The Effects of Individual and Group Incentives on High and Low Performance

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THE EFFECTS OF INDIVIDUAL AND GROUP INCENTIVES ON HIGH AND LOW PERFORMANCE

by

Heather M. McGee

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

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Heather M. McGee
THE EFFECTS OF INDIVIDUAL AND GROUP INCENTIVES ON HIGH AND LOW PERFORMANCE

Heather M. McGee, M.A.
Western Michigan University, 2003

This study examined the effects of individual and group monetary incentives on the performance of high and low performers. Participants were six college students who performed a computerized work task called SYNWIN. Participants earned points for correct responses and lost points for incorrect responses. The primary dependent variables were the total number of points earned per session and the percent correct per session. An ABAC within-subject reversal design was used, where A = individual incentives, B = group incentives (either high or low performance), and C = hourly pay.

The point scores of all six participants decreased when group incentives were in effect, but failed to increase to previously higher levels for all but two participants during the second individual incentive condition. The point scores of all participants were lowest during the hourly pay condition. The data were highly variable for the majority of participants, particularly during the second individual incentive condition. Due to this variability, no distinct conclusions could be drawn about the effects of individual and group monetary incentives on the performance levels of high and low performers.
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INTRODUCTION

In the mid to late 1980s, responding to the increasingly competitive global market, organizations in the US began shifting their compensation systems from noncontingent to performance contingent pay (Latham & Huber, 1992; Lawler, 1990; O’Dell & McAdams, 1987; Wilson, 1995). Addressing the shift, Hurst (1998) stated that while traditional compensation systems may effectively attract and retain workers, “they have never been too successful in motivating the moment-to-moment individual performance” (p. 13). The performance contingent pay systems have been adopted in order to align pay with organizational strategies designed to increase productivity (Abernathy, 1996; Belcher, 1996; Chingos, 1997; Flannery, Hofrichter, & Platten, 1996; Lawler, 1990, 2000; Risher, 1999; Schuster & Zingheim, 1992; Zingheim & Schuster, 2000). Wilson (1995) stated, rather simply, that the reason for the changes was the fact that “traditional patterns of management, organization, and rewards [were] no longer working” (p. 9); that is, US companies were losing their competitive edge.

In the early 1990s, a survey by Hewitt Associates of over 2000 US companies indicated that 68% of the firms were using some form of variable or incentive compensation (Tully, 1993). In another study, conducted by the Hay Group, 54% of 500 large and medium US companies reported that they had begun to change their pay systems to reflect changes in organizational culture (Flannery et al., 1996). In
addition, in that same study, 73% acknowledged the necessity to alter their pay systems so that they would be consistent with new cultural initiatives. Similarly, studies from 1986 to 1997 showed “large increases in the percentage of Fortune 1000 firms using a variety of compensation innovations” (Ledford & Hawk, 2000, p. 28). Thus, not only have a large number of companies altered their pay systems within the past decade, the trend appears to be continuing.

Both compensation and behavioral experts have praised the pay innovations, not only in terms of promoting productivity but in terms of promoting organizational justice and equity as well. For example, Lawler (1992), in his book, *The Ultimate Advantage: Creating the High Involvement Organization*, stated:

> Financial rewards are vital to a proper balance of power, information, knowledge, and rewards in an organization. If such rewards are missing, individuals have no financial responsibility for how they use the information, knowledge and power they are given to improve organizational performance. Lack of financial rewards also can raise major equity issues that can harm an organization’s culture. When, as a result of employees’ efforts, organizational performance improves, employees expect to share in the gains. If they do not share in these gains, they feel exploited and ultimately reject management systems that give them more information, knowledge, and power and ask them for better performance but do not reward them for their performance. (p. 172)

Similarly, Mawhinney (1990), when arguing against the position that extrinsic rewards always harm a worker’s intrinsic motivation, stated that extrinsic reward systems in the work place can be designed to improve performance and “promote equity in the allocation of the monetary benefits produced by the cooperative efforts of many people in an organization” (p. 189).
Several types of variable pay plans exist. The most popular include employee stock ownership, profit sharing, gain sharing, pay-for-knowledge or skill, lump sum bonuses, small group monetary incentives and individual monetary incentives. Only four basic systems, however, use a predetermined formula to tie compensation to internal operational or economic measures: profit-sharing, gain-sharing, small group incentives and individual monetary incentives (Abernathy, 1990; McAdams & Hawk, 1992). In the absence of a pre-announced formula based on objective measures, pay cannot truly be contingent on performance (Abernathy, 1990; Honeywell-Johnson & Dickinson, 1999; Mitchell, Lewin, & Lawler, 1990). Thus, although other types of pay plans are *variable* pay plans, they cannot be considered to be *performance contingent* pay plans. It should be noted that while employee stock ownership plans tie pay to economic measures, those measures are based on the market value of the stock. Because market value is difficult to control by the organization, the compensation received by employees is not easily viewed as performance contingent. Hence, these plans will be excluded from further discussion, as will other forms of variable pay plans that cannot be considered performance contingent.

Of the four performance contingent compensation systems (profit sharing, gain sharing, small group incentives and individual incentives), profit sharing and gain sharing link compensation not to individual performance, but to the performance of the organization as a whole or to organizational units (Abernathy, 1990; Honeywell-Johnson & Dickinson, 1999; Lawler, 1990). In contrast, individual and small group incentive systems tie the worker’s pay to the worker’s performance
(Abernathy, 1990; Honeywell-Johnson & Dickinson, 1999; Lawler, 1990). Although arguable, profit sharing and gain sharing do not appear to be as effective as individual and small group monetary incentives with respect to increasing worker performance (for reviews, see Blinder, 1990; Dickinson & Gillette, 1993; Lawler, 1990). This is not surprising from a motivational perspective. Profit sharing bonuses are based on the profitability of the entire organization and can be greatly influenced by factors that are outside the control of the employee, such as mergers and acquisitions and the investment of funds in research and/or new facilities. Bonuses are typically distributed annually or placed in retirement accounts and, as a result, the extra pay is far removed from the day-to-day performance of a worker. Similarly, gain sharing bonuses are based on the aggregate performance of workers in an organizational unit. Disbursements are typically made quarterly or annually, or, like profit sharing bonuses, deposited in retirement accounts. Thus, they, too, are removed from day-to-day performance.

In individual incentive systems, employees receive compensation based on their individual performance. Wilson (1995) described the defining feature of individual incentive systems as follows: employees receive “a predetermined amount of money for every unit of work they produce” (p. 115). Thus, the employees’ pay is not affected by the work of others, as it is in group-based systems. In addition, Bucklin and Dickinson (2001) pointed out that individual incentives have three additional characteristics that are common to other effective rewards and consequences as well: (a) They are based on clearly specified behaviors or outputs,
(b) they are certain (if the behavior or output occurs, employees will receive the extra
compensation), and (c) they are distributed as soon after the performance as possible,
usually in the employee's regular paycheck. Compensation experts (Conrad, 1994;
Lawler, 1990, 1992; McCoy, 1992; McNally, 1988) and behavioral psychologists
(Braksick, 2000; Brown, 1982; Daniels, 1989; O'Brien & Dickinson, 1982) alike
have emphasized the importance of these characteristics when the goal of an
intervention program is to influence work performance.

Group incentives may be set up in a variety of different ways, but no matter
how they are configured, each employee's pay is based on the performance of the
group that includes that employee. They have several features in common with
individual incentives in that they are (a) based on clearly specified behaviors or
outputs, (b) are certain, and (c) distributed in the employee's regular paycheck
(Bucklin & Dickinson, 2001). Group incentives differ from individual incentives in
that the worker's pay is not only based on his or her performance, but on the
performance of others in the group. The size of the group is considered to be an
important factor with respect to the effectiveness of group incentives (Blinder, 1990;
Honeywell-Johnson & Dickinson, 1999; Honeywell, Dickinson, & Poling, 1997;
Lawler, 1990). As the group size increases, workers cannot affect the performance of
the group as much, and hence the link between their performance and pay becomes
weaker.

Surveys conducted over the past decade have consistently reported that 12%-16%
of US companies use small group incentives (Honeywell et al., 1997). Peterson
(1992) found that in certain manufacturing industries, 50% of employees are covered by group plans. Although individual incentives are more prevalent, the use of group incentives is increasing (Honeywell-Johnson & Dickinson, 1999). In a 1994 Hay Group survey, 39% of respondents who did not use group incentives indicated that they were considering them (Gross, 1995). Similarly, Ledford and Hawk (2000) reported that Fortune 1000 firms increased their use of group incentives by 50% between 1987 and 1996.

The use of individual and group monetary incentives is not new. In their article “Pay for Performance from Antiquity to the 1950s,” Peach and Wren (1992) cited examples of incentives that dated back to the 18th Century BC in Babylonia. Incentives were also part of the early Egyptian, Roman and Grecian economies (Peach & Wren, 1992). The foundation for modern incentive systems, however, is generally attributed to Frederick W. Taylor (Louden, 1944; Opsahl & Dunnette, 1966; Peach & Wren, 1992). Taylor’s work in “scientific management” began in the 1880s (Mitchell et al., 1990; Peach & Wren, 1992) and culminated in his highly influential book The Principles of Scientific Management (Taylor, 1911) (see also, Taylor, 1895, 1903). According to Milkovich and Stevens (2000):

Incentives based on Frederick Taylor’s “scientific management” were seen as “best practices.” More than 60 percent of manufacturers responding to a 1920 National Industrial Conference Board survey reported using piece rates. Eighty percent of all workers were employed in plants where piece rates were used. (p. 9)

The use of incentives declined dramatically from the mid 1920s through the mid 1970s due to a variety of complex factors that included the inflation and
mismanagement of performance measures, the rise of the human relations movement in the 1920s, the severe economic depression in the 1930s, labor unrest, increased regulation of wages by the government, and union negotiated labor contracts (Milkovich & Stevens, 2000; Mitchell et al., 1990; Opsahl & Dunnette, 1966; Peach & Wren, 1992). A renaissance of alternative pay systems, including the use of individual and group monetary incentives, occurred in the early 1980s. As indicated earlier, this renewed interest resulted from the desire to reverse the decreasing annual productivity growth of the US and the concomitant decline of the global competitiveness of US industries (Blinder, 1990; Dickinson & Gillette, 1993; Lawler, 1990). In addition, companies began to implement group-based incentives to initiate changes in the organizational culture, consistent with the trend toward team-based work environments that occurred during those years (Honeywell-Johnson & Dickinson, 1999; McAdams & Hawk, 1992).

In spite of the long history of incentives and their momentary popularity in the early 1900s, little controlled research was conducted until their resurgence in the 1980s. In 1966, Opsahl and Dunnette published an extensive review of “The Role of Financial Compensation in Industrial Motivation.” While stating that “There is considerable evidence that installation of such plans usually results in greater output per man hour, lower unit costs, and higher wages in comparison with outcomes associated with straight payment systems” (p. 98), they also pointed out that “Strangely, in spite of the large amounts of money spent and the obvious relevance of behavioral theory for industrial compensation practices, there is probably less solid
research in this area than in any other field related to worker performance” (p. 94). They appealed to researchers to conduct studies in controlled laboratory settings and to analyze the effectiveness of different methods of payment in isolation from the other changes that usually accompany their implementation. For detailed treatments of the early field studies and experiments, readers are referred to Opsahl and Dunnette (1966) and Marriott (1957). Readers are also referred to Parsons (1974) for a detailed analysis of the effects of incentives during the Hawthorne studies, conducted between 1924 and 1932, and to Handlin (1992) and Lincoln (1946, 1951, 1961) for descriptions of one of the most successful and enduring incentive programs – Lincoln Electric’s “incentive management” program which began circa 1914.

Individual Incentives

Individual Incentives versus Hourly Pay

Most of the subsequent controlled laboratory and field studies have focused on the effectiveness of individual incentives. Laboratory studies have consistently demonstrated that performance levels are higher under individual incentive conditions than under hourly pay conditions (e.g., Berger, Cummings, & Heneman, 1975; Dickinson & Gillette, 1993; Farr, 1976; Frisch & Dickinson, 1990; Honeywell et al., 1997; Pritchard, Hollenback, & DeLeo, 1980; Pritchard, Leonard, Von Bergen, & Kirk, 1976; Riedel, Nebeker, & Cooper, 1988; Smoot & Duncan, 1997). Individual incentives have also resulted in higher performance in the work place (e.g., Abernathy, Duffy, & O’Brien, 1982; Bushhouse, Feeney, Dickinson, & O’Brien,
1982; Gaetani, Hoxeng, & Austin, 1985; George & Hopkins, 1989; LaMere, Dickinson, Henry, Henry, & Poling, 1996; Latham & Dossett, 1978; Nebeker & Neuberger, 1985; Saari & Latham, 1982; Wagner & Bailey, 1997; Yuki & Latham, 1975; Yuki, Latham, & Pursell, 1976; Yuki, Wexley, & Seymore, 1972). The majority of applied studies, however, have consisted of case studies: There have been only four well controlled field studies (George & Hopkins, 1989; LaMere et al., 1996; Nebeker & Neuberger, 1985; Wagner & Bailey, 1997).

Different Types of Arrangements Between Performance and Individual Incentives

Given that the general effectiveness of individual incentives had been established, much of the subsequent research focused on comparing the relative effectiveness of various types of arrangements of individual incentives. Three types of arrangements have been examined in two or more studies: (a) schedules of incentive delivery; (b) linear, accelerating, and decelerating piece-rate pay; and (c) percentages of total or base pay earned in incentive pay (Bucklin & Dickinson, 2001).

Schedules of Incentive Delivery

Schedules of incentive delivery were examined in a series of studies that spanned a decade, from the early 1970s to the early 1980s (Berger et al., 1975; Latham & Dossett, 1978; Pritchard et al., 1980; Pritchard et al., 1976; Saari & Latham, 1982; Yukl & Latham, 1975; Yukl et al., 1976; Yukl et al., 1972). Four of the studies were laboratory studies and four were field studies. A major objective of
these studies was to examine conflicting predictions from expectancy theory of work motivation and behavior analysis with respect to how various reinforcement schedules affect human performance. The studies compared performance under continuous schedules of reinforcement and fixed and variable ratio schedules of reinforcement. As noted by Dickinson and Poling (1996), although the studies purported to study the same basic schedules of reinforcement as those examined in the basic operant laboratory, several features of the schedules differed. While Dickinson and Poling criticized the researchers for using the same names to refer to their schedules and drawing conclusions based on their “sameness,” they nonetheless lauded the efforts of the researchers, stating:

As discussed elsewhere (e.g., Blinder, 1990; Frisch & Dickinson, 1990; Lawler, 1990; Peck, 1990; Stoneman & Dickinson, 1989) practical attempts to improve productivity through appropriate scheduling of monetary incentives are of obvious importance. The eight studies... are noteworthy as a conceptually integrated effort in this area. (p. 87)

In seven of the eight studies, incentive pay improved performance when it was compared to hourly pay, however, no uniform differences occurred as a function of the schedule of delivery. Dickinson and Poling (1996), after a detailed description of the results, concluded, “At best, these results are ambiguous” (p. 82). Similarly, Bucklin and Dickinson (2001), referring to this same set of studies, concluded that performance improved when there was a contingent ratio relationship between performance and pay but that the different ratio schedules did not exert control over the level of performance.
Linear, Accelerating and Decelerating Piece-Rate Pay

Laboratory studies by Oah and Dickinson (1992) and Smoot and Duncan (1997) addressed whether performance levels would differ if the relationship between performance and piece-rate pay was linear, accelerating or decelerating. In linear relationships, the amount of the per piece incentive remains constant regardless of the number of pieces that a worker produces. In accelerating relationships, the amount of the per piece incentive increases as productivity increases; that is, the more pieces a worker produces, the more each piece is worth. Conversely, in decelerating relationships, the amount of the per piece incentive decreases as productivity increases.

