what they should have been to maintain equity, the incentive system provided an opportunity to earn more by making more widgets. No matter how many widgets were made during the flat pay condition the subject still earned only $2.00. This is not to suggest that inequitable incentive pay systems should be employed. Rather every attempt should be made to eliminate such inequities, because, while an inequitable system may generate higher performance levels in the short term, it will likely generate long term problems associated with job dissatisfaction, absenteeism and turnover.

The productivity results from the linear and positively accelerating pay systems also support the notion that the most essential feature of any effective incentive pay system is that pay and performance are directly linked. When pay is contingent upon the number of items an individual produces the presence of the pay-performance contingency is a more powerful determinant of performance than is the magnitude of the incentive. This is supported in that the subjects in the current study made more

widgets in the incentive conditions even though (a) $.10 per widget is not much money, and (b) each additional widget under the accelerating system did not represent much of a gain in cumulative pay.

There are several additional issues which should be considered when interpreting the results of this study. The first has to do with the availability of competitive sources of reinforcement. According to Dickinson and Gillette (1993), where there are no competitive activities it could be argued that the incentive systems are effective to some extent because there are no other activities to participate in. Therefore, subjects spend more time on task then is typically the case in the work place. So incentives may increase performance by increasing the amount of time spent on task and decreasing the amount of time spent doing other things. In the current study, subjects had access to off-task behaviors throughout all experimental conditions, however, subjects consistently made more widgets during the incentive conditions. Therefore, it is reasonable to conclude that the isolated effects of the incentive systems, not the fact that subjects spent more time on task because there was nothing else to do, accounted for the performance improvements.

Another, and often cited, criticism of laboratory investigations of the effects of incentive pay systems is that earnings are typically small, in relation to earnings from a real job. As such those earnings function as discretionary money rather than as job earnings that are needed for living expenses (as is the case with real job earnings). It is certainly the case that the individual earnings from this study were not large amounts of money. Actually, total earnings ranged from $55.56 to $85.01. However, subjects reported that their earnings were used to cover living expenses and school-related expenses. Therefore, it should be acknowledged that the earnings may not have functioned as discretionary funds.

A third criticism of empirical investigations of incentive pay systems is that incidental performance feedback is always present in all incentive conditions and, therefore, is a confounding variable. While performance feedback was inherent in the present study, its effects as a confounding variable were controlled for by allowing feedback to occur via the same method and at the same frequency across all subjects, conditions and groups. It still remains that feedback may have interacted with the incentive system and may have influenced productivity levels. While it may be possible to tease out the supplemental effects of feedback through better experimental controls, doing so is neither practical nor useful because performance feedback exists collaterally with incentives in the work place.

More valid criticisms associated with external validity concern subject characteristics and duration of work sessions. In terms of subject characteristics, all subjects were female undergraduates. The absence of male subjects in the study simply means that the findings can only be generalized to females. Future research on social loafing should assure that male and female subjects are included. This is particularly important given that some social psychology studies have reported social loafing behavior to be greater in males than females. As for work session duration, the laboratory simulation would have been improved by making the work session longer than fifteen minutes. Half-day work sessions would be a more accurate simulation of a typical work schedule.

Collectively, the findings from the current study may be valuable information to OBM practitioners and designers of incentive pay systems. First, organizations considering re-engineering to team structures can benefit by installing a linear or non-linear incentive pay system simultaneously with the restructuring. The incentives will control for performance deficits arising from team work. Second, the linear and non linear systems are viable interventions for eliminating performance decrements typically

seen when people are paid under an hourly system, irrespective of whether the individual is working alone or coactively with others. Third, individual and group payouts can be equally effective in generating desirable performance improvements. Fourth, linear and positively accelerating systems are comparable in terms of generating performance improvements and controlling costs. Fifth, a positively accelerating system may be the better choice for organizations that need to, in the short term, gain market share without concern for cost containment. Sixth, a linear system is likely the appropriate choice for organizations that need moderate productivity improvements at predictable cost.

Opportunities for future research are plentiful. To begin with, direct replications of the current study should address the identified. That is, work sessions need to be longer, male subjects need to be included, the calculation problem with the negatively accelerating group system must be eliminated and a better system of covertly tracking individual performance during group sessions must be found. Although it looks like social loafing did not occur here, the data do suggest that incentives can effectively eliminate decrements in coaction. Therefore, it would be useful to continue direct replications that empirically investigate the effects of monetary incentives on social loafing behavior.

Systematic replications may provide some additional research opportunities. Investigations which simulate the work context and real work-like tasks will provide a strong basis for generalizing results to the general population. A series of studies which employ simple to complex tasks within similar work environments will allow for the evaluation of task characteristics on social loafing behavior. Also, it will be useful to incorporate tasks that are actually found in a real work setting, not just simulated tasks.

