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**THE EFFECTS OF GROUP INCENTIVE PLANS  
ON INDIVIDUAL PERFORMANCE**

**by**

**Karen Geralyn Stoneman**

**A Thesis  
Submitted to the  
Faculty of The Graduate College  
in partial fulfillment of the  
requirements for the  
Degree of Master of Arts  
Department of Psychology**

**Western Michigan University  
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# THE EFFECTS OF GROUP INCENTIVE PLANS ON INDIVIDUAL PERFORMANCE

Karen Geralyn Stoneman, M.A.

Western Michigan University, 1988

A simulated work environment was utilized to study the effects of group incentive plans on individual performance on an assembly task. The subjects in the study were college students who worked in groups of a small size, a medium size, or a large size. A reversal design was utilized in which the first condition was an individual incentive condition, the second was a group incentive condition, and the final was the return to an individual incentive condition.

The results showed: (a) individual performance did not significantly change when individuals were switched from an individual to a group incentive plan; (b) overall productivity did not differ as a function of group size; and (c) the degree of individual performance changes from the individual to the group incentive condition did not differ as a function of group size. However, the results showed that the range of performance was greatest for the smallest groups and variability decreased as the group size increased.

## ACKNOWLEDGEMENTS

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Karen Geralyn Stoneman

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## CHAPTER I

### INTRODUCTION

In order to improve worker productivity, many organizations are turning to monetary incentive systems (Dolan, 1985). A recent survey conducted by the American Productivity Center found many companies departing from traditional pay systems because they wanted to link pay to performance, reduce compensation costs and improve employee commitment. Seventy-five percent of the companies surveyed used some form of nontraditional reward system (these companies employ eight percent of the American workforce) and in the majority of the cases, the programs were started in the last five years (Geber, 1987).

Widespread interest in money as a method for improving productivity was first stimulated in this country by the work of Frederick Taylor and his "scientific management" principles (Taylor, 1911). However, as a result of the "human relations movement" of the 1920s, the emphasis on money as a motivator decreased. Due to management policies of raising standards and/or laying off workers as a result of productivity improvements, resistance to incentive systems arose and job factors other than pay came to be emphasized to a greater degree (Opsahl & Dunnette, 1966).

Although that emphasis on factors other than pay is

still present in organizations today, money continues to be a major means for rewarding and modifying behavior in industry. In today's competitive labor markets, there is now an increased tendency for companies to utilize non-traditional reward systems and to tie pay directly to productivity. Locke's (1982) review of the management literature supports this emphasis on pay-for-performance systems. He concluded that monetary incentives were significantly more effective in increasing performance than were goal-setting, participation, or job enrichment.

In the area of nontraditional reward systems, several commentators have predicted that in the future fewer employees will work under individual incentive plans while greater numbers of individuals will work under some type of group incentive system (Nash & Carroll, 1975). Buck (1957) noted that the number of workers grouped together varies considerably from company to company, from factory to factory and even within a workshop. He also stated that variations in the size of the group (that the group incentive is based on) may be related to variations in certain measures of performance and morale.

An increased reliance on group incentive systems may be due to the fact that employees on individual incentive systems often restrict output due to expected and experienced negative social and economic consequences for increased productivity (London & Oldham, 1977). Standards

for expected performance may informally or formally develop and employees in a work group may not want those standards exceeded for fear that supervisors or managers will then increase the amount of work that the employees need to accomplish. Employees who exceed those formal or informal standards may be punished by way of social pressure from peers (Schwab, 1973). Group incentive plans may avoid these negative side effects and may do a better job of tying social rewards to performance than do individual incentive plans (Lawler, 1973).

Research has documented the superiority of pay-for-performance systems for improving performance when compared to hourly and salaried pay systems (Latham & Dossett, 1978; Gaetani, Hoxeng, & Austin, 1985; Terborg & Miller, 1978). In spite of this research, little is known about how to design incentive systems that optimize worker productivity. Little is also known about the differences between individual incentive plans and group incentive plans. Few studies have been conducted with a primary focus on group incentive systems (Lawler, 1971).

One study that is often cited in the area of group incentive plans was an observational study by Marriott (1949). In this study, Marriott studied the productivity of two motorcar factories (factory A and factory B) that utilized group incentive plans of varying group sizes. There were 153 groups in factory A and between 79 and 98

groups in factory B during different periods. The groups included over 4,500 and 1,000 workers. Marriot looked at groups that had less than 10 members, 10-19 members, 20-29 members, 30-39 members, 40-49 members, and groups with 50 or more members. His correlational data indicated that there was an inverse relationship between output and group size with the smaller sized groups (less than 10 members) showing greater output in each factory. However, there exist serious methodological flaws in Marriott's study. His study took place over a 15 to 18 month period in which there was transference of individuals to other production areas, instability of group size, economic fluctuations, and other extraneous variables that were not controlled.

A similar observational study on group incentive systems by Campbell (1952) analyzed the performance of employees in two factories (factory A and factory B) which operated group incentive plans with group sizes ranging from under 20 men to over 100. Also analyzed were the employees' knowledge of results and job satisfaction based on confidential interviews conducted with the employees. Also noted was an inverse relationship between output and group size and between knowledge of results and group size. In both factories, output and knowledge of results decreased as the size of the group increased. He also found that the workers who had no knowledge of their results became progressively less satisfied with the

payment system. However, this study also did not involve direct manipulation of the incentive system and suffered from instability of group size and economic fluctuations.

A few controlled experiments have recently been conducted in the area of group incentive systems. Weinstein and Holzbach (1973) compared group incentive systems in which the total amount earned was divided equally among the members in a group (three-person groups) or divided differentially depending on the individual's performance. In the differential group condition, one-half of the total amount earned was given to the top performer, one-third to the middle performer, and one-sixth to the lowest performer. Productivity was higher in the differential reward condition, however, satisfaction was lower.

Farr (1976) compared the effectiveness of individual incentive, group incentive and hourly pay on a card sorting task in a laboratory setting. The number of cards sorted in both the individual and the group incentive condition was significantly higher in comparison to the hourly pay condition. Farr found no difference between the individual and the group incentive condition. The groups, however, were small (three-person groups) and only this size group was examined. Since there were only two sessions that lasted twenty minutes each, the long term effects of these incentive conditions were not assessed.

London and Oldham (1977) found that the performance



of students whose pay was contingent solely on their own performance (the individual incentive condition) or contingent upon the performance of the high performer in a group was higher than when it was based on the average performance of the group. In this study, three group incentive systems were investigated and compared with an individual incentive and hourly pay systems. In the average-performance condition, the performance of the two members was averaged and each received one cent for each piece in the average. In the high-performance condition, each received the amount earned by the high performer and in the low-performance condition, each received the amount earned by the low performer. Productivity in the individual incentive condition and the high-performance incentive condition did not differ and was significantly higher than in the hourly pay condition, the average-pay condition and the low-performance condition.

As with the previous studies, the groups in this research were only of one small size (two-person groups) and the sessions lasted only a short period of time (five minutes). Also, these groups were coacting rather than interacting groups meaning that the people in the groups performed the task in isolation of one another.

Prior to the present study, no controlled study had been conducted that had analyzed the differences between workers' performance if the workers were paid on an in-

dividual incentive basis or if the workers were paid on a group incentive basis of varying group sizes.