Accelerating relationships are rationalized in terms of an effort/reward ratio. The more a worker produces, the harder it is to produce more; thus, increasingly higher pay may be necessary to generate and sustain the increasingly higher levels of effort/behavior that are needed to maximize performance (Oah & Dickinson, 1992). Moreover, given that additional effort/behavior is necessary to maximize performance, workers may perceive accelerating pay to be more equitable than linear pay, and it indeed may be more equitable (Mawhinney, 1984; Oah & Dickinson, 1992). Decelerating relationships were examined by Smoot and Duncan (1997) in order to compare their effects with those of linear and accelerating relationships as well as to compare the cost-effectiveness of the three pay systems.

Oah and Dickinson (1992) found that performance was comparable when workers were exposed to a linear and a 1.5 exponentially accelerating relationship.
between performance and pay. In contrast, in a series of four experiments, Smoot and Duncan (1997) found that the three pay arrangements resulted in different levels of performance. Linear pay, however, resulted in higher levels of productivity in two of the experiments while accelerating pay resulted in higher levels of productivity in the other two. The results of the studies were, thus, inconsistent across the studies as well as within the Smoot and Duncan study. After critiquing these studies, Bucklin and Dickinson (2001) stated:

In summary, the results of the two studies that have examined linear, accelerating and decelerating pay are inconclusive. While these studies are worthy initial investigations, additional studies are needed to determine whether the pay arrangements affect productivity differently. . . Certainly, at the current time, there are no compelling data indicating that linear, accelerating and decelerating piece rate pay generate different levels of performance. (p. 120)

Percentage of Total Pay or Base Pay Earned in Incentive Pay

Several studies have examined the effects of different percentages of total pay or base pay earned in incentive pay on performance levels (Dickinson & Gillette, 1993; Frisch & Dickinson, 1990; LaMere et al., 1996; Matthews & Dickinson, 2000; Riedel et al., 1988). The percentages of incentive pay examined in these studies have ranged from 3% to 100% of a person’s base pay and total pay. Higher percentages of incentive pay are more closely tied to an individual’s performance than lower percentages; that is, a greater proportion of a worker’s pay is dependent upon on his or her performance. Thus, it was reasoned that performance levels would increase as
the percentage of incentives increased (Bucklin & Dickinson, 2001; Frisch & Dickinson, 1990).

After a detailed review of these studies, Bucklin and Dickinson (2001) concluded:

To summarize, the results of all five studies (Dickinson & Gillette, 1993; Frisch & Dickinson, 1990; LaMere et al., 1996; Matthews & Dickinson, 2000; Riedel et al., 1988) were consistent: When participants were exposed to incentive systems in which they could earn different percentages of their total pay or base pay in incentives, their performance was comparable. In contrast to statements made by compensation experts (Fein, 1970; Henderson, 1985), small percentages of incentives, as low as 3% of a person’s total pay, increased performance appreciably in comparison to hourly wages (Frisch & Dickinson, 1990; LaMere et al., 1996). Moreover, the differences were both statistically and practically significant. The effectiveness of relatively low incentive percentages was demonstrated in LaMere et al.’s (1996) field study as well as in two laboratory studies (Frisch & Dickinson, 1990; Riedel et al., 1988). These data have led researchers to propose that the contingent ratio relationship between performance and pay is the critical determinant of productivity, rather than (a) the percentage of total pay or base pay that can be earned in incentives, (b) the total amount of pay that can be earned in incentives, or (c) the amount of the per piece incentive (Dickinson & Gillette, 1993; LaMere et al., 1996). (p. 84)

Bucklin and Dickinson (2001) concluded that the results regarding the effectiveness of low percentage of incentives were persuasive. Not only have low percentages significantly improved performance in all relevant studies, but LaMere et al. (1996) demonstrated their long-term effectiveness in an actual work setting. In their study, the performance of truck drivers was sustained by small percentages of incentives (3% - 9% of total pay) for over three years.

While maintaining that the results regarding the effects of different percentages of incentives on performance are, to date, convincing, Bucklin and
Dickinson (2001) stated that they should not be considered definitive until further research verifies their validity. They pointed out that all but one study, the Lamere et al. (1996) study, have been conducted in the laboratory. Faced with economic constraints, researchers have not been able to offer real world wages, and “the effectiveness of various proportions of incentive pay to total wages or base wages may well depend upon the absolute amount of base wages earned and/or the total compensation earned” (Bucklin & Dickinson, 2001, p. 87). In addition, although alternative tasks were available to participants in the laboratory studies, they may not have been as attractive as those in an actual work setting. If the alternatives were not realistic alternatives, participants may have spent all of their time performing the experimental task in order to make as much money as possible regardless of the specific incentive percentage (Bucklin & Dickinson, 2001; Matthews & Dickinson, 2000). Finally, feedback has been a consistent confound in all the studies, including LaMere et al.’s field study (Bucklin & Dickinson, 2001; Matthews & Dickinson, 2000). Thus, feedback may have sustained performance under the various incentive percentages. While not decreasing the importance or validity of the findings, this possibility may restrict their generality to situations where performers receive relatively immediate and frequent feedback (Bucklin & Dickinson, 2001).

**Summary**

In studies that have examined different arrangements between performance and individual incentives, performance levels have not been functionally related to (a)
the ratio schedule of delivery, (b) linear, accelerating or decelerating piece-rate pay, or (c) the percentage of total pay and base pay earned in incentive pay. Although not conclusive, the data from these three lines of research suggest that the main determinant of productivity is the contingent relationship between performance and incentives rather than the specific way the incentives are related to performance.

Group Incentives

With group incentives, the pay a worker receives is dependent not only on his or her performance, but on the performance of the other members in the group. Thus, the link between performance and pay is weaker than with individual incentives. As the size of the group increases, the link between a worker's pay and his or her performance becomes weaker due to the fact that the worker's contribution to the group's performance becomes smaller. That is, the worker has less control over the total group's performance and hence his or her earnings. In small groups, however, the worker's performance constitutes a sizable proportion of the group's total performance and thus the worker still has a certain degree of control over his or her earnings. Because of that, even though large group incentives may not effectively influence a worker's performance, small group incentives may (Honeywell et al., 1997).

The effects of group monetary incentives have not been as extensively researched as the effects of individual incentives. In a recent review of the literature, Honeywell-Johnson and Dickinson (1999) stated that "relatively few experimental
investigations have examined the effects of group monetary incentives on the performance of groups that are of the size typically found in the workplace” (p. 116). Their search of the literature, which excluded survey studies, uncovered only 12 experimental studies, four of which were unpublished. Most of these studies examined groups of under 10 members. Only two field studies examined groups of over 12 members. Noting the small number of studies, Dickinson (2000) emphasized the need to conduct additional research, particularly in light of the fact that group incentive systems are being increasingly adopted by organizations.

The author recently searched the literature and located two experimental studies (Honeywell-Johnson, McGee, Culig, & Dickinson, 2002; Thurkow, Bailey, & Stamper, 2000) that were conducted after Honeywell-Johnson and Dickinson’s (1999) review, bringing the total number of known studies to 14. Five of the 14 studies examined the effects of group incentives and hourly pay, three compared cooperative (equally divided) and competitive (differentially divided) group incentives, four examined the effects of group size on performance, and ten compared group and individual incentives. Only two studies investigated the effects of group incentives on high or low performance, which is the focus of the proposed study.

**Group Incentives versus Hourly Pay**

As stated previously, 5 of the 14 studies compared the effects of small group monetary incentives and hourly pay. Four of the studies were conducted in a laboratory setting (Farr, 1976; Honeywell-Johnson et al., 2002; Miroff, Naylor,
Lubeach, Greenberg, Gillen, Sitarsky, & Duncan, 1993; Smoot, 1997). Farr (1976) examined forty-eight three-member groups in a between group study, Smoot (1997) examined six three-member groups using a within-subject multiple baseline design, and Miroff et al. (1993) examined four five-member groups using a combined multiple baseline and group design. Honeywell-Johnson et al. (2002) used simulated ten-person groups. That is, during the group incentive condition, the four participants were told that they were members of a ten-person group and that their data would be combined with the data of the nine other group members. Honeywell-Johnson et al. (2002) adopted a single subject research design. In all of the studies, the incentives earned by the group were equally divided among the group members. Farr also included a competitive group incentive condition during which the top performer received 50% of the incentives earned by the group, the middle performer received 33%, and the bottom performer received 17%. Tasks consisted of sorting computer cards punched with various combinations of holes (Farr, 1976), assembling parts made from pop beads (Miroff et al., 1993; Smoot, 1997), and performing a computerized work task (Honeywell-Johnson et al., 2002). In all four studies performance was higher when participants were paid group monetary incentives than when they were paid hourly, regardless of whether the incentives were equally divided among group members (Farr, 1976; Honeywell-Johnson et al., 2002; Miroff et al., 1993; Smoot, 1997) or differentially divided (Farr, 1976).

In the one field study, Allison, Silverstein and Galante (1992) compared the number of tasks workers completed when they were paid hourly wages, cooperative
group incentives and competitive group incentives. Twelve teaching assistants for disabled children participated in the study. All 12 participants were exposed to all of the pay conditions. In the cooperative group incentive condition, the available incentives were shared equally among the 12 workers. In the competitive group incentive condition, the available incentives were divided equally among the top three workers. As in the laboratory studies, participants performed better when they were exposed to both of the group incentive conditions than when they were paid hourly.

The results of aforementioned studies have been consistent. For groups ranging in size from 3 to 12 members, group monetary incentives have resulted in higher levels of performance than hourly pay.

**Group Cooperative versus Group Competitive Incentives**

Group incentives can be distributed to members of the group in different ways. Incentives can be equally divided among the members or differentially divided based on the individual’s contribution to the group. Some types of differentially divided rewards are competitive; that is, when one group member receives incentives, it decreases the opportunity for other members in the group to receive the same or a similar amount of incentives. Honeywell-Johnson and Dickinson (1999) discussed the potential differing effects of equally divided and differentially divided rewards in their review.

When group rewards are differentially distributed, the link between a worker’s performance and pay is strengthened, and thus higher performance may occur. On the other hand, differential distribution methods may create intragroup competition and perceptions of
unfairness if one member benefits from the poorer performance of another and/or if the amount of the incentive does not accurately or reasonably reflect member contributions. While competition might increase productivity, it may also have deleterious effects, as members may attempt to hinder the performance of others. (pp. 108-109)

The effects of group cooperative and group competitive incentives were investigated in two laboratory studies (Farr, 1976; Weinstein & Holzbach, 1973) and one field study (Allison et al., 1992). Farr (1976) and Weinstein and Holzbach (1973) studied three-person groups using between group research designs. In both studies, during the cooperative group incentive condition, the incentives earned by the group were equally divided among the three group members. During the competitive group incentive condition, the top performer received 50% of the available incentives, the middle performer received 33%, and the bottom performer received 17%. Productivity was higher when individuals received competitive group incentives than when they received cooperative group incentives.

Allison et al. (1992) reported different results. As indicated earlier, in their cooperative group incentive condition, the incentives earned by the workers were divided equally among the 12 participants while in the competitive group incentive condition, the incentives were distributed only to the top three performers. In this study, cooperative and competitive group rewards resulted in comparable performance.

The above results suggest that competitive group incentives may result in higher levels of performance than cooperative group incentives. However, Honeywell-Johnson and Dickinson (1999) argued against competitive rewards
because of the satisfaction data reported by Farr (1976) and Allison et al. (1992). Farr’s participants found the competitive incentives to be less fair than either the individual or equally divided incentives. Similarly, when Allison et al.’s (1992) participants were given the opportunity to choose between cooperative or competitive incentives, the 12 staff members unanimously selected the cooperative incentives. Although Weinstein and Holzbach (1973) did not assess fairness or satisfaction, their participants reported that the differentially divided rewards led to significantly greater competition between group members than did the equally divided rewards. Based on these data, Honeywell-Johnson and Dickinson concluded that the competitive nature of the rewards may have accounted for the preferences expressed by the participants in the Farr and Allison et al. studies.

Abernathy (1996) has developed a unique differential group incentive program that does not have competitive features. In this program, the total amount of money available for distribution is based on group profitability measures. An equal portion of the money is reserved for each worker in the group. The actual incentive that a person receives is based on his or her performance. That is, individuals can earn all of their share or only a portion of it. Thus, while the total amount of money that is available for disbursement is based on the total group’s performance and incentives are differentially distributed, workers are not competing with each other for the amount they receive. That is, one worker does not benefit if another performs poorly. Although this type of noncompetitive differential pay system is conceptually very sound, it has yet to be experimentally investigated.
Based on negative participant reaction to competitive differentially divided rewards (Allison et al, 1992; Farr, 1976; Weinstein & Holzbach, 1973), Honeywell-Johnson and Dickinson (1999) provided the following advice to managers: “Given these data, managers would be wise to favor equally-divided group rewards, or differentially-divided group incentive programs that do not contain competitive contingencies, like the one offered by Abernathy (1996)” (p. 111).

Group Size

As indicated earlier, group size may play a key role in the effectiveness of group incentives. As the size of the group increases, the relationship between a worker’s pay and performance decreases. This occurs because the worker’s ability to affect the group’s performance decreases. Blinder (1990) referred to this as the “1/nth problem,” in which “n” represents the number of employees in the group. As “n” increases, the worker loses control over his or her wages and hence the effectiveness of group incentives is likely to decrease (Blinder, 1990; Honeywell-Johnson & Dickinson, 1999; Honeywell et al., 1997; Stoneman & Dickinson, 1989). Applying similar logic, Lawler (1990) stated that the worker’s “line of sight” becomes obscured as the size of the incentive group becomes larger, hence productivity is likely to suffer. When the size of the group is relatively small, however, the worker retains a certain degree of control over the group’s performance and hence his or her earnings. Thus, group incentives may effectively influence performance when the work group is small.
The effects of group size on performance were investigated in four of the fourteen studies. Two early field studies (Campbell, 1952; Marriott, 1949) examined the effects of group incentives on the performance of large groups—the only two studies that have done so. In Campbell's study, groups ranged in size from under 20 to over 100 workers. In Marriott's (1949) study, groups ranged in size from under 10 to over 50. Workers received incentives based on the group's total productivity, hence they all received the same amount of incentive. In both studies, performance decreased as the size of the group increased.

The results of investigations with small groups have differed from the results reported by Campbell (1952) and Marriott (1949). Stoneman and Dickinson (1989) and Roberts and Leary (1990) examined the effects of equally divided group incentives on the performance of groups ranging in size from two to nine members. Both studies were conducted in the laboratory and between group comparisons were used in both. In the two studies, the performance of the groups was comparable regardless of the size of the group.