A specific line of investigation follows from the social loafing theories and intervention studies. Further investigations of social loafing should target the environmental variables identified in the theories: (a) the absence of systematic performance feedback, (b) the loss of conditioned reinforcers as a function of being required to work in a group, (c) the role of tangible reinforcers in eliminating social loafing, (d) the lack of individual identification and evaluation, and (e) failure to establish individual performance standards for all group members. All of these represent variables that are relevant to actual work environments and they may constitute solutions to the social loafing problem.

Other research opportunities arise from a general weakness in the social loafing studies. What is currently known about the causes of social loafing has been derived, primarily, from self report data. OBM researchers should look for ways to empirically isolate the controlling variables of social loafing.

The importance of continuing this line of research is exemplified by Sigrid Glenn's (1993) comments in her article entitled "*Windows on the 21st century.*" "Behavior analysis has its own identity and it can build both organizational and conceptual bridges between itself and other disciplines and organizations...behavior analysis stands to gain in the long run from such bridge-building attempts" (p. 145). Bringing social loafing out of the social psychology theory-building laboratory and into the OBM/behavior analysis applied arena will benefit both theoretical orientations that are being connected by that "bridge," the science of behavior and social psychology.

Appendix A

Human Subjects Institutional Review Board Approval

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899
616 387-8293

123

WESTERN MICHIGAN UNIVERSITY

Date: December 8, 1994

To: Delores A. Smoot

From: Richard Wright, Interim Chair

Re: HSIRB Project Number 94-11-24

This letter will serve as confirmation that your research project entitled "The effects of linear and non-linear incentive pay systems with individual and group payouts on the social psychology phenomenon of social learning" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you must seek specific approval for any changes in this design. You must also seek reapproval if the project extends beyond the termination date. In addition if there are any unanticipated adverse or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: Dec. 8, 1995

xc: Michael, PSY

Appendix B

Subject Recruiting Script

Recruitment Script

Hello! My name is Dee Smoot. I am looking for individuals to participate in an Industrial/Organizational Psychology study designed to investigate worker performance under different pay conditions. If you decide to participate in the study, your task will be to make "widgets" from plastic pop beads. A widget consists of 16 beads joined together in a circle.

I am seeking 18 volunteers to participate. Participation will require you to attend 15-minute work sessions on Mondays, Tuesdays, and Wednesdays, for a total of 25 sessions. You will be paid for each session based on your performance (the number of widgets you make during the session), and you will receive an additional $15.00 for completing the study and another $10.00 for participation in a follow-up exit interview and debriefing session.

Your assistance is completely voluntary. If you participate, you may leave the study at any time. If you do leave the study early, you will be paid the amount of money you have earned to the date of withdrawal. However, you will forfeit the $15.00 for completing the study and the $10.00 for participation in the exit interview and debriefing session. Your willingness to volunteer for, or withdraw from the study, will not affect your course grades in this or any other class.

If you would like to participate, please print your name and phone number on the list I am about to pass out. Also, indicate on the list, by circling the times, the times that you will be available to participate in the study.

I will be contacting you within the next few days to arrange a time that we can meet and discuss the study in detail.

Thank you for your time!

Appendix C

Subject Screening Form

Subject Screening Survey

Subject Number_____

Instructions: **Please complete the following questions. All the information you provide will remain completely confidential.**

1. If you participate in this study, how do you plan to spend the money you earn?

2. Do you currently hold a job? YES NO

3. If you currently have a job, how long have you had it? Please indicate your answer in months/years.

4. If you currently have a job, how many hours a week do you work at the job?

5. If you do not currently have a job, how long has it been since you held a job? Please indicate your answer in weeks, months, or years.

6. Do you receive any financial aid? YES NO

7. Do you know anyone who has signed up to participate in this study? Please list their names.

8. If you know anyone who might be interested in signing up for this study, please refer them to Dee Smoot at 387-4464.

Appendix D

Informed Consent Form

Western Michigan University, Department of Psychology
The effects of Linear and Non-Linear Incentive Pay Systems With Individual and Group Payouts
Delores A. Smoot and Jack Michael

Informed Consent for Participation in a Research Study

My name is Dee Smoot and I am a graduate student in the Department of Psychology at Western Michigan University. You are being invited to participate in a research study that will fulfill my dissertation requirements for a Doctor of Philosophy degree in Applied Behavior Analysis. The purpose of this study is to investigate the effects of monetary incentives on work performance.

As a participant in this study, you will be required to make "widgets" from plastic pop beads during 25, 15-minute work sessions. A widget is constructed by joining 16 beads together in a circle. I have given you a completed widget to look at. You will work by yourself at an individual work station and with other participants seated at a large work table. Your own containers of pop beads will be placed on the table in front of you. You will be able to get up, take a break, enjoy other available activities (i.e., magazines, homework) at any time during the study.