The purpose of the present research was to design a simulated work setting that would provide information on how an individual's productivity is influenced by the size of the group in a group incentive plan. It would have been ideal to conduct this research in an actual industrial setting, but due to the practical constraints of in such settings, the research took place in a simulated work setting.

More and more companies are implementing incentive systems in order to decrease labor costs and improve worker productivity. This research should be of value in assisting organizations in the design of these contingent pay systems and also be critical in the analysis of the economic and psychological impacts of such systems. Business and industry will benefit from this increased knowledge as will employees who will profit from being on more effective payment systems.

## CHAPTER II

### METHOD

#### Subjects

Twenty-eight (male and female) adults with ages ranging from 18 to 32 years were the subjects in this experiment. All participants were undergraduate students at Western Michigan University in Kalamazoo, Michigan. They were recruited from various undergraduate courses at the university. No subject had prior experience in a study similar to this experiment. Also, no subject was considered if he or she had extensive knowledge of incentive systems. Each subject signed an informed consent form that was approved by The Human Subjects Institutional Review Board of Western Michigan University. The informed consent form is in Appendix A and the Human Subjects Institutional Review Board approval letter is in Appendix B. Prior to the actual experiment, each subject was randomly assigned to one of eight work groups.

#### Setting

This experiment was conducted in classrooms in Western Michigan University's psychology department over a period of four months. The rooms were large enough for each subject to work comfortably. The subjects worked at large tables with one to two other subjects. Magazines

and a radio were available for the subjects since low productivity in work settings is often attributable to off-task behavior. The subjects were also allowed to take breaks and to leave the rooms at any time.

### Apparatus and Materials

The subjects in the experiment performed a simple assembly task. Parts were assembled from nuts, washers and bolts. The task was designed so that both quantity and quality data were available. Some of the washers were painted with one-inch red bands and some were painted with a one-inch black band. The correct placement of the washers and nuts on the bolt was: nut, plain washer, red washer, black washer, red washer, and nut. In order for the part to be scored as correct two of the painted bands must have been lined up on one side and the washers and nuts must have been placed on the bolt in the right order. The subjects placed their parts in their individual bin when assembled.

### Dependent Variable

The dependent variable was the number of items accurately assembled per session as scored at the end of each session. A sample session recording form is in Appendix C. It was not possible to inform the subjects of the number of correctly assembled parts at that time due to

the large number assembled, especially by the larger groups. Therefore, at the beginning of the next session, subjects were informed of their individual production rate for the previous session and if the group incentive condition was in effect, they were also told the average production rate for the work group. This information was delivered prior to each session on a sheet that contained each session's work rates for all subjects in the respective work group. The subjects also received information on the amount of money earned during the last session and the cumulative amount earned during the pay period (the pay periods will be described in the procedure section).

Three undergraduate students in psychology and two graduate students in industrial psychology served along with the author as observers. The observers were trained in calculating incentive pay and in the definition of a correctly assembled task.

#### Interobserver Agreement

Interobserver agreement data were collected for approximately 17% of all sessions (85 out of 509 sessions). A second observer independently counted the number of correctly assembled items per subject. Agreement was defined as both observers scoring an item as correct or not correct. Point-by-point interobserver agreement statistics were calculated by dividing the number of agree-

ments by the number of agreements plus disagreements and then multiplying by 100. Interobserver agreement averaged 97% for the entire study.

## CHAPTER III

### PROCEDURE

Each experimental session lasted 45 minutes. During the first session the experimenter demonstrated the work task, had the subjects try it and answered any questions they had. They were informed that they were free to take breaks when they desired them and that the magazines and radio were available for their use. In the beginning of each session they were also informed of the incentive condition that was in effect that day and the specifics of it were explained. The experimenter then left the room. At the end of the 45 minutes, the experimenter returned to the room, told the subjects that the session was over, counted the number of accurately assembled items and calculated the incentive pay for each subject.

The subjects were given a receipt at the beginning of each session that informed them about how much money they earned the previous session and what their cumulative total pay was to date for that pay period. The subjects were paid at the end of each phase and twice during the baseline phase due to the length of that phase. The subjects were paid after approximately four or five sessions. Subjects worked in the room with the same individuals for all three sessions. Thus, if a subject was randomly assigned to a work group of five people, he or she worked

with the same four people in all conditions.

#### First Experimental Condition

The subjects were paid on an individual incentive plan during this condition. The pay consisted of a base salary of \$1.50 and the incentive pay that was dependent upon the number of items produced above a performance standard by the individual. The standard was 58 correctly assembled parts per session. This standard was based on data from a previous study. In that study, subjects assembled an average of 58 parts in 45 minutes when they were paid \$2.00 base pay. In the present study, subjects earned \$.02 for each correctly assembled part above this standard. As indicated earlier, at the beginning of each session, subjects were informed of the number of parts correctly assembled in the previous session.

#### Second Experimental Condition

In this condition the subjects were also paid a base salary of \$1.50, however, their incentive pay was based on the average number of items produced by the entire work group. When average group performance exceeded the 58-part standard, all members of the group received \$.02 for each correctly assembled part in the average. Subjects were randomly assigned to a small group (two subjects), a medium group (four or five subjects), and a larger group



(nine subjects). In order to hold the number of subjects constant across the groups, five small groups (groups of two), two medium groups (one group of four and one group of five), and one large group (group of nine) were analyzed.

#### Final Experimental Condition

This condition was the reinstatement of the individual incentive plan.

Phases were changed when performance reached a stability criterion. For the individual incentive conditions, steady-state responding was defined as when the performance of each subject was within 5% of the median performance for that subject for four sessions. For the group incentive condition, steady-state responding was defined as when the average group performance was within 5% of the median performance for four sessions.

#### Experimental Design

A combined within-subject, between-group design was employed. A within-subject comparison was conducted to examine whether an individual's performance differed under the individual and the group incentive plan. An ABA reversal design was used. A between-group comparison was conducted to examine whether overall productivity was affected by group size.

## CHAPTER IV

### RESULTS AND DISCUSSION

The three experimental questions that were analyzed in this study were: (a) how does individual performance change when individuals are switched from an individual incentive system to a group incentive system; (b) how does overall productivity differ as a function of group size; and (c) are there any differences in the degree of individual performance changes when individuals are switched from an individual incentive system to a group incentive system as a function of group size.

In this section, the performance of individuals in the different sized groups (small, medium, and large) will first be discussed. The overall productivity of the small, medium, and large groups will next be examined. Finally, the degree of performance variability within the different groups will be discussed.

#### Effects of Individual Incentives and Group Incentives on Individual Performance

##### Groups of Two

Figure 1 provides the performance data per session for individuals in the first three groups of two (Groups A-C). Figure 2 provides the performance data for the individuals in the remaining groups of two (Groups D-E).