The most likely reason for the differences in results between the two field studies and the two laboratory studies is the size of the groups that were examined. However, Honeywell-Johnson and Dickinson (1999) mentioned three additional factors that may have contributed to the differences: (a) the length of exposure to the pay systems; (b) the amount of the incentives; and (c) differing types of social interactions. Nonetheless, the results of the four studies suggest that group incentives
are likely to be (a) less effective with large groups than with small groups, and (b) equally effective with groups of ten and fewer members.

Group Incentives versus Individual Incentives

Both small group and individual monetary incentives have been shown to result in higher levels of performance than hourly pay. Additionally, group incentives appear to be equally effective with groups ranging in size from two to ten members. The logical question thus becomes whether small group monetary incentives are as effective as individual incentives. Compensation experts have argued that because individual incentives are more closely tied to the individual’s performance, they are more likely to result in higher levels of performance (Dierks & McNally, 1987; Honeywell-Johnson & Dickinson, 1999; Lawler, 1990; McAdams & Hawk, 1992). Results indicating that differentially divided group incentives may produce higher levels of performance than equally divided group incentives (Farr, 1976; Weinstein & Holzbach, 1973) support this argument due to the fact that when incentives are differentially distributed, the amount of incentives that a worker receives is more dependent on his or her performance. On the other hand, as argued earlier, in small groups individuals retain considerable control over the group’s total productivity. Thus, small group incentives may exert as much control over performance as individual incentives (Honeywell et al., 1997; Honeywell-Johnson & Dickinson, 1999). It is also the case that group incentive plans may be more appealing to
organizations because of the increasing prevalence of work teams and the fact that, in most cases, group plans are easier to administer (Dickinson & Gillette, 1993).

Equally Divided Group Incentives versus Individual Incentives

Seven studies have compared the effects of equally divided group incentives and individual incentives on performance (Allison et al., 1992; Farr, 1976; Honeywell et al., 1997; Roberts & Leary, 1990; Smoot, 1997; Stoneman & Dickinson, 1989; Thurkow et al., 2000). Five of the studies were conducted in the laboratory and two in the work place. With the exception of the Thurkow et al. (2000) study, the size of the groups ranged from two to twelve members. In the Thurkow et al. (2000) study, the size of the group varied from session to session. While the average group size was seven, the groups ranged from two to twenty-four members. In all of the studies, during the individual incentive condition, performers received per piece incentives based on their own performance. During the group incentive condition, the performances of group members were pooled and incentives were based on the group’s productivity. In Thurkow et al.’s study, the top performer received an additional bonus during the group incentive condition. However, because the additional bonus was small (one hour of additional pay) in comparison to the amount of the incentives that were distributed equally among the members of the group, for the purposes of the current review, the incentives are being classified as equally rather than differentially divided.
In five of the seven studies (Farr, 1976; Honeywell et al., 1997; Roberts & Leary, 1990; Smoot, 1997; Stoneman & Dickinson, 1989), performance was comparable when workers received equally divided group incentives and individual incentives. In one of the two field studies (Allison et al., 1992), performance was slightly higher when workers received equally divided group incentives. Thus, in six of the seven studies, the small group incentives were at least as effective as individual incentives.

The results reported by Thurkow et al. (2000) differ. In their study, the performance of telephone interviewers was considerably better when they were paid individual incentives than when they received equally divided group incentives. The reason the results differ from the results of the prior studies is unclear. One possibility is the lack of a clear performance standard during the group incentive condition. During that condition, workers earned incentives when the group's performance exceeded a specified standard. The group standard was calculated by multiplying an hourly goal by the number of person-hours for the shift. The group standard was very difficult for the supervisor to determine because interviewers failed to report for scheduled shifts, were tardy, or attended shifts for which they were not scheduled. According to the authors, "Therefore, it was difficult for the supervisors to give the interviewers an accurate goal during the shift because it was hard to estimate the final person-hours and this frustrated the interviewers" (p. 18). It may have suppressed their performance as well. There are other possible reasons for the discrepant results. The size of the group may have affected the results. The results of the study were
based on the performance of six participants, however, the participants were part of different sized groups from day to day, depending upon how many other employees were scheduled to work. As indicated earlier, while the average size of the work group was seven members, the size of the work group varied from two to twenty-four members. Results from the other studies suggest that group incentives are as effective as individual incentives for groups ranging in size from two to twelve members. Findings from studies by Campbell (1952) and Marriott (1949) also suggest that the effectiveness of group incentives decreases for larger groups. Thus, in Thurkow et al.'s study, the size of the group, its uncertainty, and/or the instability of the particular individuals who comprised the group from session to session could explain the superiority of individual incentives. Finally, the six participants typically performed higher than other members of their groups (Thurkow et al., 2000). Thus, the authors suggested, based on analyses by Dierks and McNally (1989) and Dickinson and Honeywell-Johnson (1999), that the participants may have decreased their performance during the group incentive condition because they received less money in incentives.

Satisfaction ratings from three of the four studies indicated that participants were equally satisfied with group and individual monetary incentives (Allison et al., 1992; Farr, 1976; Honeywell et al., 1997). In addition to asking workers to rate the pay systems in terms of satisfaction, Allison et al. (1992) also asked them to choose the pay system they wanted to work under during the last week of the study. The twelve staff members voted privately and were told that a simply majority would be
used to determine which pay system would be implemented. In spite of the fact that staff rated the group and individual incentive systems similarly with respect to satisfaction, they unanimously voted for the equally divided group incentives. Thus, in the preceding three studies, participants were equally satisfied with or preferred group monetary incentives. In contrast, Thurkow et al.’s (2000) participants preferred individual incentives. If Thurkow et al.’s participants were indeed high performers as the authors proposed, then these latter data would be consistent with preference data from the Honeywell et al. (1997) study. In that study, although high performers rated the two types of pay systems similarly, all of the top performers preferred individual incentives when they were asked to choose between them.

In summary, in six of the seven studies, equally divided small group incentives were found to be at least as effective as individual incentives for groups ranging in size from two to twelve members. In three of the four studies that assessed satisfaction and/or preference, participants were equally or more satisfied with the group incentives than with individual incentives. The results from Thurkow et al. (2000) differed with respect to both performance and satisfaction. As indicated above, there are several reasons why Thurkow et al.’s findings may have differed from the findings of the other studies, including (a) the lack of a clear group goal during the group incentive condition, (b) the size of the payout group, (c) the changing membership of the group, and (d) the possibility that the participants were high performers in comparison to the other workers.
Differentially Divided Group Incentives versus Individual Incentives

In addition to comparing equally divided group incentives with individual incentives, three of the seven studies cited in the preceding section compared differentially divided (competitive) group incentives with individual incentives (Allison et al., 1992; Farr, 1976; Thurkow et al., 2000). As indicated earlier, in Farr’s (1976) study, one group of participants received per piece incentives for correctly sorting computer cards that were punched with different patterns of holes. In the differentially divided group incentive condition, the top performer in a three-person group received 50% of the available incentives, the middle performer received 33%, and the low performer received 17%. Differentially divided incentives resulted in higher performance than individual incentives and, as reported earlier, higher performance than equally divided group incentives. While participants rated the three pay systems similarly in terms of satisfaction, they indicated that the differentially divided incentives were less fair than either individual or equally divided group incentives.

In the Allison et al. (1992) study, workers received incentives based on the percentage of target behaviors completed during the week. In the individual incentive condition, incentive pay was calculated by multiplying the percentage of target behaviors completed by $20.00. In the differentially divided group incentive condition, pay was calculated by dividing the total amount of incentives available ($200.00) equally among the top three performers. No significant differences in
performance were observed between differentially divided group incentives and individual incentives. Satisfaction ratings were comparable as well.

In the Thurkow et al. (2000) study, during the individual incentive condition, telephone interviewers received hourly pay and a per survey incentive for each survey completed above a specified goal. During the competitive incentive condition, only the top performer received a bonus. The bonus was provided weekly and consisted of an extra hour of pay. Performance was substantially higher when workers were paid individual incentives. Although only the performance of six workers was recorded, all 41 telephone interviewers employed by the firm were asked to indicate their preference for the pay systems. Over 80% of the interviewers selected the individual incentives while only 2% selected the competitive rewards.

The results of the preceding studies differ. Farr (1976) found performance to be higher when participants received differentially divided incentives than when they received individual incentives, Allison et al. (1992) found performance to be comparable, and Thurkow et al. (2000) found performance to be lower when participants received competitive incentives. Although satisfaction ratings were comparable for the group and individual monetary incentives in two of the studies (Allison et al., 1992; Farr, 1976), Farr’s participants indicated that the group incentives were less fair. Thurkow et al.’s participants overwhelmingly preferred individual incentives over the competitive group incentives.

The competitive incentive systems in the three studies were very different, and thus it is not surprising that the results differed. Further research is required to
determine the relative effectiveness of differentially divided group incentives and individual incentives and the parameters that may make one more effective than the other. However, as mentioned earlier, competitive rewards may have long-term deleterious effects as workers vie for the limited rewards. Because of this, a number of individuals have argued against their use in work settings (Daniels, 1994; Honeywell-Johnson & Dickinson, 1999).

The Effects of Small Group Incentives on High and Low Performance

Two studies have investigated the effects of group monetary incentives on high and low performance (Honeywell-Johnson et al., 2002; London & Oldham, 1977). This topic of research is important for several reasons. As indicated earlier, many compensation experts have argued that the performance of individuals is likely to be lower when they are paid group incentives than when they are paid individual incentives (Blinder, 1990; Dickinson & Gillette, 1993; Dierks & McNally, 1987; Lawler, 1990). However, as also discussed earlier, in six of seven studies, equally divided group incentives were just as effective as individual incentives with groups ranging in size from 2 to 10 members (Allison et al., 1992; Farr, 1976; Honeywell et al., 1997; Roberts & Leary, 1990; Smoot, 1997; Stoneman & Dickinson, 1989). Honeywell-Johnson and Dickinson (1999) stated that these results may have been due to the fact that individuals within the group performed similarly to one another. If participants within a group perform similarly, the amount of pay they receive under individual and group incentives does not vary much (Dickinson, 2000). If pay does
not vary, the monetary contingencies are essentially the same for the performer and thus one would not expect performance to vary. Rather, "decreases in group productivity are most likely to result when high performers earn less money when paid group incentives and lower their performance accordingly over time" (Dickinson, 2000, p. 5). Dickinson's statement was based on an analysis originally provided by Dierks and McNally (1989) who argued against group incentive systems on the grounds that high performers would decrease their performance when they saw their earnings repeatedly decreased by other workers. Honeywell et al. (1997) addressed below average performers as well, stating that "Poor performers, in contrast, may continue to perform below average because they benefit from the labor of the other group members, an effect commonly referred to as 'social loafing' or the 'free rider effect' (Organ & Bateman, 1989)" (p. 262).

The preceding analyses suggest that individual and group monetary incentive systems are likely to result in comparable performance levels when members within the group perform similarly to one another. If members perform differently, group incentives are not likely to alter the performance of low performers, but are likely to decrease the performance of the high performers and hence the productivity of the entire work group.

The effects of group incentives on high and low performance are important from a business perspective. As indicated earlier, surveys conducted over the past decade indicate that approximately 12% - 16% of organizations currently use small group incentives (Honeywell et al., 1997). In some manufacturing industries, 50% of
employees are covered by group plans (Peterson, 1992). In addition, surveys conducted in the mid-1990s indicate that the use of small group incentives is increasing (Gross, 1995; Ledford & Hawk, 2000). In 1996, based on the survey data as well as the increasing trend for organizations to adopt team work structures, Flannery et al. (1996) predicted that the use of group monetary incentives would increase significantly. Given the increasing use of group incentives, organizations would benefit from knowing whether equally divided group incentives result in lower levels of productivity than individual incentives. If, indeed, performance levels of high performers decrease while performance levels of low performers remain the same, organizations might want to consider using individual incentives, if and when possible. On the other hand, if performance levels of high performers decrease under group incentives but performance levels of low performers increase, perhaps due to social factors, group incentives might be more appealing. The decrement in performance by high performers would be offset by the increase in performance by low performers, and the group average would remain relatively unchanged. While companies could also consider using differentially divided group incentives, as indicated earlier, they may generate counterproductive competitive behaviors.

As presented earlier, seven studies compared the effects of equally divided and individual incentives. In all but one (Thurkow et al., 2000), individuals performed comparably when they were paid individual incentives and when they were paid group incentives. Four of the studies included the individual performance data that are necessary to determine whether members of the group performed similarly to one
another (Honeywell et al., 1997; Smoot, 1997; Stoneman & Dickinson, 1989; Thurkow et al., 2000). The other three reported only group data (Allison et al., 1992; Farr, 1976; Roberts & Leary, 1990). The four that provided individual data will be discussed next, to explore Dickinson’s (2000) contention that if performers within a group perform similarly, performance is likely to be the same under individual and group incentives.

Stoneman and Dickinson (1989) examined groups ranging in size from two to nine members. Participants performed comparably when paid group and individual incentives. Consistent with Dickinson’s (2000) analysis, there were no discernible high or low performers.

Smoot (1997) examined individual and group incentives with six three-member groups, and, similar to Stoneman and Dickinson (1989), found performance to be comparable when individuals received individual and group monetary incentives. The author of the current paper developed an arbitrary criterion to determine whether participants were high or low performers. Participants were classified as high performers if their performance was 20% higher than the performance of the middle performer during the individual incentive condition. Similarly, they were classified as low performers if their performance was 20% lower than the performance of the middle performer during the individual incentive condition. According to these criteria, there were no high performers in any of the six groups and no low performers in four of the six groups. There were low performers in each of the remaining two groups, however. In one, the low performer (Participant 9)
assembled 25% and 29% fewer parts than the middle and top performers, respectively, during the individual incentive phase. When the group was switched from individual to group monetary incentives, this participant assembled fewer parts. The low performer in the other group (Participant 14) assembled 25% and 45% fewer parts than the middle and top performers, respectively, during the individual incentive phase. This participant assembled a comparable number of parts during the individual and group monetary incentive conditions. Thus, in this study, the low performers assembled the same or fewer number of parts when they were paid group monetary incentives than when they were paid individual monetary incentives. Nonetheless, because most of the participants performed comparably to each other within the groups, the overall results of this study lend support to Dickinson’s (2000) contention that if group members perform similarly to each other, their performance is likely to be the same when they are paid individual and group incentives.

Honeywell et al. (1997) examined two 10-person groups. As with the prior two studies, individuals performed similarly when they were paid individual and group monetary incentives. There were high and low performers in that study, which, when combined with the results of the study, would appear to contradict Dickinson’s contention. However, pay differences between the group and individual incentive conditions were quite small, ranging in size from $.02 to $1.00, with a mean of $.29 per 20-minute session. This relatively small pay difference could account for the failure to find performance differences. Moreover, a more detailed analysis of Honeywell’s data supports the possibility that high performers decreased their
performance (Honeywell-Johnson et al., 2002). When Honeywell et al. (1997) statistically analyzed their data, they collapsed the data across the two groups of participants. When the data for the two groups were analyzed separately, however, performance was statistically significantly lower during the group incentive conditions for one of the groups. This group contained the highest performers with the highest pay differentials between the individual and group incentive conditions. These suggestive results prompted Honeywell-Johnson et al. (2002) to state that they merited further study.