This research involves minimal risk to you as a participant. However, you may encounter mild stress while performing the widget-making task and mild soreness in your fingertips may occur from making the widgets in the first few sessions. As described below, you may withdraw from the study at any time if this occurs, or you may work on other activities. As in all research, there may be unforeseen risks to the participant. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or treatment will be made available to the subject except as otherwise stated in this consent form.

You will receive monetary compensation for your participation in this study. You will be paid in two different ways during the study. In one condition, the total amount of money you will earn will depend upon the number of widgets you make. In the other condition, the total amount of money you will earn will depend upon the number of widgets made by you and the two other individuals in your group. In addition, compensation will include a $15.00 bonus for completing the study and $10.00 for participation in an exit interview and debriefing session. Total compensation will include the amount of money you earn from making widgets plus the $25.00. The information obtained from this study may allow business, industry, and governmental agencies to better design pay systems that satisfy both the organization and the employee.

All information obtained in this study will remain strictly confidential. When the results are publicly presented, no one will be able to identify who you are. As a participant, a code number will be assigned to you and will be used to identify your data. By signing this consent form, you will be giving permission for data obtained in this study to be presented in my dissertation and in professional presentations and publications.

Your participation in this study is entirely voluntary. You may withdraw from the study at any time, without repercussions. If you do withdraw, you will receive the amount of money that you have earned up to the point of withdrawal, but you will not receive the $15.00 bonus for completing the study nor will you receive the $10.00 for participation in the exit interview and debriefing session. Your participation in the study or your withdrawal from the study will not affect your grades in any of your courses. During the debriefing session at the end of the study, the experimenter will answer any questions and explain how your data will help us learn more about monetary incentives.

If you have any questions concerning this study, you may contact Dee Smoot at 387-4464. In addition, Dr. Jack Michael, the faculty advisor for the study, may be contacted at 387-4480. The participants may also contact the Chair, Human Subjects Institutional Review Board or the Vice President for Research at 387-1893, if questions or problems arise during the course of the study.

Your signature below indicates that you understand the above information and agree to participation in the study.

_____

Participant Signature **Date**

_____

Print Participant Name

Please keep the attached copy of this form for your records.

Appendix E

Subject Debriefing Script

Debriefing Script

There are two purposes for this debriefing session. First, I want to explain to you the purpose of the study you participated in and the role that your participation has played in helping the field of Organizational Behavior Management learn more about individual and group incentive pay systems. Second, participation in scientific research should provide a learning opportunity for not only the experimenters, but also for the subjects. Therefore, I will describe the research design and methods we employed and the research questions we asked. Also, I will show you graphs of the data you generated, give our interpretation of the data, and explain what the data mean in terms of the research questions we were investigating.

I encourage you to ask questions as I go through the debriefing. If there is some aspect of the study that I have not made clear, please feel free to ask for further clarification.

Purpose Of The Study:

The purpose of this study has been twofold. First, we investigated the presence of social loafing, under simulated work conditions, when subjects were engaged in a simple production task. Social loafing is defined as the loss of individual motivation to perform when working in a group co-action environment when compared to what an individual produces when he/she works alone. Second, we evaluated the affects of individual and group monetary incentives on social loafing behavior in order to identify potential intervention strategies to eliminate social loafing behavior in real work settings. Intervention strategies are methods that scientists use to solve problems.

Rational: Recent efforts to improve productivity in business and industry have found companies turning to teamwork and the "Total Quality Management" (Deming, 1986; Berry, 1991) for solutions. Annually, over 10,000 people attend Deming's four-day seminars which emphasize improvements through cooperative efforts. According to Wellins, Byham, and Wilson (1991), approximately 25% of all U.S. industries are experimenting with work teams to improve quality and quantity. And, Robert Reich (1987) has proclaimed the "Team as Hero" in resurrecting U.S. economic stability. Interestingly, according to some social psychologists, teamwork may not be a solution at all, but may actually constitute another source of productivity problems in the form of "social loafing" (Harkins & Jackson, 1985; Kerr & Bruun, 1981; Latane, Williams & Harkins, 1979). Social loafing is said to exist when the level of an individual's performance in an "alone" work setting is greater than the level of that same individual's performance when working in a group co-action work setting. Therefore, working in teams may result in less productivity and the phenomena of social loafing should be of concern to the field of management and organizational behavior management. However, the literature in neither field gives any attention to teamwork and social loafing. In addition, the efforts by social psychologists to isolate the variables that account for the social loafing effect have been restricted to laboratory studies that have not simulated real work environments. Thus, there is no evidence that social loafing exists in the real world. However, of even greater concern is the fact that there is no evidence suggesting that social loafing does not exist; if it does exist, social psychology has not provided ways to change social loafing behavior.