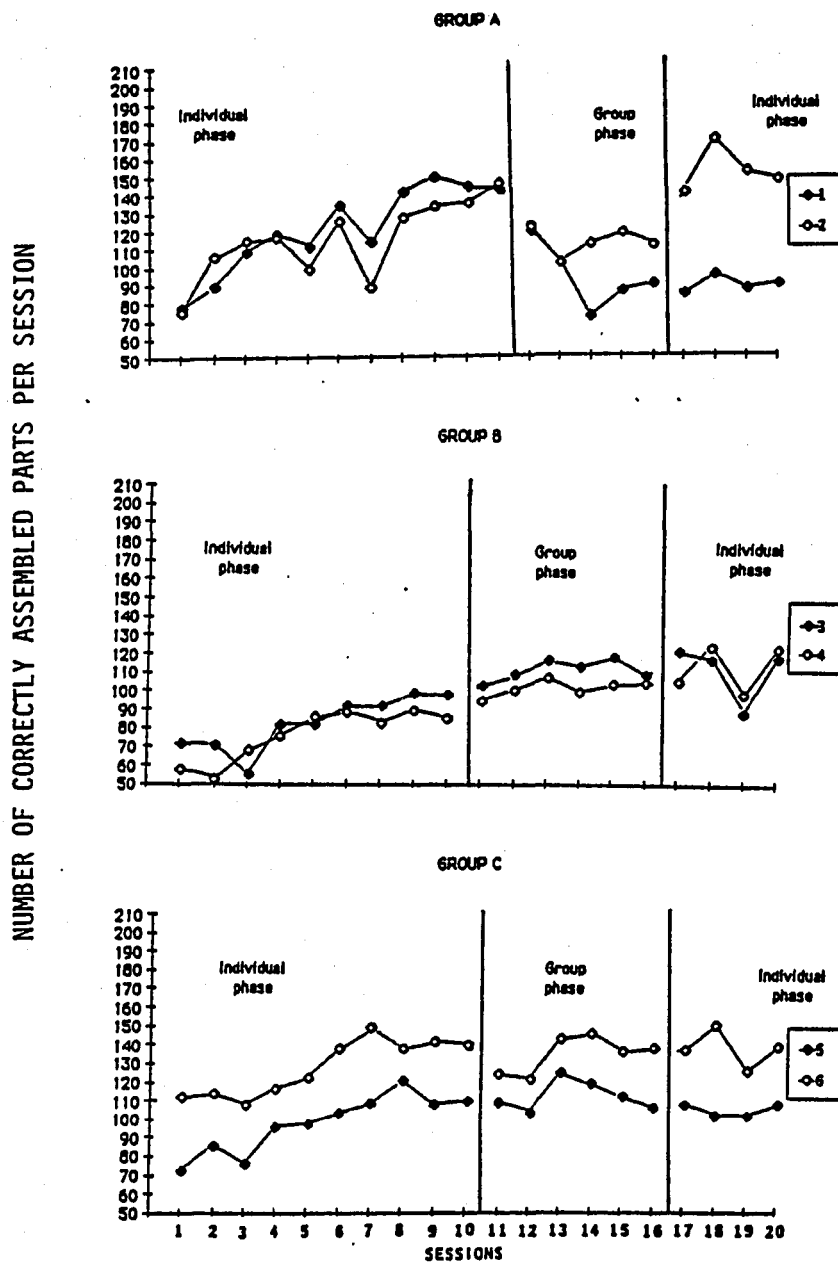


Figure 1. Performance per session for subjects in Groups A-C (N=2).

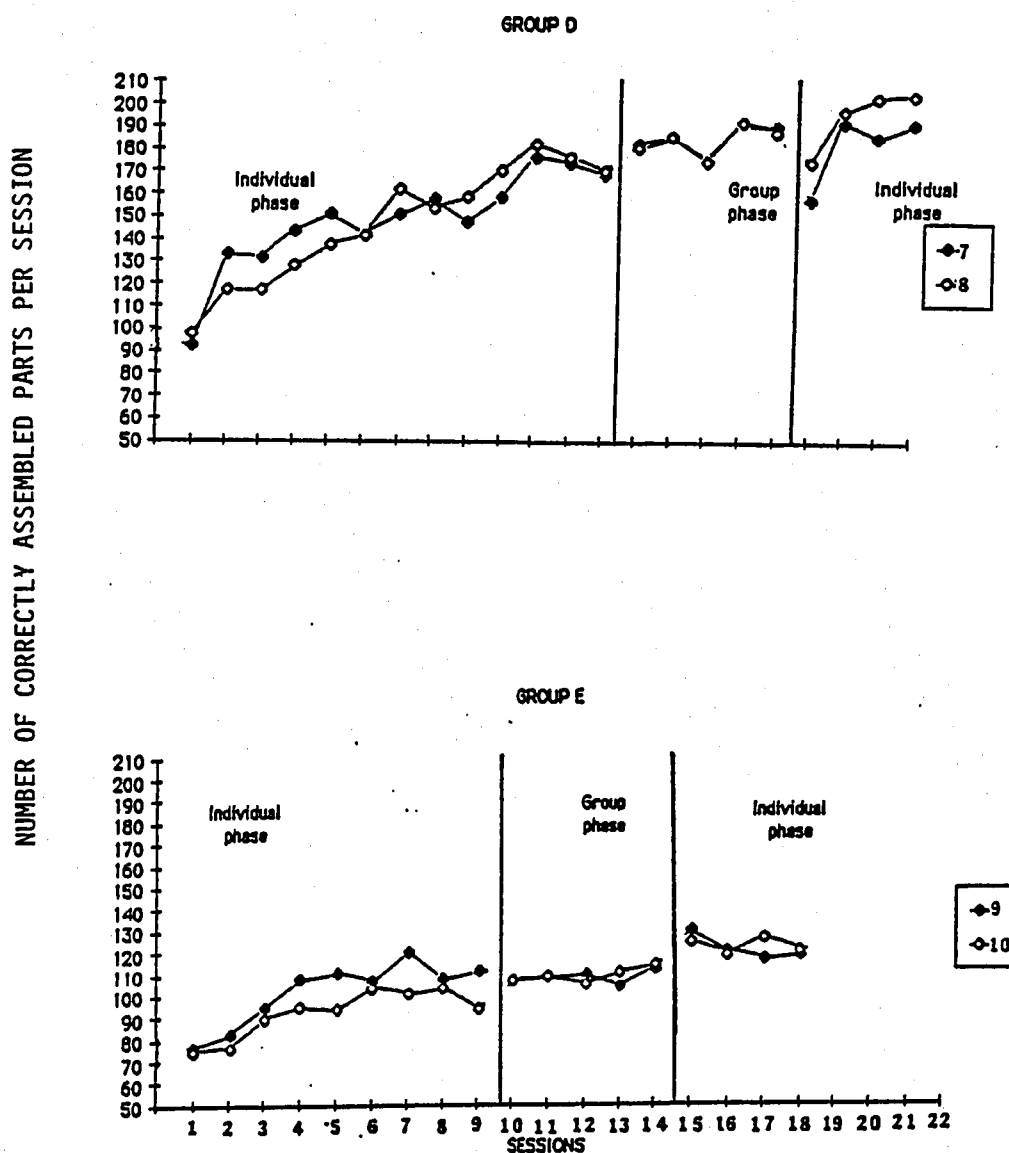


Figure 2. Performance per session for subjects in Groups D-E (N=2).

The overall results of the individuals' performance in the groups of two show that the performance of only one of the subjects was significantly affected by the switch from an individual incentive condition to a group incentive condition. This subject's performance decreased significantly during the group incentive condition over her performance during the individual incentive conditions. The performance of the other nine subjects did not appear to be significantly affected by the switch from an individual incentive system to a group incentive condition.

The rate of responding for Subject 1 in Group A decreased during the group incentive condition significantly. This decrease cannot be attributed to the condition change, however, because her performance remained at a low level when the individual incentive condition was reintroduced. The rate of responding for Subject 2 also decreased during the group incentive condition. Unlike Subject 1, however, Subject 2's performance returned to a high level when the individual incentive condition was reintroduced, suggesting that group incentives may have decreased performance for this subject.