Thurkow et al. (2000), in an appendix, reported individual and group data for all of their participants. In this study, individuals performed higher when they were paid individual incentives than when they received group monetary incentives. As noted by the authors, an analysis of the individual performance data revealed that their six participants performed better than the other group members in 67% of the sessions. Thus, the participants could be considered high performers and, as stated by Thurkow et al., “based on Dickinson and Honeywell-Johnson (1999), would be expected to perform lower during the group incentive sessions” (p. 19). They also added that “Further research into this phenomenon is necessary to determine more precisely how high and low producers perform across varying incentive contingencies” (p. 19).

Taken together, the available data from the preceding studies provide credibility to the suppositions that (a) equally divided and individual incentives will result in similar levels of performance if group members perform similarly to each
other (Honeywell-Johnson et al., 2002; Smoot, 1997; Stoneman & Dickinson, 1989),
and (b) group incentives may decrease performance if there are distinct high
performers in the group (Honeywell-Johnson et al., 2002; Thurkow et al., 2000). The
potential effects of group incentives on the performance of low performers is more
speculative, but Honeywell et al. (1997) have reasoned that group incentives would
maintain the low performance and results from Smoot (1997) seem to support this
reasoning.

As stated previously, only two experimental studies have examined the effects
of group monetary incentives on high and low performance (Honeywell-Johnson et
al., 2002; London & Oldham, 1977). London and Oldham (1977) investigated the
performance of 35 two-person groups. The two group members were introduced to
each other and then separated to work in different rooms. The experimental task
consisted of sorting cards punched with holes into separate piles based on the pattern
of the holes in the card. Participants were first exposed to an individual monetary
incentive system for one 5-minute session, during which they were paid $.01 for each
card they sorted. After participants were paid for this trial, one-half of the participants
was told that they sorted 25% more cards than their partner, while the other half was
told that they sorted 25% fewer cards than their partner. Participants were then
randomly assigned to one of the following five pay conditions for three 5-minute
sessions: (a) fixed rate pay, (b) the individual incentive condition or (c) one of three
group monetary incentive systems. Seven two-person groups were thus assigned to
each condition, with one member of the group believing he or she was a high
performer and the other believing that he or she was a low performer. In all three of
the group monetary incentive conditions, the available incentives were equally
divided between the two members. However, in one of the group conditions,
participants were told that the incentives would be based on the performance of the
high performer, in one, they were told that the incentives would be based on the
performance of the low performer, and in the third, they were told that the incentives
would be based on the average performance of the two. Before each of the three 5-
minute sessions, participants were asked to set a goal for their performance. The goal
was recorded on a progress sheet along with their past performance level and
remained in view of the participants during the sessions.

Three sets of results are of interest when analyzing how individual and group
incentives affect high and low performance: (a) a comparison of the performance of
high performers across pay conditions; (b) a comparison of the performance of low
performers across pay conditions; and (c) a comparison of the total productivity of the
two-member groups across pay conditions. Participants who were told they were high
performers performed significantly better when they were paid individual incentives
than when they were paid a flat rate or group incentives. They sorted 16% more cards
when they were paid individual incentives than when they were paid group incentives
based on the average performance of the two members (69.6 cards versus 58.2 cards)
and 27% more cards when they were paid individual incentives than when they were
paid group incentives based on either the performance of the high or low performer
(69.6 cards versus 51.1 cards for both group conditions). Participants who were told
they were low performers performed best when they were paid group incentives based on the performance of the high performer, sorting 74.9 cards per session. They performed equally well when they were paid individual incentives and group incentives based on the average performance of the two members (58.5 and 56.5 cards), and least well when paid group incentives based on the performance of the low performer (49.6 cards). Although the authors reported that they conducted individual post-hoc statistical comparisons between the groups, they did not indicate which specific comparisons they conducted nor did they report the results of most of the analyses. They did state that “A significant interaction emerged for the effects of incentive plan and level of the other participant’s performance. . . Performance was highest when the subject paid on the individual piece-rate basis was the higher performer and when the subject paid on the high performance piece-rate basis was the low performer” (p. 38). Nonetheless, without additional information regarding the tests they conducted, it is not possible to determine whether the comparisons presented previously were statistically significant.

The last comparison from London and Oldham (1977) that is relevant is a comparison of the total productivity of the two-member groups across pay conditions. Group productivity was greatest when participants were paid individual incentives and when they were paid group incentives based on the performance of the high performer. The former result is due to the high performance of the high performers; the latter result is due to the high performance of the low performers. The mean number of cards sorted by the two group members was 128.1, 126.0, 114.7, 111.3,
and 100.7 under (a) the individual incentive condition, (b) the group incentives based on the high performer, (c) the group incentives based on the average performer, (d) the flat rate pay, and (e) the group incentives based on the low performer, respectively. The authors reported that the post hoc analyses demonstrated that performance was significantly higher for the individual piece rate condition and the group incentives based on the high performer than for the other incentive systems taken together; that is, when the performance under the other two group incentive systems was averaged together. No other statistical comparisons were reported. It is likely that other comparisons were not statistically significant. However, lacking further information about the comparisons that were made, it is unclear whether the performance differences (a) between the individual incentives and the group incentives based on the average performance of the two members or (b) between the group incentives based on the high performer and the group incentives based on the average performance were statistically significant.

Consistent with the analyses by Dickinson (2000) and Honeywell et al. (1997), the preceding data suggest that (a) the performance of high performers will be better when they are paid individual incentives than when they are paid equally divided group incentives and (b) the performance of low performers will be comparable when they are paid individual incentives and equally divided incentives that are based on the average performance of the members.

In London and Oldham’s (1977) study, low performers sorted the most cards when group incentives were based on the performance of the high performer. While
the cause of this result is not clear, performance may have increased due to social factors; that is, in this condition the low performers believed they were receiving considerable benefit from the performance of the high performer and may have increased their performance out of "fairness." The inequality when incentives were based on the average performance of the two members was apparently not sufficient to affect their performance.

Although the results of London and Oldham are suggestive, they are not definitive due to (a) the lack of clarity regarding the statistical analyses and (b) the goal-setting confound. Moreover, the groups consisted of only two members. Different results may occur with larger groups.

Honeywell-Johnson et al. (2002) examined the effects of individual and group incentives on the performance of high performers, using a within-subject reversal design. Participants were four college students who performed a computerized work task, SYNWORK (Elsmore, 1994), on networked computers. The experimental design was an ABCB reversal design, with A = hourly pay with individual feedback, B = individual incentives with individual feedback, and C = group incentives with group feedback. Each session was two hours and each phase lasted between 5-10 sessions. Alternative tasks (email and computer games) were available on adjacent computers and participants could engage in those activities whenever they wanted. In addition, the experimenter prompted participants to take three 5-minute work breaks during the session.
During the hourly pay condition, participants earned $10.00 per session. During the individual and group incentive conditions, the amount of money they received was based on the number of points they earned each session. In the individual incentive condition, participants received $.10 for every 100 points earned. At the end of each session, the computer displayed the number of points earned. In the group incentive condition, participants were told that they were members of a ten-person group and that their incentives would be based on the average performance of the group members. Participants received $.10 for every 100 points in the group average. The groups were simulated; that is the point score of each participant was averaged with a predetermined score based on the performance of pilot participants, not with the scores of nine other current group members as the participants were told. The predetermined score was used to ensure that the participants would indeed be “high performers.” The predetermined score was based on a simulated point score of 11,400 per group member. This score was the score that was “1.5 standard deviations below the average performance of pilot subjects who were paid individual incentives when performing SYNWORK” (Honeywell-Johnson et al., 2002, p. 94). To determine the group average, (a) 11,400 was first multiplied by nine (to represent the total number of points earned by the other nine members of the group), (b) then the product, 102,600, was added to the participant’s session point score, and (c) the resulting sum was divided by 10. Thus, if a participant earned 15,000 points during a session, his or her incentives would have been based on the “group average” of 11,760 points \([\frac{102,600 + 15,000}{10}]\). All four participants earned more than 11,400
points in each session and thus were true high performers in comparison to the predetermined score. In addition, because the participants performed above the predetermined score, the “group’s” average scores were always lower than their individual scores and they earned less money than they did during the individual incentive phases. During the group incentive condition, the computer displayed the average group score at the end of each session. The individual’s point score was not displayed during this condition. In a post-experimental questionnaire, all four participants indicated that they believed that their performance was combined with the performance of nine other group members during the group incentive condition.

The performance of all four participants was significantly higher during the individual incentive conditions than during the hourly pay condition. Three of the four participants performed lower during the group incentive condition than during the individual monetary incentive condition, earning 16%, 14% and 12% fewer points. During the individual and group pay conditions, respectively, Participant 2 earned an average of 13,070 points versus 10,860 points, Participant 1 earned an average of 12,885 points versus 11,094 points, and Participant 4 earned an average of 12,939 points versus 11,447 points. The performance of the fourth participant in the study increased throughout the study, regardless of pay condition.

In a post-experimental questionnaire, Honeywell-Johnson et al. (2002) also assessed participant satisfaction and preference for the three pay systems. All four participants indicated that they preferred the individual incentives and found them to
be more satisfying than either hourly pay or group incentives. Three of the four reported that the group incentive system was the most stressful.

Honeywell-Johnson et al. (2002) concluded that the group incentives resulted in lower performance than the individual incentives, stating, “these data indicate that high performers are likely to decrease their performance when they are paid small group monetary incentives” (p. 100). The results also suggest that top performers prefer individual incentives and find group incentives to be more stressful than either hourly pay or individual incentives.

While the results of the studies conducted by London and Oldham (1997) and Honeywell-Johnson et al. (2002) are compelling, they are limited. As indicated earlier, the results reported by London and Oldham are problematic due to (a) the lack of clarity with respect to the statistical comparisons and (b) the confound due to the goal-setting intervention. In addition, they examined groups with only two members while in business and industry, group incentives are most commonly implemented with groups of ten members (Honeywell et al., 1997). Finally, participants were exposed to the pay conditions for only three 5-minute sessions. It is risky to make conclusions about the effects of group incentives on performance given the number and length of those sessions. And, although London and Oldham compared the effects of individual and group incentives on both high and low performance, Honeywell-Johnson et al. (2002) examined their effects only on high performance.

This study extended the work of London and Oldham (1977) and Honeywell-Johnson et al. (2002). Honeywell-Johnson et al. (2002) stated the need for extension
studies that “determine whether individual and small group monetary incentives have different effects on average and low performance” (p. 102). Also, the need for experiments consisting of multiple sessions per condition, rather than one to three, is generally accepted within the field of behavior analysis. For example, Johnston and Pennypacker (1993) stated that “observing the behavior of a single subject repeatedly under a constant set of conditions gives the experimenter the opportunity to obtain a complete and clear picture of the effects of that condition on behavior” (p. 198). The current study examined how group and individual incentives affect both high and low performance across multiple sessions using simulated groups of 10 members. Moreover, a single subject reversal design was used in order to assess the effects of individual and group incentives on the performance of individuals, not on the performance of groups of individuals.
METHOD

Participants

Participants were six college students who were recruited from junior and senior level psychology classes (see Appendix A for the recruitment script). Participants were screened according to three criteria. First, only participants that showed interest in computer games (the primary source of alternative activities in the proposed study) were included (see Appendix B for the screening questionnaire). Second, because the experimental task required participants to add two and three digit numbers, only participants who passed a quiz testing these computational skills were considered for the study. The problems on the quiz duplicated those in the experimental task and potential participants were required to score at least 95% correct (see Appendix C for the quiz). Finally, after the experimenter explained the pay systems that would be used in the study, participants were required to score 100% on a quiz that tested their understanding of them (see Appendix D for the quiz).

Participants included in the study were paid an hourly wage during one experimental phase and monetary incentives during three experimental phases as described in the Independent Variable section. Participants were also paid $7.50 for each of two mandatory 90-minute training sessions.

Only participants who had read and signed an informed consent form approved by Western Michigan University's Human Subjects Institutional Review
Board (HSIRB) were included in the study. The consent form is provided in Appendix E and the HSIRB research approval letter is provided in Appendix F.

Setting

Sessions were conducted in an on-campus computer laboratory located in 1505 Wood Hall. The laboratory contained 20 computers, with six or seven computers on each of three tables. The computers were approximately 1.5 to 2 feet apart. The computers were connected through a Local Area Network (LAN). Each participant had a work area consisting of a computer, keyboard, mouse, headphones, and an adjacent break-task computer, terminal, keyboard, and mouse.

Apparatus/Materials

Participants performed a computerized synthetic work task called SYNWIN (2000), which is an updated version of the task used by Honeywell-Johnson et al., (2002). SYNWIN has two features that are similar to many jobs in actual work settings: concurrent tasks and measurable outcomes for completion of those tasks (Honeywell-Johnson et al., 2002). In addition, the four sub-tasks were selected for this program because they require simultaneous attention to tasks that are similar to those required for many jobs (Elsmore, 1994). Each of the four sub-tasks, a memory task, an arithmetic task, a visual monitoring task, and an auditory monitoring task is presented in one of the four quadrants of the computer screen (see Appendix G). Participants earned points for every correct response and lost points for each incorrect
response. Points were not deducted for nonresponding because that would have penalized off-task activities. The points earned on the sub-tasks were added together and recorded as a cumulative point total.

**Memory Sub-Task**

In the memory task, a list of six letters was displayed on the screen for 5 s. Twenty seconds later, a sample letter appeared for 10 s. The participant’s task was to decide whether this letter belonged to the set of letters that was displayed earlier. Participants could click on a “retrieve list” box to review the set of letters, but each retrieval resulted in the loss of 10 points. The participant indicated whether the letter was part of the set by clicking on the word “Yes” or “No.” Ten points were awarded for a correct response and ten points were deducted for an incorrect one.

**Arithmetic Sub-Task**

An addition problem involving two numbers, each with a value of less than 1,000, was presented on the screen. An answer of 0000 was displayed below the addition problem. Two boxes, one containing a “+” and one containing a “-,” were located directly below each zero in the answer. Clicking the “+” box increased the value of the corresponding digit by one, whereas clicking the “-” box decreased the value by one. When participants completed a problem, they clicked on the “done” box and a new problem was presented. Five points were awarded for correct answers and five points were deducted for incorrect ones.
Visual Monitoring Sub-Task

In the visual monitoring task, a pointer in a simulated fuel gauge moved from a maximum value of 100 (full) to a minimum value of 0 (empty) at an inter-step interval of 200 msec. Clicking on the gauge reset the pointer to the 100 (full) value. The number of points awarded for a reset was proportional to the distance of the pointer from the 100 (full) value. A maximum of 10 points could be earned for resetting the pointer when it was located in the 10 percent of the scale closest to the 0 (empty) value, with fewer points awarded for resetting the pointer when it was closer to the 100 (full) value.

Auditory Monitoring Sub-Task

In the auditory monitoring task, a brief tone was presented every 5s. The sound was either a high frequency (2000 Hz) tone or a low frequency (1000 Hz) tone. High frequency tones were considered “signals” while low frequency tones were considered “nonsignals.” To earn points, participants clicked on a box labeled “High Sound Report” after the presentation of a high frequency tone. Participants must have responded before the presentation of the next tone or they did not earn points. Participants earned 10 points if they correctly identified a high tone, and lost 10 points if they falsely identified a low tone as a high tone.
Alternative Activities

For every session, participants had access to an adjacent computer. The computer at this station was turned on and provided alternative activities (internet access, e-mail, and computer games). Participants were able to engage in the alternative activities any time during the session. In addition, the experimenter prompted participants to take two breaks during the 90-minute session. One break was prompted after 30 minutes had elapsed and another after 60 minutes had elapsed. As stated earlier, participants did not lose points for not responding to the experimental task while taking breaks.