The search for solutions to productivity problems has not been restricted to the concept of teamwork. Organizations are increasingly turning to group monetary incentive programs such as profit sharing and gain sharing (Blinder, 1990; Lawler, 1990; Perry, 1988; Skryzcki, 1987; Weitzman & Kruse, 1990). However, Agnew, Dickinson, Acker and Cronin (1992) suggest such systems are relatively ineffective at changing organizational behavior because they violate a basic behavioral principle relevant to pay-for-performance: to derive the greatest benefit from monetary incentive systems money should be delivered contingent upon clearly defined, individual behavior as soon after the behavior as possible. Because group co-action is inherent in organizations employing group monetary incentive programs, the ineffectiveness of such programs may also be a function of social loafing effect. Yet, it is also possible that monetary incentives used with small groups (i.e. N=3 proposed in the current study) may prove to be effective at eliminating social loafing effects and, thereby, making teamwork in small groups a viable solution to productivity problems. In addition, there is considerable evidence that individual monetary incentive systems, conforming to the parameters outlined by Agnew et al. (1992), consistently improve productivity in the laboratory and in applied settings (for a review, see Dickinson & Gillette, 1993). Yet, none of these studies have investigated the effects on individual monetary incentives on social loafing behaviors.

Given the current trend of business and industry toward team work and the use of group incentive programs, the potential that social loafing exists in the real world, and the fact that monetary incentives increase productivity, an empirical investigation of the social loafing phenomenon and the effects of monetary incentives on social loafing is a logical step. The current study will provide valuable information to designers of incentive pay systems and to organizations with team cultures.

Your Role In This Study:

Empirical investigation of real world work problems necessitates that the subjects who participate in the research be like the individuals who actually hold full-time jobs in the real world. Undergraduate students are very much like others who have full-time jobs. Typically, you juggle a part time job and many other work-like activities such as repetitive class schedules and assignment demands, positions on sporting teams and in organizations. Therefore, you have played an important role in helping us to simulate a real world work setting in the confines of an experimental laboratory.

How The Study Was Designed and Conducted:

Experimental Questions. Seven research questions were investigated in this study. First, does social loafing occur when a group of 3 workers engaged in a simple construction task are paid a flat, hourly-type rate? Second, if social loafing occurs, what effect will group monetary incentives have on social loafing when the incentives are paid as an equal-share of the group's total earnings? Third, if social loafing does not occur will equal-share group incentives have any effect on individual performance beyond that observed when subjects received flat pay while working alone and in a group co-action setting? Fourth, if social loafing occurs what effect will individual monetary incentives have on social loafing behavior when incentive pay is based on individual widget production? Fifth, if social loafing does not occur will individual

incentives have any effect on individual performance beyond that observed when subjects received flat pay while working alone and in a group co-action setting? Sixth, which monetary incentive system, linear (group equal-share or individual payout), positive acceleration (group equal-share or individual payout), negative acceleration (group equal-share or individual payout), is better at managing performance improvements? Seventh, which monetary incentive system is most cost effective?

Research Design. A within-subject, multiple baseline design with counterbalancing was used to assess the independent variables. The within-subject manipulation consisted of exposing each of you to all levels of the independent variables and tracking your performance during all the experimental conditions. For example, you started working by yourself and received $2.00 for the work session; next you worked with 2 others and received $2.00 for the session; then you worked with those same people and were paid either individual incentives or group incentives. So each of you were exposed to all pay systems and to the individual and group work conditions. The multiple baseline configuration was included to more accurately assess the effects of the incentive pay systems on social loafing behavior. Multiple baseline means that you have two identical groups running at the same time but you introduce the pay systems at different times. performance changes after, and not prior to the introduction of a pay system, and the change occurs for both groups at different times, then the evidence supporting the effects of the pay system are more compelling. Counterbalancing occurred in that the sequence of the introduction of the incentive pay phases across the six groups was reversed. This was done to discount any sequencing effects as the causes of productivity changes under the incentive systems.

Simulation. Because the overall purpose of this study was to investigate the existence of social loafing in the real world and the effects of monetary incentives in such settings, the laboratory environment was designed to resemble, as much as possible given the physical and budgetary constraints of academic research, the real world of work. First, the production task of constructing widgets was not unlike piece work. Second, if you arrived to work late you were permitted to enter the work session and you were not systematically penalized for tardiness nor were you given extra time. However, there was a naturally occurring penalty in that people arriving late typically produced fewer widgets, thereby, earning less pay. In the group flat pay and incentive conditions, tardiness may have translated to lower overall group productivity and less for each group member. Third, in a real work setting it is not unusual to find competitive sources of reinforcement for off-task behaviors such as social interaction with co-workers, talking on the telephone, reading magazines, and eating. Therefore, you were prohibited from engaging in alternative activities and were permitted to bring items, such as reading materials and food, to work sessions. In addition, coffee and snacks, reading materials and playing cards were made available to you. Fourth, you were asked to sign a form verifying the number of widgets you produced and the amount earned per work session. This verification served much the same purpose as an employee's signature on a time card.