The performance of Subject 3 steadily improved throughout the entire study. Performance was higher during the group incentive condition for this subject than during the first individual incentive condition. This increase cannot be attributed to the condition change since

performance during the reversal condition also increased (except for session 18 in which performance significantly decreased). The performance of Subject 4 also steadily increased throughout the entire study. Her performance appeared to match the performance of Subject 3 throughout all phases (even during session 18 in which her performance also significantly decreased) although it was slightly lower throughout the first two phases.

The rate of responding for Subject 5 was approximately the same throughout all phases. This subject was the low performer in Group C throughout the study. The rate of responding for the other subject in this group (Subject 6) also remained at a similar level throughout all phases.

The performance of the subjects in Group D (Subject 7 and 8) steadily increased throughout the entire study indicating that performance was not affected by the switch from an individual incentive system to a group incentive system. Considerable matching of performance existed between these two subjects throughout all phases. These subjects also performed at a higher level than any other subject in the entire study (Subject 8's performance reached a maximum of 205 correctly assembled parts during session 22).

The subjects in Group E (Subject 9 and 10) performed at similar levels throughout the entire study. The

performance of these subjects did not significantly change when the condition was changed from the individual incentive payment to the group incentive payment condition.

Only the performance of one of ten subjects (Subject 2) was consistently affected by the individual and group payment conditions. Performance for this subject decreased during the group incentive condition and increased when the individual incentive payment system was reintroduced. Subjects in two of the groups (Groups B and D) displayed steadily increasing trends throughout the study but these increases could not be attributed to the payment conditions. In summary, performance for the individuals in the groups of two did not appear to be differentially affected by the individual and group incentive conditions.

#### Groups of Four and Five

Figure 3 depicts the performance data per session for individuals in Group F (N=5) and Group G (N=4). The bottom graph is the data from the group of four individuals and the top two graphs are the data from the individuals in the group of five. For purposes of clarity, the data for this group were divided into two graphs with the top graph representing the data from the two high performers in the group and the bottom graph representing the data from the remaining three subjects. Session data that are missing are represented by hatch marks on the lines

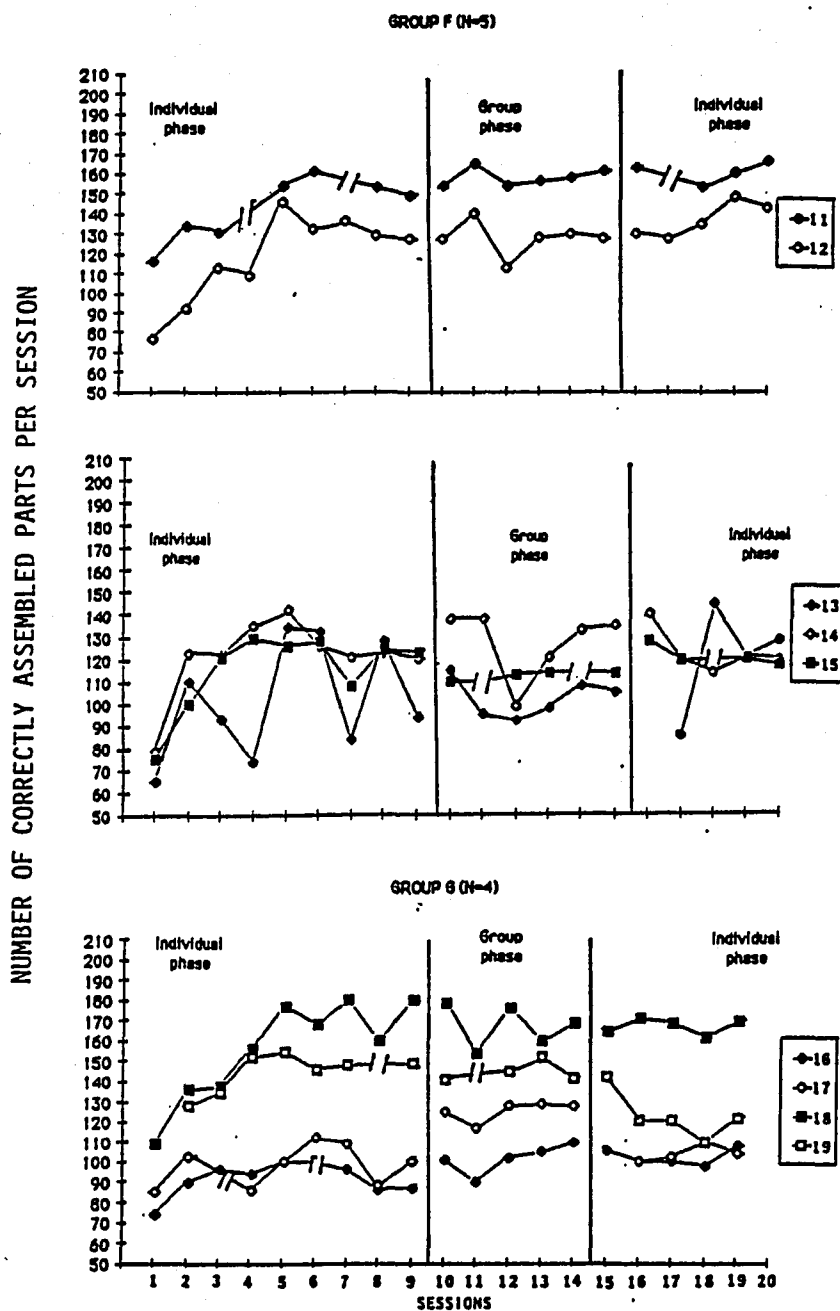


Figure 3. Performance per session for subjects in Group F (N=5) and Group G (N=4).



seperating data points.

The overall results of the individuals' performance in the groups of five and four show that only the performance of one of the subjects (Subject 18) was clearly affected by the switch from an individual incentive payment to a group incentive payment. This subject's performance significantly increased during the group incentive condition over what his performance was during the individual incentive conditions. The performance of the other eight individuals did not appear to be affected by the condition change. One of the subjects, however, displayed more stable responding during the group incentive condition than during the individual incentive condition.

Subject 11 was the high performer in Group F. His performance remained at a high level throughout the entire study. His performance did not appear to be affected by the switch from an individual incentive condition to a group incentive condition even though he received less pay during the group incentive condition.

The performance of Subject 12 in Group F remained approximately the same throughout the study; her performance did not appear to be affected by the condition change. The rate of responding for Subject 13 showed great fluctuation during the baseline condition. Her performance was more stable during the group incentive condition and remained at a low level. Her performance

again became less stable when the individual incentive condition was reintroduced. Therefore, while overall performance remained similar across all conditions, performance was more consistent during the group incentive condition.

Similar to Subject 12, the performance of Subject 14 remained approximately the same throughout the entire study and her performance did not appear to be affected by the switch from an individual to a group incentive condition.

Performance for Subject 15 was slightly lower, but more stable, during the group incentive condition than during the first individual incentive condition. Performance remained at this level when the individual incentive condition was reinstated.

In Group G, individual performance differences across subjects were more pronounced than for any of the other groups. Subject 18 was the high performer in Group G the entire study. Her performance remained at a high level throughout all phases of the study and did not appear to be affected by the condition change even though she received less pay during the group incentive condition.

