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The Effects of Individual and Group Incentives on High Performance

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THE EFFECTS OF INDIVIDUAL AND GROUP INCENTIVES ON HIGH PERFORMANCE

by

Heather M. McGee

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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Heather M. McGee

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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.

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 the point is 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 remote 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 remote 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: (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, Dickinson, & Poling, 1997; Honeywell-Johnson & Dickinson, 1999; 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 U.S. 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.

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. In spite of a long history
of use of monetary incentives and their momentary popularity in the early 1900s (see Louden, 1944; Milkovich & Stevens, 2000; Mitchell et al., 1990; Opsahl & Dunnette, 1966; Peach & Wren, 1992; Taylor, 1911), little controlled research was conducted until their resurgence in the 1980s (Blinder, 1990; Dickinson & Gillette, 1993; Lawler, 1990). 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**

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,

It has been argued that these changes in performance are likely to be due to changes in the amount of time an individual spends on or off task (Bucklin & Dickinson, 2001; Matthews & Dickinson, 2000). To this extent, it is important for researchers to include viable alternative activities for participants to engage in. If the alternatives are not realistic alternatives, participants may spend all of their time performing the experimental task regardless of the pay system in effect.

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 performance, which is the focus of the proposed study.
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 comparing the differential effects of group incentives and hourly pay, 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 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 incentive pay 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 the five laboratory 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, including the size of the group. 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.

Four of the 7 studies comparing equally divided group incentives and individual incentives reported satisfaction data. 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 simple 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._ Three studies compared the effects of differentially divided group incentives and individual incentives (Allison et al. 1992; Farr, 1976; Thurkow et al. 2000). 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 Performance

Two studies have investigated the effects of group monetary incentives on high 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 two to twelve 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.

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 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 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, organizations might want to consider using individual
incentives, if and when possible. 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 differential 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. The authors reported that there was a clear top performer in four of the
eight groups (Group A, N=2; Group C, N=2; Group G, N=4; and Group F, N=5). The
authors do not report their criterion for determining what was considered high
performance and it would appear that this assertion was based on a visual inspection
of the data. In three of these cases (Group C, N=2; Group G, N=4; and Group F,
N=5), the performance of the top performer was not significantly different under
group and individual incentives (again, this assertion appears to be based on visual inspection), although high performers earned, on average, $.49 less per session during the group incentive phase. In the fourth group (Group A, N=2), both participants performed comparably during the first individual incentive condition. During the group incentive condition, the performance of both participants dropped, with Participant 2 emerging as a high performer (based on visual inspection) during this phase. Both participants earned less money during the group incentive phase than they had during the individual phase. When reversed to individual incentives, the performance of the lower performer remained low, but the performance of the high performer increased to previously higher levels. These results (aside from the performance of the high performer in Group A) appear to contradict Dickinson’s (2000) contention that high performers will decrease their performance over time when paid group incentives. Stoneman and Dickinson (1989) note, however, that participants were paid only once at the end of the group incentive phase and that pay decreases resulting from the group contingencies may not have been salient enough to affect performance. Additionally, the authors note that in very small groups in which overall pay is highly contingent on individual performances, high performers may behave according to self-generated rules stating that any decreases in their performance will further decrease their earnings.

Smoot (1997) examined individual and group incentives with six three-member groups, and, like 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. According to this criterion, there were no high performers in any of the six groups. 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 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), 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).
As stated previously, only two experimental studies have examined the effects of group monetary incentives on high 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 were 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.

Two sets of results are of interest when analyzing how individual and group incentives affect high performance: (a) a comparison of the performance of high performers across pay conditions; and (b) 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). 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.

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 the performance of high performers will be better when they are paid individual incentives than when they are paid equally divided group incentives.

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 [(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 they believed 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. 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). It is risky to make conclusions about the effects of group incentives on performance given the number and length of those sessions.

of high and low performers. Participants were six college students who performed a computerized work task called SYNWIN (2000), which is an updated version of the task used by Honeywell-Johnson et al. (2002). The SYNWIN (2000) program consisted of four sub-tasks, each presented in a separate quadrant of the computer screen: a memory task, an arithmetic task, a visual monitoring task, and an auditory monitoring task. 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. Each participant was exposed to individual monetary incentives, simulated group (n = 10) monetary incentives and hourly pay. The participants worked individually 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 participants who had the highest cumulative point scores were assigned to the “high performance” condition. The participants who had the lowest cumulative point scores were assigned to the “low performance” condition. 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.

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. During debriefing, these participants indicated that their performance had been affected because the task, specifically the auditory monitoring sub-task, had become aversive over time and because the 90-minute sessions were too long. 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.