Dependent Variable. The primary dependent variable was the number of correctly produced widgets in each work session within each pay condition. A secondary dependent variable was the cost-per-widget in each pay condition.

Independent Variable. The independent variables were the work setting (individual and group) and the system by which workers were paid. The work setting

variable consisted of you working alone and in a group co-action environment. The pay system variable consisted of four pay systems, one flat rate system and three incentive pay systems - linear, positive acceleration and negative acceleration, and two payout plans - individual and group equal-share.

Flat Pay. You were paid $2.00 per work session in Phase A (individual work setting), provided you produced at least 10 correct widgets, and Phase B (group co-action setting), provided your group's total productivity was equal to 10 widgets per group member. Flat pay of $2.00 per session during the initial two phases, which were compared to determine if social loafing occurred, was used to hold pay constant between the two phases and among subjects. The existence of differential pay in either phase would likely confound the performance data and essentially render the measures of social loafing behaviors useless.

Linear Incentive Pay System. In Phases C and D, subjects in two groups were paid under the linear incentive pay system and received .10 for each correctly constructed widget. In the Phase C group co-action setting, you were paid an equal share of your group's total earnings provided that the group's total productivity was equal to at least 10 widgets per subject. In the Phase D group co-action setting, individual widget productivity was reported overtly and each of you received incentive pay based on the number of widgets you actually produced, provided you made at least 10 widgets, rather than being paid an equal-share of the group's total earnings.

Positive Acceleration Pay System. Subjects in two other groups were paid under the positive acceleration pay system during Phases C and D. The positive acceleration pay curve is based on gradual increases in the value of each additional widget and, therefore, you were paid somewhat more for each additional widget you produced. In the Phase C group co-action setting, you were paid an equal share of the group's total earnings provided that the total group productivity equaled at least 10 widgets per subject. In the Phase D group co-action setting, individual widget productivity was reported overtly and each of you received incentive pay based on the number of widgets you actually produced provided you made at least 10 widgets.

Negative Acceleration Pay System. Subjects in the last two groups were paid under the negative acceleration pay system during Phases C and D. The negative acceleration pay curve is based on gradual decreases in the value of each additional widget and, therefore, you were paid somewhat less for each additional widget they produce. In the Phase C group co-action setting, you were paid an equal share of the group's total earnings provided that total group productivity equaled at least 10 widgets per subject. In the Phase D group co-action setting group, individual widget productivity was reported and each subject was paid incentives equal to the total number of widgets s/he actually produced.

Experimental Controls. It is important to built controls into your research so that other variables (other things that may be happening during the study) do not confound (interfere) your research and, thereby, contaminate the data you collect and render the conclusions you draw from those data useless. So, we did a number of things to control for confounding variables. First, we read all of you the same instructions and gave the same demonstration on how to correctly construct a widget. Second, you were read standard instructions before each work session. Third, research assistants worked in teams so that one could verify the accuracy of the other

assistant's behavior when counting how many widgets you made and when calculating how much money you had earned. Fourth, we had you report to work at the same time each day and work for the same amount of time during each session. Fifth, we timed your work sessions with a calibrated watch. Sixth, we did not give you any information about the study which could in any way influence how many widgets you made. Seventh, all subjects were treated the same in terms of working space, comfort, access to breaks and refreshments, and amount of construction materials. Eight, subjects were all screened using the same criteria which made each of you essential equal coming into the study. Ninth, research assistants received training in how to implement the independent variables and how to collect and record data correctly and with accuracy. This is important for intervention integrity and interobserver agreement. Intervention integrity simply means that the assistants introduced the experimental conditions the same across all subjects and groups and they introduced the intervention as it was intended to be. Interobserver agreement means that both assistants on the team counted the same number of widgets and calculated the same amount of pay for the session.

Measuring Your Productivity. Well you know that we tracked how many widgets each of you made when you were working alone in the flat pay condition and when you received individual incentive pay, but we also tracked you individual productivity when you were working in the group conditions. We did this by color-coding the white pop beads that you used. We put a dot of airplane paint inside the pop bead hole. That way, when we took the widgets apart we could easily see which ones each of you had made. We did this because one of the theories about social loafing behavior is that when people work in group co-action settings they are more susceptible to loafing (putting out less work) when their productivity can not be identified. In other words, if we could not tell how many of the widgets produced by your group were yours, then you would be more likely to loaf. So, we had all members of the group throw their widgets in a pile in the middle of the table and had all of you use the same colored beads. That way it was more probable that you would believe your individual performance was not being tracked.