Subject 16's performance in Group G remained at a steady, but low level throughout all phases. This subject remained the low performer during the entire study and her performance did not appear to be affected by the condition

change.

The rate of responding for Subject 17, one of the low performers in this group, increased during the group incentive condition (over the rate during baseline) and returned to baseline levels when the individual incentive condition was reintroduced.

Subject 19's rate of responding was similar during the group incentive condition as it was during the first individual incentive condition. Her performance steadily decreased, however, during the return to individual incentive condition for reasons that are not known.

The performance of only two subjects appeared to be affected by the switch from an individual incentive condition to a group incentive condition. The performance of Subject 13 (a low performer) was more stable during the group incentive condition, although overall level of performance was not significantly changed. The performance of Subject 17 (another low performer) was higher during the group incentive condition than it was during the individual incentive conditions. The performance of all remaining subjects, including the performance of the top performers (Subjects 11 and 18) was not differentially affected by the two incentive conditions.

#### Group of Nine

Figure 4 depicts the performance data per session for

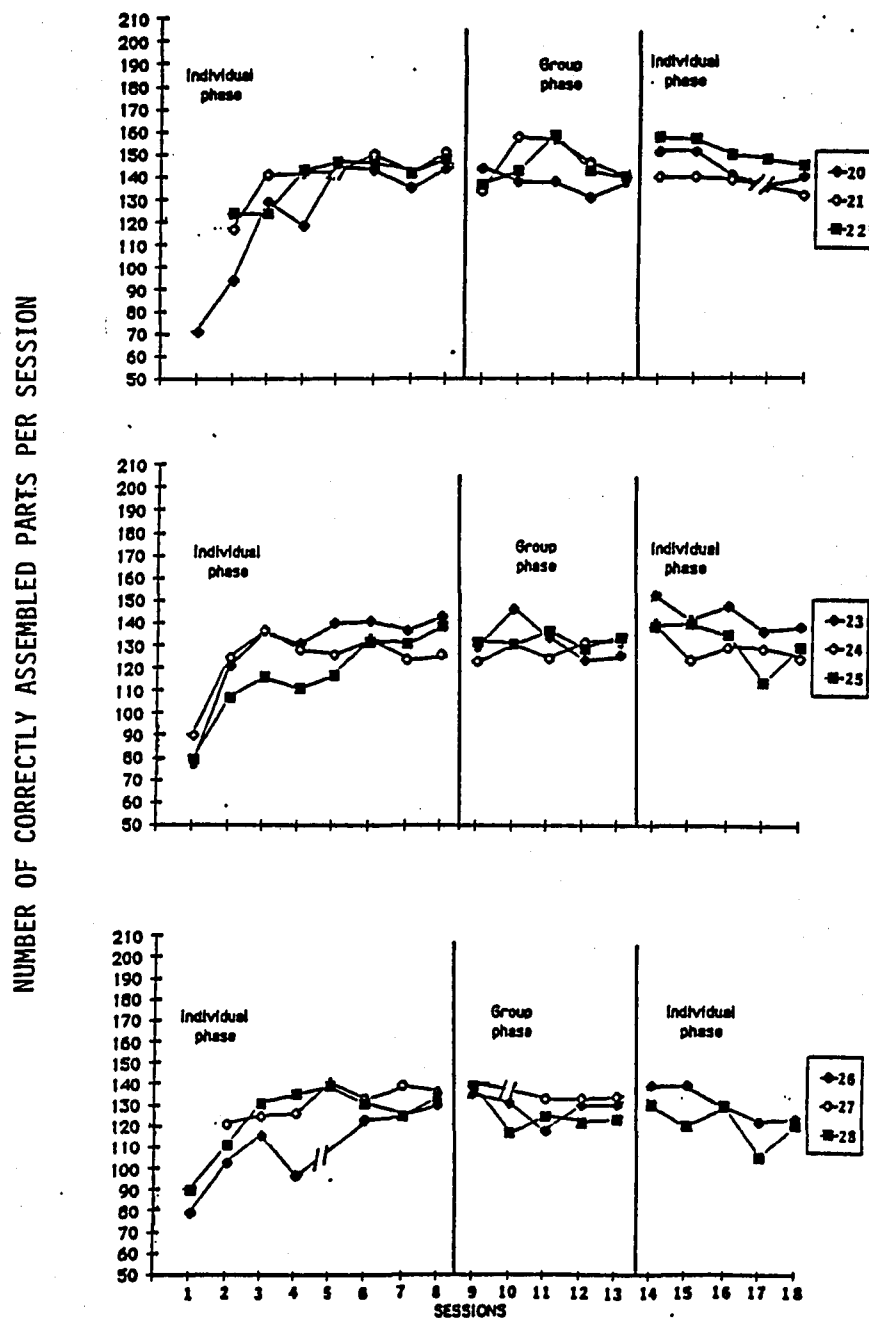


Figure 4. Performance per session for subjects in Group H (N=9).

subjects in Group H (N=9). For purposes of clarity, the data for Group H were divided into three separate graphs. The data for the three high performers are presented in the first graph, the remaining performers are presented in the second and third graphs. Session data that are missing are represented by hatch marks on the lines separating data points.

The overall results of the subjects in the group of nine show that all subjects performed at similar levels with only slight differences between the top, middle and low performers. The results also show that none of the individuals appeared to be affected by the switch from an individual incentive system to a group incentive system. All performers performed at approximately the same level throughout the entire study.

The performance of three of the subjects (Subject 20, 22, and 23) increased during the initial reinstatement of the individual incentive condition, however, it decreased to previous levels after two or three sessions in this condition. Thus, the performance of the majority of the subjects in the group of nine remained at relatively constant levels during all conditions.

#### Comparison Between Different Groups

##### Average Performance of Groups

Figure 5 represents the mean performance per group

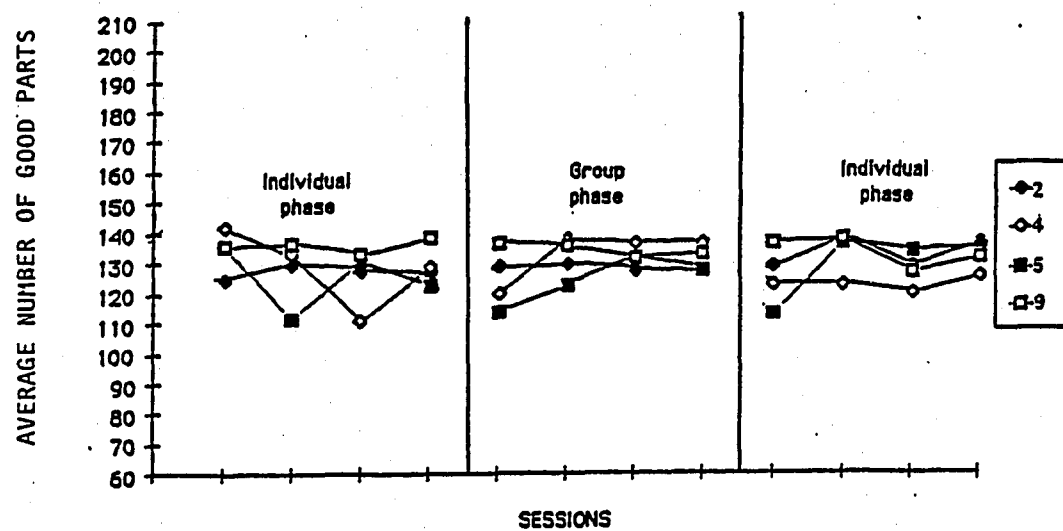


Figure 5. Average performance per group for the last four sessions in each phase.

for the last four sessions in each phase. The data for the groups of two (Groups A-E) were averaged together so that one score was obtained for each session. Table 1 shows the means for the groups of two, the group of four, the group of five, and the group of nine during the last four sessions in each phase. As can be seen from Figure 5 and Table 1, no significant differences appeared between the means for the groups of two, four, five, or nine individuals.