Dependent Variables

The primary dependent variables were the total number of points earned per session and the percent correct per session. In addition, two secondary dependent variables were measured: (1) points earned on each of the sub-tasks, and (2) percent correct for each of the sub-tasks. Two additional secondary dependent variables were to be measured: (3) time spent performing SYNWIN (as opposed to the alternative activities), and (4) time spent performing each sub-task, but problems associated with the SYNWIN program prevented collection of these data. Points earned and percent correct were automatically recorded by the SYNWIN program.

The experimenter tested the computer program before the first session each week to insure that it was accurately recording these data. Although the computer program stored the data for each participant for each session, to insure that data were
not lost due to a computer malfunction, the experimenter recorded the sub-task point scores, percent correct and the time spent performing the sub-tasks on a data sheet after each session. The experimenter also recorded the amount of money earned by the participant each session on the data sheet. The data sheet is provided in Appendix H.

In addition to the preceding dependent variables, at the end of the study, participants were asked to indicate which of the three pay systems they preferred, found less stressful, and found more satisfying. The questionnaire that was administered to participants is contained in Appendix I.

Independent Variable

Each participant was exposed to individual monetary incentives, simulated group (n = 10) monetary incentives and hourly pay. The participants worked alone under all pay systems, but during the group pay condition they were told that their pay was based on the average performance of a ten-person group. During the group monetary incentive condition, participants were exposed to either a “high performance” condition or a “low performance” condition. The assignments to the “high performance” and “low performance” conditions were based on the performance of participants after the first individual incentive condition session. The five participants who had the highest cumulative point scores were assigned to the “high performance” condition. The five participants who had the lowest cumulative point scores were assigned to the “low performance” condition. Participants were
assigned to the conditions based on their performance rather than randomly assigned to the two conditions because, at least within the context of the current study, those assigned to the high performance condition were relatively high performers and those assigned to the low performance condition were relatively low performers. In terms of sampling procedures, the population of high performers might react differently to the high and low performance experimental contingencies than the population of low performers. For example, due to historical contingencies of reinforcement, high performers may be more competitive and thus perform differently than low performers when they are told that their performance is lower than the performance of the other members of their group. Furthermore, failure to randomly assign participants to the conditions did not unduly jeopardize the interpretation of the results because the main comparisons that were made were the within subject comparisons. That is, the performance of the participants assigned to the high performance condition were used to determine how individual and group incentives affect the performance of high performers and the performance of the participants assigned to the low performance condition were used to determine how individual and group incentives affect the performance of low performers.

Hourly Pay Condition

During the hourly pay condition, participants were paid $7.50 for each 90-minute session, given that they earned a minimum of 3,800 points performing SYNWIN. This minimum decreased the likelihood that participants would not
perform the task at all. In work settings, employees must perform at minimum levels to avoid being fired. Thus, the purpose of this minimum standard requirement was to simulate that contingency. The 3,800 point minimum was based on previous research with SYNWORK, which is the predecessor to SYNWIN (Elsmore, 1994). The minimum criterion represented approximately 50% of the average total number of points earned by participants when they were paid hourly (Bucklin, Dickinson, & McGee, 2002; Honeywell-Johnson et al., 2002).

**Individual Incentive Condition**

During the individual incentive condition all participants were paid on a piece-rate pay system where they earned $.10 per 100 points earned. Participants would earn $7.50, an amount comparable to base pay, if they earned at least 7,500 points per session (See Appendix J for the pay scale). This equivalency is based on the average performance of participants who were paid monetary incentives in a study conducted by Bucklin et al. (2002). Bucklin et al. used SYNWORK as the experimental task and sessions were 90 minutes, as they were in this study. Participants who earned more than 7,500 points earned more money.

**Group Incentive Condition**

During the group incentive condition, the pay earned by each participant was based on the average performance of the simulated group. Similar to the individual incentive condition, participants received $.10 per 100 points in the group average.
Thus, the participants would earn $7.50 per session if the group average was 7,500 points.

The performance average of the simulated group was manipulated according to the performance level (high or low) to which the participant was assigned. The simulated group average was based on the average performance of the participant during the individual incentive phase, which preceded the group monetary incentive phase. The calculations used to determine high and low performance insured that the performance of the nine other group members was either 20% higher or 20% lower than the average performance of the participant during the final three sessions of the individual monetary incentive condition. This controlled for the fact that the extent to which an individual's performance differs from the group's performance may affect the individual's performance when exposed to the group incentives.

For a participant assigned to the high performance group, the group score was calculated as: $\{(0.80 \times \text{the participant's mean score under the final three sessions of individual incentives} \times 9) + \text{current session score}\}/10$. Therefore, if a participant's average score under the final three sessions of the individual incentive condition was 7,500 and his or her current session score was also 7,500, the simulated group average would be $\{(0.80 \times 7,500 \times 9) + 7,500\}/10$ or 6,150 points. The participant would thus receive $6.20 for that session based on the average performance of the group. Conversely, for a participant assigned to the low performance group, the group score would be calculated as $\{(1.20 \times \text{the participant's mean score under the final three sessions of individual incentives} \times 9) + \text{current session score}\}/10$. Therefore, if
that participant's average score under the final three sessions of the individual incentive condition was 7,500 and his or her current session score was also 7,500, the simulated group average would be $\frac{(1.20 \times 7,500 \times 9) + 7,500}{10}$ or 8,850 points. The participant would receive $8.90 for that session based on the average performance of the group.

Feedback and Pay

Participants were also given feedback about their performance and the amount of money earned during each session. During the hourly pay and individual incentive conditions, participants were given a "receipt" that indicated their total point score and the amount of money they earned. During the group incentive condition, the receipt indicated the average point score of the simulated group and the amount of money they earned. The experimenter gave the receipts to the participants immediately before they began their next session. Receipts were given to participants before they began their next session rather than immediately after each session, because if participants received feedback immediately after the sessions during the simulated group incentive condition, it would decrease the likelihood that they would believe that their score was being combined with the scores of nine other individuals. In order to control for potential confounds due to the timing of the feedback, the same feedback procedure was used in all pay conditions. The receipts that were given to the participants are included in Appendices K and L. Participants were paid before their first session of the week or immediately before the first session of a new phase.
Integrity of the Independent Variable

To insure that the experimenter was correctly implementing the pay systems, the descriptions of the pay systems and the feedback provided during each pay condition were scripted. The experimenter read the scripted description of the pay system in effect to participants before each session began. Also, the experimenter read from a feedback script when providing participants with their scores for the preceding session. These scripts are provided in Appendix M.

The computer program automatically recorded participants' data. To insure the program was accurately recording the data, the experimenter calibrated the computer program before the first session each week. Accurately recorded data are crucial, for without them, participants would not receive the correct pay. To insure correct payment, during the individual incentive condition, the experimenter compared the participants' composite score, recorded by the computer program, to a pay chart indicating the amount of pay the participants should receive based on their performance. During the group incentive condition, the experimenter computed the amount of pay the participants should receive by entering the participants' composite score, recorded by the computer program, into a mathematical formula, described in the Group Incentive Condition section that resulted in the simulated group score. The experimenter compared this score to the pay chart to determine the amount of pay the participants should receive. Finally, a research assistant reviewed the experimenter's calculations to make sure the participants were receiving the correct pay.
Experimental Design

Each participant was exposed to the individual incentive condition, one of the group incentive conditions, either high performance or low performance, and hourly pay in an ABAC sequence, where A = individual incentives, B = group incentives, and C = hourly pay. Three participants were exposed to the high performance group incentive condition, and three to the low performance group incentive condition. The sequence of exposure to conditions was not counterbalanced because the simulated group performance mean during the B condition was individualized; that is, for each participant the simulated group performance mean was either 20% higher or lower than the participant’s mean performance during the individual incentive condition.

The relative effects of individual and group monetary incentives can only be validly determined if incentives effectively control performance. The control by incentives was ascertained by comparing performance during the hourly pay condition with performance during the individual and group monetary incentive conditions. The performance of each individual under the three pay conditions was graphed and visually compared.

Experimental Procedure

Introductory Session

Potential participants were screened using the criteria stated in the Participants Section. Candidates who met the inclusion criteria were asked to participate in the
study and scheduled for training sessions as well as the first week of experimental sessions. They were asked to schedule at least three sessions per week. Participants were paid $5.00 for attending the introductory session, and were paid immediately after the session.

Training Sessions

Before beginning the experimental sessions, all participants were trained on the use of the SYNWIN program. This training consisted of two 90-minute sessions. The first session trained participants in the arithmetic sub-task, independently of the other three sub-tasks. This training session allowed participants to practice their basic arithmetic skills. They were also introduced to the alternative tasks, the computer games, email and access to the internet, that were available on the computer next to them. During the second training session, participants performed all four sub-tasks simultaneously. This session allowed participants to practice the work task as it appeared in the experimental sessions. The training sessions were expected to result in performers becoming proficient in using the SYNWIN task. The length of training was based on Elsmore’s (1994) statement that “In most studies [using the SYNWORK task], six 15-min sessions are sufficient to achieve near-maximal performance” (p. 423).

During both training sessions, the experimenter remained in the room to answer any questions. Participants were paid $7.50 per session, and received the
payment at the end of the second session. If they decided to withdraw at the end of the first training session, they were paid immediately after that session.

Experimental Sessions

Before beginning the study, all participants were informed of the different pay systems to be used during the sessions. If it was the first session of the week or the first session of a condition, the participants were paid. Before the first session of each pay phase participants were told which pay system was in effect and how they would be paid (i.e., during individual incentive pay they were told that they would be paid $.10 for every 100 points they earned). Before each session within the pay phase, the participants were reminded of the pay condition that was in effect for that session. The experimenter also reminded them that they were free to take work breaks whenever they desired, and that computer games, email and access to the Internet were available on the computer next to them. The instructional scripts are provided in Appendix M.

The experimenter was not present in the computer laboratory during sessions. The reason for this was to control for reactivity to the experimenter. That is, participants may be less likely to engage in off task activities if the experimenter were present (Matthews & Dickinson, 2000). The experimenter returned to the laboratory after every half-hour to provide a prompt for taking a break. The experimenter announced "It's been about half an hour if you would like to take a break." The computer program automatically ended after 90 minutes (the total session time). At
this time, the experimenter again entered the room, thanked the participants for their
time, and reminded them of their next session date/time.

Participants signed up for sessions for the next week at the end of the last session for the current week. Participants worked under each condition for at least five sessions. The next condition began when participants’ performance levels were stable [3 consecutive sessions with point score totals that differed from each other by no more than 750 points] or participants had completed 10 sessions. The stability criterion was the criterion that Honeywell-Johnson et al. (2002) used, adjusted for the shorter sessions that were used in the current study. It was based on the performance of pilot participants when they were paid hourly, and represents .5 standard deviation from the mean performance of those participants (Honeywell-Johnson et al., 2002).

Debriefing Session

Upon completion of the last phase, each participant was asked to schedule a debriefing session. When the debriefing session began, the participants were asked to complete the Satisfaction and Stress Level Questionnaire (Appendix I). After participants completed the questionnaire, the experimenter explained the purpose of the study (see Appendices N and O for debriefing scripts) and answered participants’ questions.
RESULTS

Task Performance

Total Points Earned

Table 1 displays the average number of total points earned per phase by each participant, Figure 1 displays the number of total points earned per session by low performers, and Figure 2 displays the number of total points earned per session by high performers. One of the high performers, Participant 1102, withdrew from the study after completing three sessions in the second individual incentive phase; hence no data are available for the remainder of that phase or for the hourly pay phase. Also, as can be seen in Figure 2, Participant 1104 had an abnormally low point score (2145) during the fourth session of the first individual incentive phase. Table 1 displays the actual average number of total points earned by this participant in this phase as well as an adjusted average based only on the points earned in the other nine sessions.

The performance of the low performers will be discussed first, followed by the performance of the high performers.

Low Performers

The performance patterns differed considerably across the three participants. There was a general downward trend in performance across phases for Participants 1101 and 1103, and, for Participant 1103, within the second individual incentive phase. The performance of Participant 1103 was highly variable within all phases.
Table 1

Average Number of Points Earned by Each Participant in Each Condition

<table>
<thead>
<tr>
<th>Performance Group</th>
<th>Participant Number</th>
<th>Individual Incentives</th>
<th>Group Incentives</th>
<th>Individual Incentives</th>
<th>Hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1101</td>
<td>10384</td>
<td>8156</td>
<td>5790</td>
<td>3997</td>
</tr>
<tr>
<td>Low</td>
<td>1103</td>
<td>10087</td>
<td>7120</td>
<td>5719</td>
<td>3775</td>
</tr>
<tr>
<td>Low</td>
<td>1106</td>
<td>8668</td>
<td>8388</td>
<td>8828</td>
<td>7895</td>
</tr>
<tr>
<td>High</td>
<td>1102</td>
<td>12473</td>
<td>8461</td>
<td>4788</td>
<td>------</td>
</tr>
<tr>
<td>High</td>
<td>1104</td>
<td>10041</td>
<td>10579</td>
<td>10381</td>
<td>5484</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10919*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1105</td>
<td>12166</td>
<td>11069</td>
<td>12816</td>
<td>4464</td>
</tr>
</tbody>
</table>

* Adjusted performance

and the performance of Participant 1101 was highly variable in the second individual incentive phase. Neither of their performances reversed during the second individual incentive phase; rather performance decreased in comparison to the group monetary incentive system. While their average performances were lower in the hourly pay phase than in all of the preceding monetary incentive phases, these data are inconclusive due to the general decreasing trends in performance across the study.
The performance of Participant 1106 was considerably more stable in all phases than was the performance of the other two low performers, and met the stability criterion prior to all phase changes. The average performance of Participant 1106 decreased, albeit slightly, from the first individual incentive phase to the group incentive phase (8,668 vs. 8,388 points) and then reversed, again slightly, during the second individual incentive phase (8,388 vs. 8,828 points). It is not clear whether these average differences are meaningful, however, because of the overlap of the point scores across the three phases (see Figure 1). Nonetheless, the performance of this participant suggests that the performance of low performers may not be very different under individual and group monetary incentive systems. Because the performance patterns of the other two low performers differed, however, generality cannot be established.

The average performance of Participant 1106 was 7,895 points during the hourly pay phase, which was lower than her performance in the individual and group monetary incentive phases. These data indicate that the monetary incentives controlled her performance, making it possible to validly compare the relative effects of the individual and group monetary incentives.

High Performers

Once again, the performance patterns differed across the three participants. The performance of Participant 1102 was high and stable during the first individual incentive phase, then declined sharply during the group monetary incentive phase.
Figure 1. Cumulative Number of Points Earned per Session by Low Performers.
Performance was highly unstable during the first three sessions of the second individual monetary incentive phase, although it appeared to rebound in comparison to the preceding group incentive phase. However, the participant withdrew from the study and no further data were available.

The average performance of Participant 1104 was similar across the three monetary incentive phases, however, the averages do not adequately summarize the session-to-session point scores. The performance of Participant 1104 was high and relatively stable during the first individual incentive phase (with the exception of Session 4). When the group incentive system was implemented, performance became highly variable, ranging from 7,871 to 12,838 points. Performance was low during the first three sessions of the second individual incentive phase, then increased sharply and remained high during the last four sessions. Performance dropped considerably in the hourly pay phase.