Data Analysis. Evaluation of the effects of the independent variables was accomplished through visual analysis of widget productivity data graphs and comparison of data derived from simple mathematical calculations. The primary units of comparison were the number of widgets produced per work session and phase, and cost-per-widget per work session and phase. In addition, to more completely assess treatment effects, change data will also be analyzed.

Visual Analysis. Your individual productivity per work session and the productivity of your group per work session was tracked using computer graphs. Visual analysis of data graphs was employed to evaluate performance trends in terms of stability, variability and overall productivity within each phase, and to compare widget productivity levels per work session across interventions, groups, and individuals. In the group graphs, widget productivity data for the three subjects was collapsed into group data and presented as mean productivity for each work session. The individual performance graphs contain absolute values of widget production per work session. The analysis of individual data included presentation of data for all subjects and the identification of typical and atypical individual productivity. Typical individual productivity was defined as productivity trends which closely track the productivity curve of the group to which the subject was assigned. Atypical individual productivity

was defined as productivity trends which do not closely tract the productivity curve of the group to which the subject was assigned.

Simple Calculations. Three simple mathematical calculations were performed to facilitate comparisons of levels of the independent variable within- and between-groups and subjects. The data allowed the seven research questions to be answered more comprehensively. First, an overall mean for productivity in each phase, by group and individual worker, was calculated. Second, the percent of change in mean productivity, when subjects are changed from one intervention phase to another, was calculated for each phase, by group and individual worker. For example, the difference between the overall mean for Phase A and Phase B was calculated as a percentage and presented as "percent of change" data. The overall means and percent of change data was compared to assess the effects of the levels of the independent variables on productivity levels within each payout condition. Finally, to understand the broader impact of the flat and incentive pay systems, a simple cost-benefit analysis was conducted. The cost-per-widget (CPW) in all phases and the percent of change in CPW was calculated for group and individual productivity.

Manipulation Check and Supplemental Data . An exit questionnaire (see Appendix H) was administered to each of you. The purpose of the questionnaire was to determine whether subjects were aware of the purpose of the study and the covert tracking of individual performance. If subjects were aware, then any changes in productivity during the intervention phases cannot be attributed, with confidence, solely to the independent variable(s) of interest. While such self-report data cannot be used as conclusive evidence, it can augment the empirical data.

Presentation Of The Data and Conclusions:

Transparencies of the individual and group data graphs were be used to present the data in terms of mean widgets produced per work session, per pay system, and per experimental condition and in terms of stability and productivity trends. The data will be interpreted and conclusions with respect to the seven research questions will be offered.

Question and Answer Period:

Are there any questions? Are there any parts of the study which you need more information about?

Concluding Comments:

I would like to take this opportunity to, once again, thank you for participating in this study. You have played a key role in helping us to understand the variables that cause and maintain social loafing behavior in a simulated work environment. And, the results of this study have told us more about the characteristics of the optimal individual and group monetary incentive pay system. This study has been funded by Aubrey Daniels & Associates Consulting, Tucker, Georgia.

This study constitutes my doctoral dissertation and will be written up and presented during my oral defense sometime next year. The oral defense will be publicized throughout the university. In addition, I plan to present this data at the annual convention of the Association for Applied Behavior Analysis in May, 1995.

Appendix F

Subject Exit Interview Form

Exit Questionnaire

Instructions. **Please circle only one answer to each of the following questions.**

1. **Before beginning the first work session were you aware that the purpose of this research was to study the effects of monetary incentives on social loafing?**

   Yes No

2. **If you were not aware of the purpose of this research before you began the first work session, did you learn of its specific purpose while the study was being conducted?**

   Yes No

3. **If you answered "Yes" to question 2 above, please indicate when you became aware of the purpose.**

   a. **When you worked alone and received $2.00 per work session.**
   b. **When you worked in a group and received $2.00 per work session.**
   c. **When you worked in a group and received an equal-share of the total group's incentive earnings.**
   d. **When you worked in a group and received pay equal to the number of widgets you personally made.**

4. **When you were working in a group and receiving $2.00 per work session, were you aware that the experimenters were keeping track of the number of widgets that you personally made?**

   Yes No

5. **When you were working in a group and receiving an equal share of the group's total incentive earnings, were you aware that the experimenters were keeping track of the number of widgets that you personally made?**

   Yes No

6. **If this research had been conducted at your place of work, would you have approved of the use of our research methods to conduct this study?**

   Yes No Yes, with some changes

7. **If you answered "Yes, with some changes" in question 6, please list the changes that would make this study more acceptable to you and your coworkers.**

8. **Do you generally like working in groups where each group member shares responsibility for completing the project?**

Yes No

9. Did this research project seem like a work simulation to you? In other words, did being required to show up for work on 25 days, working for the fifteen minute sessions, having to make at least 10 widgets to get paid, and getting paid on a weekly basis (for the most part) seem like a real job?