Table 1  
Mean performance per group for the last  
four sessions in each phase.

Groups	Individual Phase $\bar{X}$	Group Phase $\bar{X}$	Individual Phase $\bar{X}$
N=2	127.5	128.5	133.5
N=4	128.75	133.0	123.0
N=5	125.5	124.25	129.75
N=9	136.25	134.5	133.5

#### Range of Performance Within Groups

Figure 6 represents the range of performance per group for the last four sessions in each phase for the groups of two and the group of four. The data from the

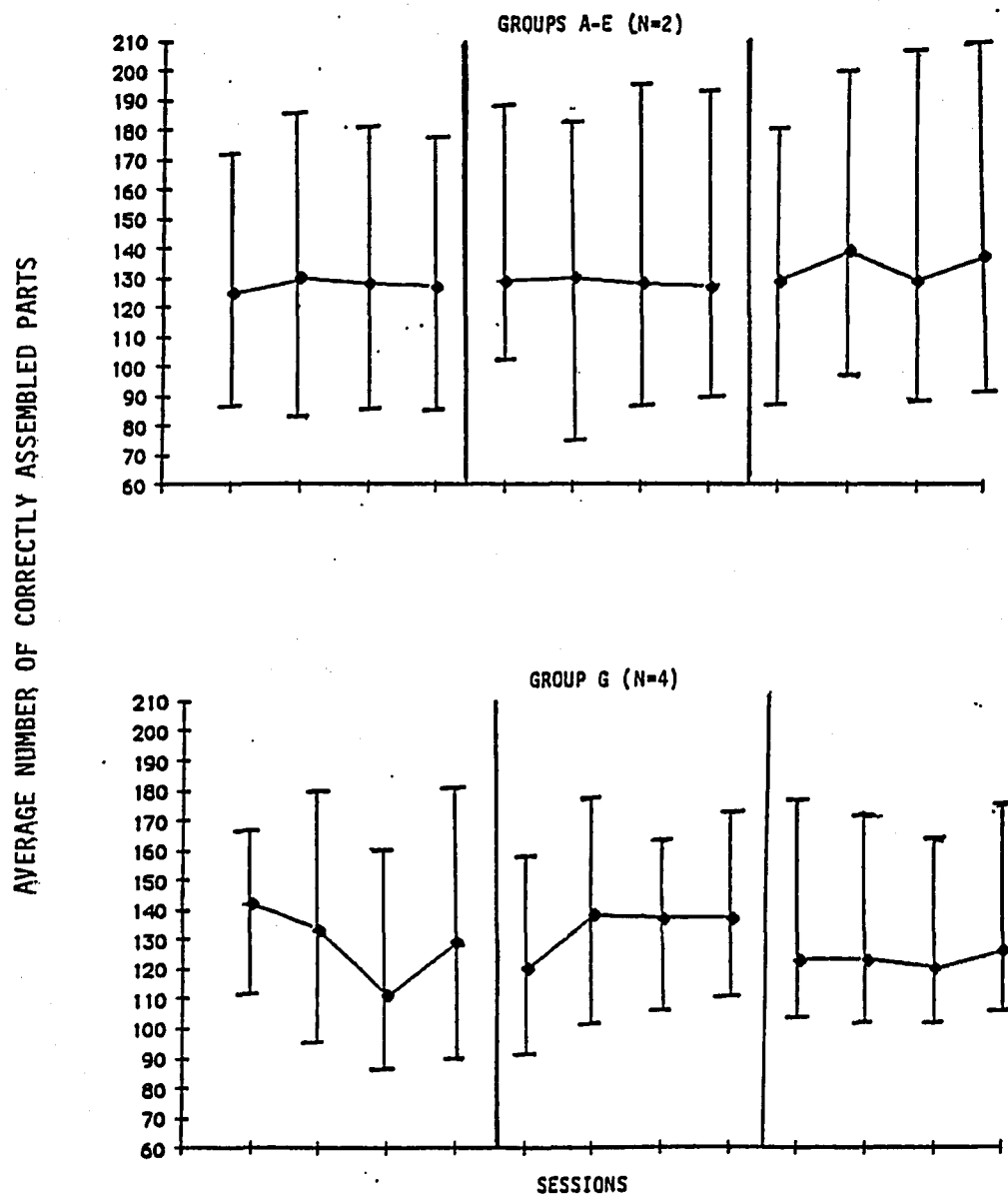


Figure 6. Range of performance for subjects in Groups A-E (N=2) and Group G (N=4) during the last four sessions in each phase.