The performance of Participant 1105 was relatively stable within each phase except the hourly pay phase, and met the stability criterion prior to all phase changes. Performance decreased when the group incentives were introduced, and reversed when individual incentives were reintroduced. Performance was low and highly variable during the hourly pay phase.

The performance patterns of Participants 1104 and 1105 suggest that the group monetary incentives affected the performance of the high performers differently than did the individual monetary incentives. Only Participant 1105, however, displayed the predicted performance pattern; that is, decidedly lower during
Figure 2. Cumulative Number of Points Earned per Session by High Performers.
the group incentive phase than during either of the individual incentive phases.

Both participants had low point scores during the hourly pay phase. These data indicate that the monetary incentives controlled their performance, making it possible to validly compare the relative effects of the individual and group monetary incentives.

Percent Correct per Session

Table 2 displays the average percent correct per phase for each participant, Figure 3 displays the percent correct per session for low performers, and Figure 4 displays the percent correct per session for high performers. As previously noted, Participant 1104 performed abnormally poorly during the fourth session of the first individual incentive phase. Thus, similar to Table 1 which displayed the average point scores of the participants, Table 2 displays the actual average percent accuracy for this participant in this phase as well as an adjusted average based only on the percent accuracy in the other nine sessions.

As before, the performance of the low performers will be discussed first, followed by the performance of the high performers.

Low Performers

The accuracy of the three low performers (Participants 1101, 1103, and 1106) decreased across all phases. Cumulative average decreases from the first phase to the
Table 2
Average Percent Correct Earned by Each Participant in Each Condition

<table>
<thead>
<tr>
<th>Performance Group</th>
<th>Participant Number</th>
<th>Individual Incentives</th>
<th>Group Incentives</th>
<th>Individual Incentives</th>
<th>Hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1101</td>
<td>89.30</td>
<td>82.40</td>
<td>75.69</td>
<td>73.33</td>
</tr>
<tr>
<td>Low</td>
<td>1103</td>
<td>92.65</td>
<td>85.83</td>
<td>82.49</td>
<td>80.18</td>
</tr>
<tr>
<td>Low</td>
<td>1106</td>
<td>90.78</td>
<td>86.77</td>
<td>86.01</td>
<td>83.33</td>
</tr>
<tr>
<td>High</td>
<td>1102</td>
<td>94.22</td>
<td>83.35</td>
<td>70.38</td>
<td>------</td>
</tr>
<tr>
<td>High</td>
<td>1104</td>
<td>93.28</td>
<td>94.57</td>
<td>93.56</td>
<td>87.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95.16*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1105</td>
<td>96.79</td>
<td>92.86</td>
<td>95.31</td>
<td>92.58</td>
</tr>
</tbody>
</table>

* Adjusted percent accuracy

last phase were 15.97% (Participant 1101), 12.47% (Participant 1103) and 7.45% (Participant 1106).

The performance pattern of percent correct is similar to the performance pattern of the number of points earned across all phases for Participants 1101 and 1103, indicating that decreased accuracy was at least partially responsible for their decreased point scores. Interestingly, Participant 1106’s accuracy was lower during the second individual incentive phase than during the preceding two phases, yet her
Figure 3. Percent Correct per Session for Low Performers.
total point score was higher than in either of these two phases. Thus, accuracy cannot entirely account for her point scores. Nonetheless, both her accuracy and point scores fell during the hourly pay phase.

High Performers

The percent correct decreased sharply for Participant 1102 during the sixth session of group monetary incentive phase, and although it appeared to rebound during the second individual incentive phase, the participant withdrew from the study after the third session. The performance pattern of percent correct duplicates the performance pattern of the number of points earned across all phases of the study for this participant, indicating that the decreased point scores were due to decreased accuracy.

The accuracy of Participant 1104 was relatively stable across the three incentive systems and then decreased by an average of 10% during the hourly pay phase. Once again, the performance pattern of percent correct duplicates the performance pattern of the number of points earned across all phases of the study, indicating that the decreased point scores were strongly influenced by decreases in accuracy.

The accuracy of Participant 1105 decreased when the group monetary incentives were introduced, and reversed when the individual incentives were reintroduced. Accuracy dropped markedly during the hourly pay phase and became
Figure 4. Percent Correct per Session for High Performers.
highly variable. The performance pattern of percent correct again duplicates the performance pattern for the point scores.

Although the performance patterns for the percent correct differed across the three high performers, the patterns duplicated the patterns of point scores across the study for all three. Therefore, as with the low performers, point scores were strongly influenced by accuracy. That is, while participants may have been making the same number of responses, their point scores may have decreased due to increased errors.

**Sub-task Points Earned**

**Low Performers**

Figure 5 displays the number of sub-task points earned per session by low performers. Participant 1101 earned the most points on the memory sub-task. Moreover, the performance pattern for points earned on this sub-task duplicates the performance pattern for the number of total points earned for all phases of the study (see Figure 1). The performance pattern for the arithmetic task varies only slightly from the patterns for the total points earned and the points earned on the memory sub-task. The performance patterns for the visual monitoring task and the auditory monitoring task were similar, but not identical, to the pattern for the number of total points earned. Thus, for this participant, while the memory and arithmetic tasks contributed most to his total point score, the performance patterns of all four tasks were similar.
Participant 1103 earned the most points on the memory sub-task during the individual incentive phase and during the first five sessions of the group incentive phase. Thereafter, she earned an equivalent number of points on the memory and arithmetic sub-tasks. She earned the fewest points on the auditory monitoring task, and, in fact, lost points on this task during the last three phases. As with Participant 1101, the performance patterns for all of the sub-tasks were similar, and duplicated the performance pattern for the number of total points earned for all phases of the study (see Figure 1).

As with Participants 1101 and 1103, Participant 1106 earned the most points on the memory sub-task, and the performance pattern for this sub-task duplicated the performance pattern for the number of total points earned (see Figure 1). Her slightly lower average total point score during the group monetary incentive phase (see Table 1) appears to be due primarily to slightly lower performance on the visual monitoring sub-task. Interestingly, performance on the arithmetic sub-task increased across phases for Participant 1106.

Two of the three participants (Participants 1101 and 1106) earned the most points on the memory sub-task. The third participant also earned the most points on the memory sub-task during the first 15 sessions, thereafter earning an equivalent number of points on the memory and arithmetic sub-tasks. With only one exception (the arithmetic sub-task for Participant 1106), the performance patterns for all four sub-tasks were similar for all phases for all of the participants.
Figure 5. Number of Sub-Task Points Earned per Session by Low Performers.
High Performers

Figure 6 displays the number of points earned on each of the sub-tasks per session by the three high performers. Similar to the low performers, Participant 1102 earned the most points on the memory sub-task. The performance pattern for points earned on this sub-task duplicates the performance pattern for the number of total points earned for all phases of the study (see Figure 1). The arithmetic sub-task point scores were more variable, but their performance pattern also duplicated the performance pattern for the number of total points earned during the first individual incentive phase and the group incentive phase. Interestingly, performance on this sub-task was considerably higher during the first three sessions of the second individual incentive phase and differed from the performance patterns for the number of total points earned and the points earned on the other three sub-tasks. Points earned on the visual monitoring and auditory monitoring tasks were quite stable during the first 13 sessions, then decreased sharply at the end of the group incentive phase. The performance patterns for these sub-tasks duplicated the performance patterns for the number of total points earned and the points earned on the memory sub-task for the last five sessions of the group incentive phase and the second individual incentive phase. This participant lost a considerable number of points on the auditory monitoring task at the end of the group monetary incentive phase and during the second individual incentive phase. As indicated earlier, this participant withdrew from the study after the third session of the second individual incentive phase.
Figure 6. Number of Sub-Task Points Earned per Session by High Performers.
Participant 1104 also earned the most points on the memory sub-task throughout the study, with the performance pattern matching the performance pattern for the number of total points earned. Performance on the arithmetic sub-task increased during the group monetary incentive phase, but also became more variable. With this exception, the performance patterns for all four sub-tasks were quite similar across all phases of the study. Decreased performance on the auditory monitoring sub-task during the hourly pay phase resulted in a loss of points.

Once again, Participant 1105 earned the most points on the memory sub-task, although point scores for this task and the arithmetic task were fairly equivalent during the hourly pay phase. Although the performance pattern for the memory sub-task point scores was similar to the performance pattern for the number of total points earned for all phases (see Figure 1), the subtle changes in the performance pattern for the number of total points resulted from the points earned on the arithmetic task. These subtle changes are most clearly seen during the second individual incentive phase. Performance on the visual monitoring and auditory monitoring sub-tasks remained relatively stable across the three incentive phases, although performance was slightly lower during the group incentive phase, then decreased sharply during the hourly pay phase. As with Participant 1104, decreased performance on the auditory monitoring sub-task during the hourly pay condition resulted in a loss of points.

Similar to the three low performers, all three high performers, for the most part, earned the most points on the memory sub-task. Two of the three participants
(Participants 1104 and 1105) increased their performance on the arithmetic sub-task during the course of the study until the hourly pay phase, whereupon performance dropped considerably. The performance patterns for the four sub-tasks were similar across all phases for Participants 1102 and 1104. The performance patterns differed for Participant 1105. Changes in the number of total points earned during the three incentive phases were primarily due to changes in the performance of the memory and arithmetic sub-tasks. The performance patterns for all four sub-tasks were the same during the hourly pay phase.

Sub-Task Percent Correct per Session

**Low Performers**

Figure 7 displays the percent correct for each sub-task per session for low performers. Participant 1101’s percent correct was high and stable for the memory and arithmetic sub-tasks across the three incentive phases, and then decreased during the hourly pay phase. The percent correct for the visual monitoring sub-task decreased during the first individual incentive condition, falling from 90% in the first session to 57% in the last session. It decreased further in the first three sessions of the group incentive phase, recovered in the fourth session, but decreased again across the four remaining sessions in that phase. It remained relatively low and variable during the second individual incentive phase, ranging between 36% and 60%, and was similar during the hourly pay phase. Accuracy on the auditory monitoring sub-task began to deteriorate in the fourth session of the group incentive phase. It decreased.
Figure 7. Sub-Task Percent Accuracy per Session for Low Performers.
further and became highly variable during the second individual incentive phase, and remained fairly low during the hourly pay phase. The performance patterns for the percent correct for the visual monitoring and auditory monitoring sub-tasks are similar to the performance pattern for the number of total points earned during the group incentive phase and the second individual incentive phase (see Figure 1). Thus, decreased accuracy on these two sub-tasks lowered Participant 1101’s point scores during these two phases. During the hourly pay phase, decreased accuracy on all four sub-tasks resulted in even lower total point scores.

With only a few exceptions, Participant 1103’s percent correct for the memory and visual monitoring sub-tasks was high and stable across all phases of the study. The percent correct for the arithmetic sub-task was somewhat unstable during the first individual incentive phase, then increased and remained stable for the remainder of the study. The percent correct for the auditory sub-task was more variable than it was for the other sub-tasks during the first individual incentive phase, ranging from 66% to 99%. It became highly unstable during the group incentive phase, and decreased both within and across the group incentive phase and the second individual incentive phase. The performance pattern for the percent correct for this sub-task is highly similar to the performance pattern for the number of total points earned during the first individual incentive phase and matches that performance pattern during the remaining three phases (see Figure 1). Thus, decreased accuracy on the auditory monitoring task accounts for the decreases in the number of total points earned by this participant across the study.
Participant 1106’s percent correct for the memory and arithmetic sub-tasks was high and stable across all phases of the study. The percent correct for the visual monitoring sub-task was less stable within each phase and decreased across phases, although it was slightly higher during the hourly pay condition than during the preceding individual incentive phase. The percent correct for the auditory monitoring sub-task was also less stable within each phase and decreased across all phases of the study, including the hourly pay phase. Once again, the performance pattern for the percent correct for the auditory monitoring sub-task reflects the performance pattern for the number of total points earned across all phases of the study (see Figure 1).

For all three low performers, the percent correct for the memory and arithmetic sub-tasks was high and relatively stable across the study. For Participant 1103, the percent correct for the visual monitoring sub-task also was high and stable across the study, but generally decreased across the study for the other two low performers. The percent correct for the auditory monitoring sub-task was generally unstable within the phases and decreased over time for all three participants. For all three, the performance pattern for the percent correct for the auditory task virtually duplicates the performance pattern for the total number of points earned indicating that changes in accuracy on the auditory monitoring sub-task were responsible for most of the changes in the number of total points earned. Decreased accuracy on the visual monitoring sub-task appears to account for the rest of the changes in the number of total points earned by Participants 1101 and 1106.
High Performers

Figure 8 displays the percent correct for each sub-task per session for high performers. Participant 1102’s percent correct for all four sub-tasks was relatively high and stable during the first individual incentive phase. Accuracy on the visual monitoring and auditory sub-tasks decreased sharply after the fifth session during the group incentive phase. Although the percent correct appeared to recover during the second individual incentive phase, it was low and highly unstable, ranging from 45% to 85% for the visual monitoring sub-task and from 1% to 71% for the auditory monitoring task. Beginning with the group incentive phase, the performance pattern for the percent correct for the auditory monitoring sub-task duplicates the performance pattern for the number of total points earned (see Figure 2). The percent correct for the visual monitoring sub-task also contributed to the number of total points earned, as can be seen by comparing the performance patterns for the percent correct and the number of total points earned.

Participant 1104’s percent correct for the memory and arithmetic sub-tasks was high and stable across all phases of the study. The percent correct for the visual monitoring sub-task was somewhat more variable, but also remained high throughout the study. Accuracy on the auditory monitoring sub-task was more variable within and across phases. It decreased considerably during the hourly pay phase. Once again, the performance pattern for the percent correct for this sub-task is highly similar to the performance pattern for the number of total points earned across all phases of the study, deviating from it only slightly (see Figure 2).
Figure 8. Sub-Task Percent Accuracy per Session for High Performers.
Participant 1105's percent accuracy for the memory sub-task was high and stable across the three incentive phases, and decreased slightly during the hourly pay phase. Accuracy on the remaining three sub-tasks decreased slightly during the group incentive phase and appears to have been responsible for the slightly lower total number of points earned during this phase (12,166 points in the first individual incentive phase vs. 11,069 points in the group incentive phase), although the similarity between the performance patterns for the percent correct and the number of total points earned is not as distinct as it is for the other participants. The percent correct for the visual monitoring sub-task decreased during the second individual incentive phase, however, the number of total points earned increased. During the hourly pay phase, accuracy dropped dramatically for the auditory monitoring sub-task. It also decreased, although to a lesser extent for the visual monitoring sub-task. The performance patterns for the percent correct for these two sub-tasks were highly similar, and, with the exception of the first data point in the hourly pay phase, duplicated the performance pattern for the number of total points earned. Thus, decreased accuracy on these two tasks accounted for the decrease in the number of total points earned during this phase.

Similar to the low performers, the percent correct on the auditory and visual monitoring sub-tasks was more variable than the percent correct for the memory and arithmetic sub-tasks for the high performers. Additionally, accuracy on one or both of these sub-tasks decreased across the study. Finally, changes in the accuracy for one or
both of these sub-tasks appear to account for changes in the number of the total points earned for the three participants.

**Time on Task**

Due to a problem with the SYNWIN program, time on task data were not available.