Yes No

10. If you were working a full-time job and were not in college, how would you prefer to be paid?

a. A flat rate for each hour you work.
b. Incentives based on an equal share of a group's total earnings
c. Incentives based solely on what you personally produce

11. In a work situation do you prefer to work alone (like the individual work setting in this research) or do you prefer to work with a group of people (like the group work setting in this research)?

Group Alone Undecided

12. When you were working in the group, equal-share incentive pay condition, some group members did not make as many widgets as others made. Yet, those members who make less widgets still got paid as much as those members who made more widgets. How did you feel about this?

13. Was there anything about the incentive pay system you were paid under that was aversive (unpleasant) to you?

14. How did you use the money you earned from this study?

15. If you have not used the money you earned from this study yet, how do you plan to use the money?

Appendix G

Pay System Scales

Pay System Scales for the Three Incentive Pay Systems

Number of Widgets	Linear	Negatively Accelerating	Positively Accelerating
1	$0.10	$0.28	$0.04
2	$0.20	$0.49	$0.08
3	$0.30	$0.67	$0.12
4	$0.40	$0.82	$0.17
5	$0.50	$0.95	$0.22
6	$0.60	$1.07	$0.27
7	$0.70	$1.17	$0.31
8	$0.80	$1.27	$0.37
9	$0.90	$1.35	$0.45
10	$1.00	$1.43	$0.55
11	$1.10	$1.51	$0.67
12	$1.20	$1.58	$0.80
13	$1.30	$1.64	$0.93
14	$1.40	$1.70	$1.07
15	$1.50	$1.76	$1.21
16	$1.60	$1.81	$1.36
17	$1.70	$1.86	$1.51
18	$1.80	$1.91	$1.67
19	$1.90	$1.96	$1.83
20	$2.00	$2.00	$2.00
21	$2.10	$2.04	$2.17
22	$2.20	$2.08	$2.34
23	$2.30	$2.12	$2.51
24	$2.40	$2.16	$2.68
25	$2.50	$2.20	$2.86
26	$2.60	$2.23	$2.94
27	$2.70	$2.26	$3.12
28	$2.80	$2.30	$3.31
29	$2.90	$2.33	$3.50
30	$3.00	$2.36	$3.69
31	$3.10	$2.39	$3.89
32	$3.20	$2.42	$4.09
33	$3.30	$2.45	$4.29
34	$3.40	$2.47	$4.50
35	$3.50	$2.50	$4.71
36	$3.60	$2.53	$4.92
37	$3.70	$2.55	$5.24
38	$3.80	$2.58	$5.46
39	$3.90	$2.60	$5.68
40	$4.00	$2.62	$5.91

Appendix H

Pay Scripts

INDIVIDUAL FLAT

Today, you will be paid $2.00 for the work session as long as you make at least 10 correct widgets. If you do not make at least 10 correct widgets, you will not receive any pay for the work session.

GROUP FLAT

Today, you will each be paid $2.00 for the work session as long as the group's total widget productivity equals at least 10 correct widgets per worker. So, the group's total widget productivity must be at least 30 correct widgets for any subject to be paid for the work session. If the group does not produce at least 30 correct widgets, no worker will be paid for the work session.

INDIVIDUAL POSITIVELY ACCELERATING

Today, you will be paid based on the number of widgets that you make during the session. Each additional widget will be worth somewhat more than the previous widget. You must make at least 10 correct widgets in order to receive any pay for the work session. If you do not make at least 10 correct widgets, you will not be paid for the work session.

GROUP POSITIVELY ACCELERATING

Today, pay will be earned based on the number of widgets made during the session. Each additional widget will be worth somewhat more than the previous widget. Each worker will receive an equal-share of the group's total earnings as long as the group's total widget productivity equals at least 10 correct widgets per worker. So the group's total widget productivity must be at least 30 correct widgets for any subject to be paid for the work session. If the group does not produce at least 30 correct widgets, no worker will be paid for the work session.

INDIVIDUAL NEGATIVELY ACCELERATING

Today, you will be paid based on the number of widgets that you make during the session. Each additional widget will be worth somewhat less than the previous widget. You must make at least 10 correct widgets in order to receive any pay for the work session. If you do not make at least 10 correct widgets, you will not be paid for the work session.

GROUP NEGATIVELY ACCELERATING

Today, pay will be earned based on the number of widgets made during the session. Each additional widget will be worth somewhat less than the previous widget. Each worker will receive an equal-share of the group's total earnings as long as the group's total widget productivity equals at least 10 correct widgets per worker. So the group's total widget productivity must be at least 30 correct widgets for any subject to be paid for the work session. If the group does not produce at least 30 correct widgets, no worker will be paid for the work session.