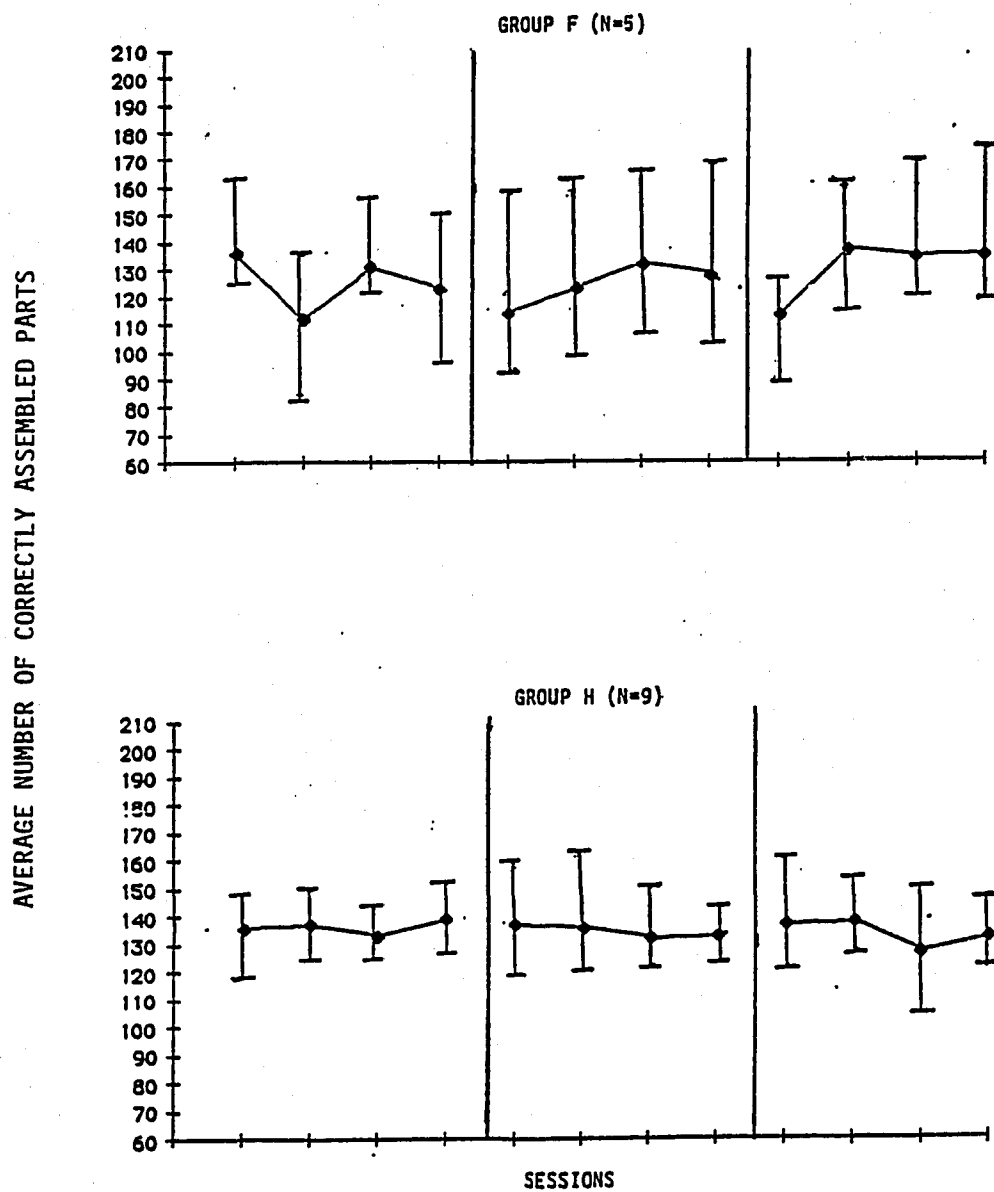


Figure 7. Range of performance for subjects in Group F (N=5) and Group H (N=9) during the last four sessions in each phase.

groups of two (Groups A-E) were averaged together so that one score would be obtained for each session. The data from the medium-sized groups are shown separately. Figure 7 represents the range of performance per group for the last four sessions in each phase for the group of five and the group of nine. The greatest range of performance occurred for the groups of two, with seven of the sessions showing a range of more than 100 correctly assembled parts.

The ranges of performance for the medium-sized groups (Groups F and G) were also great, although not as great as the groups of two. The greatest range of performance for Groups F (N=5) was 62, and for Group G (N=4) it was 93 correctly assembled parts.

The range of performance for Group H (N=9) during these last four sessions in each phase was much less than for any of the other group sizes. The performance range for eight of the sessions was less than 30 correctly assembled parts.

## CHAPTER V

### GENERAL DISCUSSION

Performance payment systems or incentive systems are being used to a greater degree in recent years as many companies search for a more effective means to improve worker productivity. These incentive systems may be based on the performance of a single individual, a few individuals, or a large group of individuals. This study had three research objectives in the study of incentive payment systems: (1) to examine how individual performance changes when individuals are switched from an individual incentive system to a group incentive system; (2) to examine how overall productivity differs as a function of group size (small, medium, or large group sizes); and (3) to examine whether there were any differences in the degree of individual performance changes when individuals were switched from an individual incentive system to a group incentive system as a function of group size (small, medium, or large group sizes).

#### Individual Performance Under Individual and Group Incentives

In reference to the first research objective, the results of this laboratory study demonstrate that individual performance did not appear to be consistently affected by the switch from an individual incentive con-

dition to a group incentive condition. Only two subjects out of 28 clearly showed performance changes when the condition was switched. The performance of one of the subjects decreased during the group incentive condition and another subject's performance increased during the group incentive condition.

One possible hypothesis regarding this study was that the performance of individuals would be higher under an individual incentive system than under a group incentive system, no matter what the size of the group. This would perhaps occur because individual incentive systems which are based on the performance of one person are designed to reward individual performance contingently whereas group incentive systems which are based on the performance of more than one person, are not.

An opposing hypothesis was that the performance of individuals would be higher under a group incentive system than under an individual incentive condition because the group contingencies could result in competition amongst members and the development of performance norms or standards.

As indicated previously, performance remained relatively stable under both types of incentive systems. Individual performance was not differentially affected by individual and group incentive systems.

### Overall Productivity of Groups

The results concerning the second research objective show that the overall productivity of the different groups did not appear to differ as a function of group size (small, medium, or large group sizes). The average performance of the small groups (groups of two) was similar to the average performance of the medium groups (groups of four and five) and it was similar to the average performance of the large group (group of nine).

An assumption regarding this research objective was that the overall productivity of smaller-sized work groups paid under a group incentive system, would be higher than the overall productivity of larger-sized work groups also paid under a group incentive system. This assumption was also based on the fact that as the group size increases, the effect that a single individual has on the group incentive payment decreases, so the overall productivity of small groups should be relatively greater than that of larger groups. The data from the present study did not support this assumption.

### Individual Performance Within Different Groups

Finally, in reference to the third research objective there did not appear to be any significant differences in the degree of individual performance changes when individuals were switched from an individual incentive system to

a group incentive system as a function of group size. The results of this study did not find that the size of the group affected individual performance during the group incentive condition. The subjects in the large group (nine subjects) did not show any more changes in performance than the subjects in the small groups (two subjects), or the medium groups (four or five subjects).

An assumption was that the performance of individuals under a group incentive system would be equal to the performance of individuals under an individual incentive system, as long as the size of the group which the group incentive system was based on was not too large. Again, this assumption is based on the fact that as the group size increases, the effect that an individual's performance has on the group incentive payment decreases. If the size of the group is two, each person in that group affects the group average by 50%, if the size of the group is five, each person affects the group average by 20% and if the size of the group is nine, each person affects the group average by 11%. This assumption was not supported by the data from this study.

The results of this laboratory study did not support the previous assumptions. Generally, there were no overall significant differences between the performance of individuals under an individual incentive system and the group incentive system in which when they were paid on the

basis of the average performance of an entire work group, regardless of the size of the work group. Only one subject performed at a significantly higher rate when she was paid on the basis of her own performance (Subject 2, in Group A, N=2) and only one subject (Subject 17, in Group G, N=4) performed at a consistently higher rate when he was paid on the basis of the entire work group. These results support the findings of Farr (1976) who did not find a significant difference between performance of individuals under an individual incentive and performance under a group incentive condition in the small-sized groups (N=3) that he studied.

These findings do not support the findings of Marriott (1949) who reported that employees paid on an individual incentive basis were slightly higher performers than were workers paid on a group incentive basis. However, most of the groups in his study were considerably larger-sized groups (groups of less than 10, 10-19, 20-29, 30-39, 40-49, and groups with 50 or more members).

The results of this study also suggested that overall productivity of small work groups (N=2) was similar to the overall productivity of medium-sized work groups (N=4 and N=5) and the overall productivity of a larger-sized work group (N=9). There were also no significant differences in the degree of individual performance changes when individuals were switched from individual incentives to

group incentives as a function of group size.

These findings do not support the conclusions of Campbell (1952) and Marriott (1949) who found that the effectiveness of group incentive plans decreases as group size increases. These investigators researched groups as large as 100 individuals, however, whereas the largest group size in this study was nine individuals. It may be that individual incentive systems are as effective as group incentive systems as long as the group size is less than 10 individuals.

Even though the results of the study do not show any significant differences in overall productivity of the different work groups, there were some interesting differences between the performance of the groups. In two of the groups of two performance steadily increased throughout the study. These trends were not present in any of the larger groups of four, five, or nine individuals. In these larger groups after initial increases in performance due to task acquisition, none of the subjects continued to steadily improve his or her performance.