**Amount of Money Earned**

Table 3 displays the average amount of money earned per session by each participant in each phase. All participants earned the least amount of money during the hourly pay condition. Only one participant (Participant 1106) met the minimum point requirement to receive pay for every session during the hourly pay condition. All three low performers earned more during the group incentive condition than during the individual incentive conditions as expected given the nature of the pay systems. Two of the three high performers earned more during each of the individual incentive conditions than during the group incentive condition, once again, as expected. The third high performer, Participant 1102, however, earned more during the group incentive condition than during the second individual incentive condition. This is unusual given the nature of the pay contingencies and reflects the fact that the participant’s average point score during the second individual incentive phase was very low (4,788 points). It should again be noted, however, that Participant 1102 dropped out of the study after the third session of the second individual incentive
condition and, therefore, any conclusions made based on these data would be inappropriate.

Table 3

Average Amount of Money Earned per Session by Each Participant in Each Condition

<table>
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<tr>
<th>Performance Group</th>
<th>Participant Number</th>
<th>Individual Incentives</th>
<th>Group Incentives</th>
<th>Individual Incentives</th>
<th>Hourly</th>
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</thead>
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<td>$10.38</td>
<td>$11.99</td>
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<td>$3.75</td>
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<td>1103</td>
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<td>$11.87</td>
<td>$5.72</td>
<td>$3.75</td>
</tr>
<tr>
<td>Low</td>
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<td>$10.32</td>
<td>$8.82</td>
<td>$7.50</td>
</tr>
<tr>
<td>High</td>
<td>1102</td>
<td>$12.46</td>
<td>$10.11</td>
<td>$7.57</td>
<td>-------</td>
</tr>
<tr>
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<td>$10.03</td>
<td>$8.88</td>
<td>$10.39</td>
<td>$6.00</td>
</tr>
<tr>
<td>High</td>
<td>1105</td>
<td>$12.18</td>
<td>$10.18</td>
<td>$12.80</td>
<td>$3.75</td>
</tr>
</tbody>
</table>

Preference, Stress, and Satisfaction Questionnaire

All three low performers preferred the group incentive condition to the hourly pay and individual incentive conditions. Two of the three indicated that they preferred this pay condition because it was the condition in which they made the most money. The third participant (Participant 1101) preferred this system because knowing that
others in the group were earning a high number of points (based on the group average) provided motivation to do well. Two of the three low performers (Participants 1101 and 1103) ranked the individual incentive condition as the least preferred of the three pay conditions. Conversely, both high performers that finished the study and completed the post-experimental questionnaire stated that they preferred the individual incentive condition to the hourly pay and group incentive conditions. Both high performers also ranked the hourly pay condition as the least preferred of the three pay conditions. The reason given by both high performers for this preference was that they earned the most money during the individual incentive condition and the least money during the hourly pay condition.

All three low performers identified the individual incentive condition as the most stressful, and the hourly pay condition as the least stressful. Two of the three indicated that they became bored and less motivated during the individual incentive condition. The third low performer stated, “With group and individual incentives I was trying really hard to do well, so it was really stressful. With hourly pay, I knew I would get the same amount of money no matter what my score.” One high performer (Participant 1104) identified the group incentive condition as the most stressful and the hourly pay condition as the least stressful, while the other high performer (Participant 1105) stated that the individual incentive condition was the most stressful and the hourly pay condition least stressful. Both high performers indicated that they had to work harder during the incentive conditions, which made them more stressful than the hourly pay condition.
Two of the three low performers indicated that the group incentive condition was the most satisfying of the three pay conditions, while Participant 1103 identified the individual incentive condition as the most satisfying. Participant 1101 ranked the individual incentive condition as the least satisfying, while the other two low performers ranked the hourly pay condition as the least satisfying. Two of the three low performers indicated that their satisfaction with each of the conditions was based on the fact that they earned the least amount of money during the hourly pay condition, while the third low performer (Participant 1101) indicated that the individual incentive condition was the least satisfying because it was hard to stay motivated when working alone. Both high performers ranked the individual incentive condition as the most satisfying of the three pay conditions. Participant 1104 indicated that the group incentive condition was the least satisfying and Participant 1105 stated that the hourly pay condition was the least satisfying. Both high performers indicated that the individual incentive condition was the most satisfying because they received money based completely on how hard they worked.

To summarize, all three low performers preferred the group incentive condition and found the individual incentive condition to be the most stressful, and two of the three found the group incentive condition to be the most satisfying. The two high performers, in contrast, preferred the individual incentive condition. One found the group incentive condition to be the most stressful while the other found the individual incentive condition to be the most stressful. Both were most satisfied with the individual incentive condition.
DISCUSSION

Previous studies have suggested that performance is comparable under equally-divided group monetary incentives and individual monetary incentives, and that both incentive systems are superior to hourly pay (Farr, 1976; Honeywell et al., 1997; Honeywell-Johnson et al., 2002; Miroff et al., 1993; Roberts & Leary, 1990; Smoot, 1997; Stoneman & Dickinson, 1989). However, recent analyses and studies are beginning to support the suggestion that when an individual performs the same under individual and group monetary incentives it may be due to the fact that the individuals within the group perform similarly to each other. Results of Honeywell-Johnson et al. (2002), London and Oldham (1977), and Thurkow et al. (2000) all support the contention that high performers may perform lower when paid group monetary incentives than when paid individual monetary incentives. Results from London and Oldham (1977) also suggest that low performers will perform the same when paid equally-divided monetary incentives or individual monetary incentives.

The present study examined the performance levels of high and low performers under equally-divided group monetary incentives, individual monetary incentives, and hourly pay to determine: (a) whether the performance levels of high and low performers would be higher under individual and group incentive pay systems than under an hourly pay system, (b) whether the performance of high performers would be lower under group incentives than under individual incentives,
and (c) whether the performance of low performers would be higher, lower, or the same under group incentives than under individual incentives.

In addition to extending the findings of previous research, the answers to the current research questions are important from a business perspective. Surveys conducted over the past decade indicate that approximately 12% - 16% of organizations currently use small group incentives (Honeywell et al., 1997). The extent to which performance differs under such incentive conditions may help to guide businesses in their decision to use group versus individual monetary incentive systems in an attempt to increase productivity while fairly compensating their employees.

Low Performers

The performance patterns for the total point scores differed across the three low performers. The point scores of two of the three low performers (Participants 1101 and 1103) generally decreased across the study. Although the point scores were considerably lower during the hourly pay phase than during the preceding incentive phases, these data, while suggestive, cannot be considered conclusive due to the decreasing performance trends. Due to the similarities in the performance patterns for the total points earned and the percent correct for the auditory and visual monitoring sub-tasks, Participant 1101’s decreased point scores appear to be due to decreased accuracy on the auditory monitoring sub-task, and Participant 1103’s point scores appear to be due to decreased accuracy on both the auditory and visual monitoring.
sub-tasks. The decidedly lower point scores during the hourly pay phase can be attributed to decreased accuracy on the auditory monitoring sub-task for Participant 1103 and to decreased accuracy on all four of the sub-tasks for Participant 1101.

The total point scores of the third low performer, Participant 1106, were considerably more stable within each phase. Her performance during the hourly pay phase was lower than her performance during the preceding three incentive phases, indicating that the monetary incentives controlled her performance. This makes it possible to validly compare the relative effects of the individual and group incentives. The average number of points earned in the first individual incentive phase, the group incentive phase and the second individual incentive phase were 8,668, 8,388 and 8,828, respectively. Once again, changes in the point scores appeared to be due primarily to changes in the accuracy for the auditory monitoring sub-task. Decreased accuracy on the visual monitoring sub-task also appeared to contribute to decreased point scores, although to a lesser extent. Although the point scores were slightly lower during the group incentive phase than during the two individual incentive phases, these differences do not appear to be meaningful, particularly given the overlap of scores across the three phases. Thus, these data suggest that the performance of low performers may not be very different under individual and group monetary incentive systems. Because the performance patterns of the other two low performers differed, however, generality across individuals was not established.
High Performers

The performance patterns for the total point scores differed across the three high performers. The total point scores for Participant 1102 were high and stable during the first individual incentive phase and decreased sharply during the group incentive phase. Although they appeared to rebound during the second individual incentive phase, the participant withdrew from the study after the third session of this phase. Thus, the data from this participant cannot be used to assess the relative effects of individual and group monetary incentives. As with the other performers, changes in the point scores appear to be accounted for by changes in the accuracy of both the auditory and visual monitoring sub-tasks.

The performance patterns for Participants 1104 and 1105 suggest that the individual and group monetary incentives affected their performance differently. For both, point scores were low and variable during the hourly pay phase, indicating that the monetary incentives controlled the responding of these two participants; hence, the relative effects of the two incentive systems can be validly compared. Participant 1105 earned more points during the two individual incentive phases than during the group incentive phase. Although decreased accuracy for the auditory and visual monitoring sub-tasks appeared to account for the low and unstable point scores during the hourly pay phase, changes in accuracy were less correlated with changes in the point scores in the preceding three incentive phases. Nonetheless, there is some indication that decreased accuracy was partially responsible for the lower point scores during the group incentive phase.
The performance pattern for Participant 1104 also indicates that responding was differentially controlled by the individual and group monetary incentives; however, the data are not as clear as they are for Participant 1105. The point scores for this participant were high and stable in the first individual incentive phase. They became highly variable during the group incentive phase. Although they decreased during the first three sessions of the second individual incentive phase, they rose sharply in the fourth session and remained high and stable during the last four sessions. Thus, it appears as though the group incentives did not control performance as well as the individual incentives, although the mean differences across the phases were small and do not reflect the momentary performance patterns. Once again, accuracy on the auditory monitoring sub-task appeared to strongly influence the total number of points earned.

Problems with SYNWIN and Re-analyses of the Results

The decreasing performance trends in the point scores and accuracy for three of the six participants (Participants 1101, 1103 and 1102), and Participant 1102’s withdrawal from the study suggest that the task may have become aversive over time, and further, that the pay contingencies were not sufficient to maintain performance, given that aversiveness. One of the low performers (Participant 1103) and all of the high performers (Participants 1102, 1104, and 1105) actually lost points on the auditory monitoring sub-task during the group incentive phase, the second individual incentive phase and/or the hourly pay phase. During the debriefing session, two
participants stated that the study was too long, and that the task, particularly the auditory monitoring sub-task had, in fact, become aversive. Moreover, one of the experimenters observed that some of the participants were not consistently wearing the headphones during the later sessions. In addition, two participants indicated that their performance during a session was lower if they had a heavy school or job related workload that day or week. They stated that these outside factors created stress for them and made it difficult to focus on their performance during the session.

Given the statements of some of the participants that the auditory monitoring task was aversive, and given the negative scores received on this sub-task by some participants, cumulative point totals were reanalyzed for all subjects with the auditory score removed from analysis. However, the adjusted cumulative point totals were no less variable than the non-adjusted totals, and did not reveal any new trends in the data.

One factor considered, but later rejected based on further analysis of the data, was whether a social relationship between two of the low participants (Participants 1101 and 1103) affected their performance. These two participants were friendly and conversational with each other before, during and after sessions they attended together. The variability was analyzed using scatterplots. No differences in variability or trends appeared, however.

SYNWIN or its predecessor, SYNWORK, has been used in two previous studies (Bucklin, 2000; Honeywell-Johnson et al., 2002). Unlike the present results, neither the point scores nor the percent correct on the sub-tasks decreased over time.
for any of the participants, in spite of the fact that several of the participants attended
the same number of sessions as in the current study. Moreover, the procedures of
those studies were highly similar to the ones in the current study. That is, participants
were sampled from the same population, the inclusion criteria for participants were
the same, the length of the sessions were similar or the same, the training sessions
were conducted similarly, and the alternative tasks that were available were the same.
Thus, the reasons for the present results are unclear.

Conclusions

The results of the current study lend support to the previous research literature
suggesting that both group and individual monetary incentive systems result in higher
levels of performance than hourly pay systems. One low performer performed the
same or similarly under both individual and group monetary incentives and two high
performers performed differently under individual and group monetary incentives.
These data are consistent with suggestions that individual and group monetary
incentives may affect the performance of low and high performers differently (Dierks
& McNally, 1987; Honeywell-Johnson et al., 2002). However, given the variability of
the data in the current study and the fact that performance decreased throughout the
study for three of the participants, it is not possible to draw any conclusions about the
effects of group monetary incentives on the performance of high and low performers.
More research is needed to determine whether high performers do indeed decrease
their performance when paid group monetary incentives as compared to individual
monetary incentives and whether group monetary incentives have any effect on the performance of low performers.

Several suggestions for future research can be made based on the problems encountered during the current study. First, the potential for an increase in the aversiveness of tasks performed over time should be considered when designing work tasks for studies that require several sessions. Participants in the current study found the auditory monitoring sub-task to be particularly aversive over time. Second, both session length and study length may have contributed to the variability and overall decrease in performance across sessions. Participants in the current study attended between 20 and 32 90-minute sessions. Again, some participants stated that the number of sessions they were required to attend became aversive. Finally, the work and/or school requirements of potential participants should be considered as a criterion for inclusion. Participants' ability and motivation to perform the experimental task may be affected by such outside factors.
Appendix A

Recruitment Script
Hello! My name is Heather McGee. I am looking for individuals to participate in a study designed to investigate the effects of monetary incentives on work performance. If you decide to participate in this study, you will be asked to perform a computer task. The task has four components: a memory task, an arithmetic task, a visual monitoring task, and an auditory monitoring task. Computer games, email and access to the Internet will be available during the sessions, and I am looking for individuals who enjoy computer games and/or using email and the Internet.

Participation will require you to attend a minimum of 22 90-minute sessions and a maximum of 42 sessions, for a total of at least 33 hours, not to exceed 63 hours of your time. The amount of money you will be paid will depend upon your performance, but it is likely that you will earn at least $170.00 if you complete the study. You may earn more if your performance on the task is higher than average and if you are asked to attend more than 22 sessions.

Your participation is completely voluntary. If you choose to participate, you may leave the study at any time. If you do leave the study early, you will be paid for your participation up to that point. Your willingness to participate in, or your withdrawal from the study at any time, will in no way affect your grade in this or any other class.

If you would like to participate, please print your name and phone number on the list that I am about to pass out.

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

Thank you for your time!
Appendix B

Subject Computer Game Use Screening Questionnaire
Subject Number ___________

Please complete the following questions. All information you provide will remain confidential.

1. Do you play any computer games? __ Yes __ No

2. If you play games, how often do you play?
   
   1 2 3 4 5 6 7 8 9 times a day
   1 2 3 4 5 6 7 days a week
   1 2 3 4 times a month

3. Do you use email or access the Internet? __ Yes __ No

4. If you use email or the Internet, how often?
   
   1 2 3 4 5 6 7 8 9 times a day
   1 2 3 4 5 6 7 days a week
   1 2 3 4 times a month

5. Do you know anyone that has signed up to participate in the study? Please list their names.

6. If you know anyone that might be interested in signing up for the study, please refer them to Heather McGee at (616) 934-0506.

Thank you!
Appendix C

Computation Skills Quiz
### Computational Math Quiz

Please solve the following addition problems in your head and write your answers below. Do not use a calculator, scratch pad or other assistance.

<p>| | | | |</p>
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Appendix D

Pay Condition Quiz
Pay Condition Quiz

Subject: ____________________

HOURLY PAY SYSTEM:
Individuals are paid $7.50 for a 90-minute session.