INDIVIDUAL LINEAR

Today, you will be paid $ .10 for each widget that you make. You must make at least 10 correct widgets in order to receive any pay for the work session. If you do not make at least 10 correct widgets, you will not be paid for the work session.

GROUP LINEAR

Today, each widget produced will be worth $ .10. Each worker will receive an equal-share of the group's total earnings as long as the group's total widget productivity equals at least 10 correct widgets per worker. So the group's total widget productivity must be at least 30 correct widgets for any subject to be paid for the work session. If the group does not produce at least 30 correct widgets, no worker will be paid for the work session.

Appendix I

Group Productivity and Pay Record

Group Productivity and Pay Record

Work Session Day and Date: _____ Group Number: _____

Total Number Correct Widgets Produced During This Work Session:_____

Total Group Earnings For This Work Session: _____

Group Member Name: Amount Earned: Signature:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Experimenter Name: Signature:

a._____

b. _____

Appendix J

Individual Productivity and Pay Record

Individual Productivity and Pay Record

Group Member Name: _____

Work Session Day and Date: _____ **Group Number:** _____

Total Number of Correct Widgets Produced During This Work Session: _____

Total Earnings For This Work Session: _____

Group Member Signature: _____

Experimenter Name: **Signature:**

a. _____

b. _____

Appendix K

Pay Summary Form

Pay Summary Form

Group Member Name: _____ **Date:** _____

Group Number: _____ **Pay Period:** _____ **To** _____

Total Pay Earned For This Pay Period: _____ **Signature:** _____

Experimenter Name: **Signature:**

a. _____

b. _____

Appendix L

Off-Task Behavior Form

Off-Task Behaviors Observation Form

Subject Name: _____ Day and Date: _____

Group Number: _____ Pay Condition At Time Of Observations: _____

Phase At Time Of Observation: _____ Session # In That Phase: _____

Provide a behavioral description of the off-task behavior and the frequency and duration of the behavior:

1._____

_____

_____

2._____

_____

_____

3._____

_____

_____

4._____

_____

_____

Experimenter Name: Signature:

a. _____

b. _____

Appendix M

Total Available Earnings

Total Earnings Available to Subjects

Subject	Flat Individual	Flat Group	Incentive Individual	Incentive Group	Total
Linear					
1 thru 3	$12.00	$14.00	$28.00	$20.00	$74.00
4 thu 6	$10.00	$10.00	$28.00	$32.00	$80.00
Pos. Acc.					
7 thru 9	$14.00	$10.00	$41.37	$47.28	$112.65
10 thru 12	$10.00	$16.00	$41.37	$29.55	$96.92
Neg. Acc.					
13 thru 15	$10.00	$12.00	$20.96	$15.72	$58.68
16 thru 18	$12.00	$12.00	$18.34	$15.72	$58.06

Appendix N

Subject Monetary Earnings

Subject Monetary Earnings Under Each Pay System andTotal Earnings

Subject	Flat Individual	Flat Group	Incentive Individual	Incentive Group	Bonus Payment	Total Earnings
Linear						
1	$12.00	$14.00	$16.90	$11.00	$25.00	$78.97
2	$8.00	$10.00	$15.40	$13.97	$25.00	$72.37
3	$12.00	$12.00	$14.00	$11.07	$25.00	$73.87
4	$10.00	$10.00	$15.60	$17.48	$25.00	$78.13
5	$10.00	$8.00	$9.40	$13.13	$25.00	$65.53
6	$10.00	$8.00	$4.28	$0.00	$0.00	$22.28
Pos. Acc.						
7	$14.00	$10.00	$18.95	$15.71	$25.00	$83.66
8	$12.00	$8.00	$17.43	$10.51	$25.00	$72.94
9	$10.00	$8.00	$6.71	$15.71	$25.00	$65.42
10	$10.00	$14.00	$19.03	$16.79	$25.00	$84.82
11	$8.00	$16.00	$19.82	$16.19	$25.00	$85.01
12	$10.00	$14.00	$18.03	$16.19	$25.00	$83.79
Neg. Acc.						
13	$8.00	$12.00	$16.24	$10.14	$25.00	$71.88
14	$10.00	$12.00	$13.68	$10.14	$25.00	$68.83
15	$10.00	$12.00	$17.66	$10.14	$25.00	$74.80
16	$12.00	$12.00	$14.24	$10.28	$25.00	$67.40
17	$8.00	$8.00	$10.44	$4.12	$25.00	$55.56
18	$8.00	$4.00	$0.00	$0.00	$0.00	$12.00

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