It is possible that competition was a more important variable within the smaller groups (groups of two) than within the larger groups. The individuals within the groups of two could have been competing directly with each other which would result in this steadily increasing trend. Within the larger groups, however, there existed



several people (high and low performers) to compare one's performance with and not just one person. It is possible that competition would be less of a factor in those larger groups.

Another difference that existed between the work groups was the existence of a high performer. Both of the medium-sized groups and one of the smaller-sized groups had a clear high performer. This high performance was maintained throughout the study even though during the group incentive condition the high performer was not differentially rewarded for his or her high performance, but was making less money than during the individual incentive conditions. Subject 6 earned an average of \$0.28 less each session (with a range of \$0.12 to 0.48 less) during the group incentive condition than she would have if she had been paid solely on the basis of her own performance.

The other two high performers sustained a larger pay decrease. Subject 11 was paid an average of \$0.62 less each session (with a range of \$0.52 to 0.82 less) and Subject 18 was paid an average \$0.58 less each session (with a range of \$0.46 to 0.84 less) during the group incentive condition than if they had been paid on the basis of their own performance.

The low performers in these groups responded somewhat differently during the group incentive condition. Subject

5 in Group C remained at the same level of performance throughout the study, the performance of Subject 13 in Group F was more stable during the group incentive phase and Subject 17 in Group G increased his performance during the group incentive phase. A possible reason for the increase in the performance of Subject 17 during the group incentive condition was that Subject 18 (the high performer) made several statements directed at him during this phase (in the beginning of the sessions) such as "I wish we would go back to the other payment, I'm losing money" and other statements that were possibly designed to increase his performance. Since the investigator was not present during the sessions but only at their onset, it is not known whether subjects in other groups made similar comments that were not observed by the investigator. It is known, however, that similar comments by other subjects were not made in the investigator's presence.

Unlike the groups of four and five individuals and one of the groups of two, there was no significant high or low performer in the group of nine (Group H). All subjects performed at relatively the same level throughout the study. The lack of high or low performers and the matching of performance between the individuals in Group H resulted in a greater similarity between the two incentive systems. Since all performers were performing at approximately the same level, their payments during the group

incentive system was almost equal to their payment during the individual incentive conditions. It is possible that the lack of individual performance changes in Group H during the group incentive condition was due to this similarity between the two conditions. Individual performance changes might have been seen between conditions if there had existed low or high performers who would have decreased or increased the amount of group incentive payment. However, even in the medium-sized groups in which there were low and high performers, this did not occur.

#### Recommendations for Future Investigations

Future investigations in the area of group incentive systems should address the following issues. Larger groups (than a group of nine individuals) should be studied to see if a functional relationship between group size and individual performance under group incentive systems does in fact exist if the groups are of a large enough size. It is possible that even a group of nine individuals could be considered a small group. Campbell (1952) and Marriott (1949) did report that this relationship existed, however, since both of these studies were field studies they lacked strict experimental control. Future studies should be conducted under tighter experimental conditions.

It would also be useful to observe how the same in-

dividuals who are exposed to group incentive systems with different sized groups would perform. Individual performance differences may be shown if an individual is first exposed to a group incentive system of a small group size and then to a group incentive system of a larger group size.

Another issue that future investigations should look at is how competition and other social interactions affect the performance of individuals under group incentive systems. Since the investigator of this study did not observe the interactions between the individuals of the groups during the sessions, the influence of the social interaction of group members could not be determined. Based on casual observation by the investigator, however, it is likely that these factors played a role in the performance of the individuals in this study. Also, if a laboratory setting is to be utilized again for further investigations, it may be beneficial to employ a different work task. Several of the subjects complained of boredom with the task during the study. Although this task was useful from an experimental standpoint because it yielded objective quality and quantity data easily, a more complex task may increase individual satisfaction with the task. This may in turn reduce some of the problems with subject attrition and absenteeism that were present during this study.

It is also possible that the amount of money used in this study was not a strong enough reward for some individuals. Even though subjects could earn more than \$4.00 during a 45 minute session, it could be that this amount was not sufficient to show the effects of the different incentive systems. Also, in this study the money earned was discretionary funds for the college students. This is not the case in a real work environment where the livelihood of the employees depends on the amount of money earned. Future investigations should address these two issues by conducting studies with actual employees or by using greater amounts of money for the incentive payment.

Finally, it is also possible that even though this study did last longer than all other laboratory-based studies in the area of group incentive systems, it still did not last long enough to reveal differences in performance under individual incentive systems and performance under group incentive systems of varying group sizes. Subjects in this study were exposed to group incentive conditions for approximately five, 45 minute sessions. That is not even equivalent to one full working day in an actual setting.

If the conditions were extended longer and the length of each session was increased, it could be that differences between conditions might have been revealed. Further experimental research or investigations that occur

in actual organizations may be able to provide this long-term analysis.

## **APPENDIX A**

### **Sample Informed Consent Form**

### Informed Consent for Participation in an Investigation

You have been selected to participate in a research study. We are investigating the effects of payment systems on performance. We hope to learn more about different pay systems. As a participant, you will be asked to perform simple work tasks with other participants for approximately an hour each session. You will be requested to participate in three sessions per week for a total of approximately 20 sessions. You will be paid a base salary of \$1.50 plus the incentive pay that you earn. You will receive the pay at the end of each week and you will also receive a bonus at the end of the study if you attend all sessions.

This research involves minimal risk to you, for the task is a simple assembly task that does not require much effort. Potential benefits of participation include the acquisition of a greater understanding on how groups interact, on how you participate in groups and on how you function in a simulated work environment.

Any information obtained in this study will be confidential to the experimenters. If you sign this Informed Consent document, you give permission for the data to be used in scientific presentations and publications. All identifying information will be removed.

Participation in this study is voluntary. Although we strongly recommend that your commitment be for the full length of the study for maximum benefit to all involved, you will be free to discontinue participation at any time without prejudice or loss of payments for sessions already attended.

Questions or comments regarding this research or your rights may be directed to Dr. Alyce Dickinson at 383-0786 or Karen Stoneman at 381-0853. If the solution is unsatisfactory, you may contact the Chairperson of the Human Subjects Institutional Review Board.  
YOUR SIGNATURE BELOW INDICATES THAT YOU UNDERSTAND THE ABOVE INVESTIGATION AND HAVE DECIDED TO PARTICIPATE.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Time

\_\_\_\_\_  
Signature of Investigator

\_\_\_\_\_  
Signature of Witness



## **APPENDIX B**

### **Human Subjects Institutional Review Board Approval Letter**



Western Michigan University<sup>47</sup>  
Kalamazoo, Michigan 49008-3899

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*Human Subjects  
Institutional Review Board*

TO: Karen Stoneman  
Alyce Dickinson  
FROM: Ellen Page-Robin, Chair *E.P.R.*  
RE: Research Protocol #87-03-04  
DATE: March 11, 1987

This letter will serve as confirmation that your research protocol, "The effects of group incentive plans on individual performance," has been approved by the HSIRB.

If you have any questions, please contact me at 383-4917.

## **APPENDIX C**

### **Sample Session Recording Form**

**PARTICIPANTS' PARTS ASSEMBLED PER SESSION****NAME:** \_\_\_\_\_**SES1****SES2****SES3****SES4****SES5****SES6****SES7****SES8****SES9****SES10****SES11****SES12****SES13****SES14****SES15****SES16****SES17****SES18****SES19****SES20****SES21****SES22**

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