INDIVIDUAL INCENTIVE PAY SYSTEM:
Individuals are paid $.10 for every 100 points accumulated during the session.

GROUP INCENTIVE PAY SYSTEM:
Individuals are paid $.10 for every 100 points accumulated during the session, determined by the group’s average number of points.

Answer the following questions based on the above pay systems.

1. Sally earned 14,000 points during a session. Sally’s group earned an average of 13,000 points.
   A. What amount would Sally earn under the GROUP INCENTIVE pay system?
   B. What amount would Sally earn under the INDIVIDUAL INCENTIVE pay system?
   C. What amount would Sally earn under the HOURLY pay system?

2. Don earned 10,000 points during a session. Don’s group earned an average of 12,500 points.
   A. What amount would Don earn under the GROUP INCENTIVE pay system?
   B. What amount would Don earn under the INDIVIDUAL INCENTIVE pay system?
   C. What amount would Don earn under the HOURLY pay system?

3. Virginia earned 13,500 points during a session. Virginia’s group earned an average of 13,000 points.
   A. What amount would Virginia earn under the GROUP INCENTIVE pay system?
B. What amount would Virginia earn under the INDIVIDUAL INCENTIVE pay system?

C. What amount would Virginia earn under the HOURLY pay system?
Appendix E

Informed Consent Form
I have been invited to participate in a research study designed to investigate the effects of monetary incentives on work performance. This project is Heather McGee’s master’s thesis project. Dr. Dickinson is her advisor.

Participation Requirements: During today’s introductory session, my eligibility to participate in this study will be determined. To participate: (a) I must be a junior or senior level college student, (b) be able to accurately answer simple addition problems, because part of the experimental task requires that I add 2 three digit numbers repeatedly, (c) spend a certain amount of time using e-mail, the internet, or computer games, and (d) pass a quiz that tests my understanding of the three pay systems that will be used in the study. If I do not meet the eligibility requirements, I will be paid $5.00 for attending the introductory session, but will not be asked to participate in the study. If I am eligible to participate, I will be paid $5.00 for this initial session, and scheduled for my first week of sessions.

Experimental Task: As a participant in this study, I will perform a computerized task for at least 22 sessions. Each session will be 90 minutes. My total time commitment will be at least 33 hours. I may be asked to attend up to 42 sessions, for a total of 63 hours. I will be asked to schedule at least three sessions per week. The computer task consists of four concurrent sub-tasks, one in each quadrant of the computer screen: a memory task, an arithmetic task, a visual monitoring task, and an auditory monitoring task. My first two scheduled sessions will involve learning the task, and an experimenter will be available to answer my questions during those sessions. I will be able to get up, take a break, and enjoy other activities (i.e., email, internet, computer games, internet games) at any time during the sessions.

Compensation: I will receive monetary compensation for my participation in the study. I will receive $5.00 immediately following today’s introductory session. I will be paid $7.50 for each of two training sessions. I will receive this pay after the second training session. If I decide to withdraw during or after the first training session, I will be paid
$7.50 before I leave. In one experimental pay condition, the individual monetary incentive pay condition, the total amount of money I earn will depend upon how many points I earn performing the computer task during the session. In another pay condition, the group monetary pay condition, the total amount of money I earn will depend on the average point score of the group of 10 members to which I am assigned. In the third pay condition, the hourly pay condition, I will be paid $7.50 per session as long as I earn a minimum number of points. I will be paid before the first session of each week. In the event that the pay conditions change during the week, I will be paid before the first session of the new pay condition. The total amount of money I will earn will depend upon my performance and the performance of my group, but it is likely that I will earn at least $170.00 if I complete the study. I may earn more if my performance on the task is higher than average and if Dr. Dickinson and Heather McGee ask me to attend more than 22 sessions. The more sessions I attend, the more money I will make.

**Benefits:** Monetary compensation will be my benefit from participation in this research study.

**Risks:** During the 90-minute sessions, I may encounter fatigue or mild stress while performing the task. This will be offset by the fact that I can take breaks and/or engage in alternative activities whenever I desire to do so. Because of past experience with the type of tasks that will be used in this study, individuals perform differently on them. My performance may be higher or lower than the performance of others and this may be stressful to me as well. 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 me except as otherwise stated in this consent form.

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

**Voluntary participation:** My participation in this study is entirely voluntary. I may withdraw from the study at any time without repercussions. If I do withdraw, I will receive the amount of money that I have earned up to that point. My participation in the study, or my withdrawal from the study, will not affect my grades in any of my courses or my relationship with Western Michigan University. During the debriefing session after
the study, the experimenter will answer any questions and explain how my data will help to learn more about monetary incentives.

Who to contact with questions: If I have any questions concerning this study I may call Heather McGee at (616) 934-0506. In addition, Dr. Dickinson, the faculty advisor for the study, can be reached at 387-4473. I may also contact the Chair, Human Subjects Institutional Review Board (387-8293), or the Vice President for Research, at 387-8298, if questions or problems arise during the course of the study.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. Participants should not sign this document if the corner does not have a stamped date and signature.

My signature below indicates that I understand the above information and agree to participate in the study.

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<th>Date</th>
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Consent obtained by: ____________________________

| Initials of researcher | Date |

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

HSIRB Approval Letter
Date: November 1, 2001

To: Alyce Dickinson, Principal Investigator
Heather McGee, Student Investigator for thesis

From: Mary Lagerwey, Chair

Re: HSIRB Project Number: 01-10-10

This letter will serve as confirmation that your research project entitled "The Effects of Hourly Pay, Individual Monetary Incentives and Group Monetary Incentives on Performance" 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 may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions 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: November 1, 2002
Appendix G

Computer-Based Task Sample Screen
Click the List Box to view list

List Box: UEPYHB

Probe Letter: □

Click YES if Probe letter is in the list, NO if it isn't

Click YES if Probe letter is in the list, NO if it isn't

Digit Adjustment controls:

Adjust digits until answer is correct then click DONE.

Click the ALERT button when you hear the HIGH tone.

Alert:

Click to refuel

Alert:

Click the ALERT button when you hear the HIGH tone.

Fuel:

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Click to refuel
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Appendix I

Preference, Satisfaction, and Stress Level Questionnaire
Satisfaction and Stress Questionnaire  
Subject:________

Instructions: Please write short answers to the following questions.

1. Originally, what did you believe to be the purpose of this research?

2. Now, what do you believe is the purpose of the study?

3. If your answers to 1 and 2 are different, when did you change your belief?
   _____ During the first Individual Incentive pay condition
   _____ During the Group Incentive pay condition
   _____ During the second Individual Incentive pay condition
   _____ During the Hourly pay condition

4. Rank order the hourly pay, the individual incentive pay and the group incentive pay in terms of how much you preferred them. Start with the one you preferred the most.
   1. ________________ (most preferred pay system)
   2. ________________
   3. ________________ (least preferred pay system)

5. Please describe why you ranked them as you did:

6. Rank order the hourly pay, the individual incentive pay and the group incentive pay in terms of how stressful they were. Start with the one that was most stressful.
   1. ________________ (most stressful pay system)
   2. ________________
   3. ________________ (least stressful pay system)

7. Please describe why you ranked them as you did:

8. Rank order the hourly pay, the individual incentive pay and the group incentive pay in terms of how satisfying they were. Start with the one that was most satisfying.
   1. ________________ (most satisfying pay system)
   2. ________________
   3. ________________ (least satisfying pay system)

9. Please describe why you ranked them as you did:
10. How many other people participated in your incentive group during the Group Incentive condition? ____________

11. How do you know that?

12. Additional Comments:
Appendix J

Pay Scale
## INCENTIVE PAY SYSTEM

($0.10/100 points)

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Appendix K

Pay Receipt (Individual Incentives and Hourly Pay)
SESSION RECEIPT

Subject Number: ________________________________

Session Date: ________________________________

Pay Condition: ________________________________

Individual Point Total: __________________________

Amount Earned: ________________________________
Appendix L

Pay Receipt (Group Incentives)
SESSION RECEIPT

Subject Number: ________________________________

Session Date: ________________________________

Pay Condition: ________________________________

Group Point Total: ______________________________

Amount Earned: ________________________________
Appendix M

Pay System Description/Feedback/Alternative Activities Script
Description of Pay Systems Script

McGee Thesis

Before the session begins, tell the participant what pay condition is in effect and read the following description for that pay condition:

INDIVIDUAL INCENTIVE CONDITION: Today you will be working in the individual monetary incentive condition. You will be paid based on the number of points you earn during this session. For every 100 points you earn, you will be paid $.10.

GROUP INCENTIVE CONDITION: Today you will be working in the group monetary incentive condition. You will be paid based on the average number of points earned by the group of 10 to which you are assigned. For every 100 points in the group average, you will be paid $.10.

HOURLY PAY CONDITION: Today you will be working in the hourly pay condition. You will be paid $7.50 for the session, provided you earn a minimum of 3800 points.

Feedback Script

Before the session begins, give the subject his/her receipt for the last session and read the following:

During your last session the ________ pay condition was in effect. You/the group earned ________ points. Therefore, the amount of money you earned for that session is _____.

If it is the first session of the week, or the first session of a new phase, tell the participant the total pay earned during the past week and pay the participant.

Alternative Task Script

As in previous sessions, you may take work breaks whenever you like. Computer games, email, and access to the Internet are available on the next computer. Twice during the session, I will remind you that you may want to take a break.
Appendix N

Debriefing Script (High Performance Group)
Script for Debriefing (High Performance Group)

McGee Thesis

Following the last session of participation:

1. Thank the subject for participating in the research study.

2. Explain the purpose of the study as follows:

   A. Previous research has demonstrated that when people are paid individual or group monetary incentives, they perform better than when they are paid hourly rates.

   B. Studies that have compared performance under individual and group monetary incentives have had mixed results. For example, some studies have found no differences in performance when individuals have been exposed to both group and individual monetary incentives. Other studies have found that performance is lower when individuals are paid group incentives than when they are paid individual incentives.

   C. One reason for these conflicting results may be that, in some of the studies, the performance of the group was relatively equal to the performance of the individual (in this situation, the money earned by the individual would have been the same under both incentive systems). However, in other studies, the performance of the group may have been lower than the performance of the individual (in this situation, the individual would have earned less when paid group monetary incentives than when paid individual monetary incentives).

   D. Recent research supports the idea that high performance may decrease when individuals are paid group monetary incentives. However, little research has been conducted to see if low performance changes under group monetary incentives.

   E. The purpose of this study is to determine (a) if high performance decreases when individuals are paid group incentives as compared to performance when individuals are paid individual incentives, (b) if low performance increases, decreases, or remains the same when individuals are paid group incentives as compared to performance when individuals are paid individual incentives, and (c) whether group incentives affect the performance of the four tasks differently.
F. If high performance decreases when individuals are paid group incentives, but low performance increases, organizations may want to consider using group incentive systems, because the group average would remain the same or similar. However, if high performance decreases when individuals are paid group incentives and low performance remains the same or decreases, organizations may want to consider implementing an individual monetary incentive system instead of a group monetary incentive system to keep performance levels up.

G. Ask if they understand this, and/or if they have additional questions.

3. Explain the four phases of the study as follows:

   A. Phase 1 was an individual monetary incentives condition. In this phase, you were paid based on how many points you earned in each session.

   B. Phase 2 was a group monetary incentives condition in which all participants were separated into one of two conditions (high performance group incentives or low performance group incentives). You were in the high performance group. Although this was a group monetary incentive phase, there were no actual groups. You were still working alone, and your “group score” was contrived. Your group score for each session was determined by multiplying a score that was 20% lower than your average score during individual incentives by nine (to give us the total score for the nine other group members) and then adding your current session score. This score was then divided by ten to give you the “group’s” average score for that session. In this way, we were able to make the group score lower than your average performance.

   C. Phase 3 was a reversal to individual monetary incentives.

   D. Phase 4 was an hourly pay condition, in which you were paid $7.50 per session, regardless of your performance. This phase served as a control.

   E. Ask if they understand this, and/or have additional questions.

4. Show the participant graphs of his/her performance (scores, sub task scores, time on task, accuracy). Ask if the participant has questions about the graphs.

5. Explain how the participant’s performance relates to the research question (e.g., did the participant’s performance increase, decrease or remain the same throughout the group incentive condition).
6. Ask the subject if s/he has questions regarding participation. Answer those questions.
Appendix O

Debriefing Script (Low Performance Group)
Script for Debriefing (Low Performance Group)

McGee Thesis

Following the last session of participation:

7. Thank the subject for participating in the research study.

8. Explain the purpose of the study as follows:

A. Previous research has demonstrated that when people are paid individual or group monetary incentives, they perform better than when they are paid hourly rates.

B. Studies that have compared performance under individual and group monetary incentives have had mixed results. For example, some studies have found no differences in performance when individuals have been exposed to both group and individual monetary incentives. Other studies have found that performance is lower when individuals are paid group incentives than when they are paid individual incentives.

C. One reason for these conflicting results may be that, in some of the studies, the performance of the group was relatively equal to the performance of the individual (in this situation, the money earned by the individual would have been the same under both incentive systems). However, in other studies, the performance of the group may have been lower than the performance of the individual (in this situation, the individual would have earned less when paid group monetary incentives than when paid individual monetary incentives).

D. Recent research supports the idea that high performance may decrease when individuals are paid group monetary incentives. However, little research has been conducted to see if low performance changes under group monetary incentives.

E. The purpose of this study is to determine (a) if high performance decreases when individuals are paid group incentives as compared to performance when individuals are paid individual incentives, (b) if low performance increases, decreases, or remains the same when individuals are paid group incentives as compared to performance when individuals are paid individual incentives, and (c) whether group incentives affect the performance of the four tasks differently.
F. If high performance decreases when individuals are paid group incentives, but low performance increases, organizations may want to consider using group incentive systems, because the group average would remain the same or similar. However, if high performance decreases when individuals are paid group incentives and low performance remains the same or decreases, organizations may want to consider implementing an individual monetary incentive system instead of a group monetary incentive system to keep performance levels up.

G. Ask if they understand this, and/or if they have additional questions.

9. Explain the four phases of the study as follows:

F. Phase 1 was an individual monetary incentives condition. In this phase, you were paid based on how many points you earned in each session.

G. Phase 2 was a group monetary incentives condition in which all participants were separated into one of two conditions (high performance group incentives or low performance group incentives). You were in the low performance group. Although this was a group monetary incentive phase, there were no actual groups. You were still working alone, and your “group score” was contrived. Your group score for each session was determined by multiplying a score that was 20% higher than your average score during individual incentives by nine (to give us the total score for the nine other group members) and then adding your current session score. This score was then divided by ten to give you the “group’s” average score for that session. In this way, we were able to make the group score higher than your average performance.

H. Phase 3 was a reversal to individual monetary incentives.

I. Phase 4 was an hourly pay condition, in which you were paid $7.50 per session, regardless of your performance. This phase served as a control.

J. Ask if they understand this, and/or have additional questions.

10. Show the participant graphs of his/her performance (scores, sub task scores, time on task, accuracy). Ask if the participant has questions about the graphs.

11. Explain how the participant’s performance relates to the research question (e.g., did the participant’s performance increase, decrease or remain the same throughout the group incentive condition).
12. Ask the subject if s/he has questions regarding participation. Answer those questions.
BIBLIOGRAPHY


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