The current study extended the work of London and Oldham (1977), Honeywell-Johnson et al. (2002), and McGee (2003). It examined how group and individual incentives affected high performance across multiple sessions using simulated groups of 10 members. Once again, 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. In response to the problems that arose with the experimental task used in the McGee (2003) study, a computer task that simulated the job of a bank proof operator replaced the use of SYNWIN (2000), and session length was 45 minutes rather than 90 minutes. Finally, this study eliminated a confound in the previous studies. In all prior studies (Honeywell et al., 2002; London & Oldham, 1977; McGee, 2003), participants were first exposed to individual incentive pay without group comparative feedback, then exposed to group incentive pay with such comparative feedback. Thus, the comparative feedback, the group incentive pay, or a combination of both may have contributed to the observed differences in performance under the individual incentive pay condition and the group incentive pay condition. In the current study, the effects of individual incentive pay with individual and group feedback were compared to the effects of group incentive pay with individual and group feedback. By holding the comparative group feedback constant across the two individual and group incentive conditions, any performance differences that occurred could be attributed to the pay system itself, rather than to the comparative feedback indicating that the participant was a high performer.
Method

Participants

Participants were 11 college students (see Appendix A for the recruitment script). Participants were screened according to three criteria. First, because the experimental task required participants to use the number pad of a computer keyboard, only keyboard proficient participants were included. The criterion for computer keyboard proficiency was 750 checks correctly processed in 45 minutes. This criterion was based on the average performance of three high performers who performed the same task during a pilot study. Second, only participants who self reported that they played computer games (the alternative off-task activities in the study) at least once a week were included (see Appendix B for the screening questionnaire). Third, after the experimenter had explained the pay systems that were to be used in the study, participants were required to score 100% on a quiz that tested their understanding of them (see Appendix C for the quiz). Only participants who 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 D and the HSIRB research approval letter is provided in Appendix E.

Setting

Sessions were conducted in an on-campus laboratory located in 2532 Wood Hall. The laboratory contained 3 Dell computers. The computers were connected
through a Local Area Network (LAN). Each participant had a work area consisting of an adjustable chair, computer, keyboard, mouse, and gel palm rest.

Apparatus/Materials

Participants performed a computer task that simulated the job of a bank proof operator. Simulated bank checks, ranging in value from $10.00 to $999.99, were presented on the computer screen (see Appendix F). Participants entered the cash values in a cell at the bottom of the computer screen, using the computer’s numeric keypad. When the participant had entered the number, he/she pressed the enter key to complete the transaction and move on to the next check. During every session, participants had access to computer games. Participants were allowed to minimize (but not close) the task program at any time to play any of several popular computer games (Freecell, Hearts, Minesweeper, Pinball, Solitaire, Spider Solitaire, and Tetris). These alternative tasks were necessary because without them participants may have spent all of their time performing the experimental task because they had nothing else to do, which could have eliminated any performance differences under the three pay systems due to differences in the amount of time spent off-task.

Dependent Variables

The primary dependent variables were the total number of checks correctly completed per session, the average rate (number of checks correctly completed per minute spent performing the task) per session, the percentage correct per session, and time spent performing the work task (as opposed to the computer games). The computer program automatically recorded the total number of checks completed, the
number of checks completed correctly and the number completed incorrectly, and the amount of time spent off-task. The computer began to record time as off-task when the participant had not entered a value in the check program for 10 seconds, and continued to record the time as off-task until the participant again entered a value in the check program. The off-task time was then totaled for the 45-minute session.

The total number of checks completed, the number completed correctly and incorrectly, and the total amount of time spent off-task were used to compute (a) the rate of correct check completion, (b) the percentage correct, and (c) the time spent performing the work task. The experimenter tested the computer program before the first session each week to insure that it was accurately recording these data. All data were manually recorded on a data sheet after each session as well as saved to a back-up file (see Appendix G). These precautionary steps were taken to insure that data were not lost due to a computer or disk malfunction.

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 least stressful, and found most satisfying. The questionnaire is provided in Appendix H.

Experimental Design

A within-subject reversal design was used. Each participant was exposed to (a) hourly pay with individual feedback, (b) individual incentive pay with individual feedback, (c) individual incentive pay with individual and group feedback, and (d) group incentive pay with individual and group feedback. The sequence of exposure
was ABCDC, where A = hourly pay with individual feedback, B = individual incentive pay with individual feedback, C = individual incentive pay with individual and group feedback, and D = group incentive pay with individual and group feedback.

Participants worked individually under all pay conditions, but during the group incentive pay condition they were told that their pay was based on the average performance of a ten-person group. However, the group was simulated. Simulated group procedures have been used successfully in a number of previous research studies (e.g., Harcum & Badura, 1990; Honeywell-Johnson et al., 2002; Kerr & Bruun, 1983; Szymanski & Harkins, 1987; White, Kjelgaard, & Harkins, 1995).

The first two phases (AB), hourly pay with individual feedback and individual monetary incentive pay with individual feedback, were included to insure that monetary incentives increased the performance of the participants. Without such a demonstration, it is not possible to validly compare the effects of two different incentive pay systems (in this case individual incentives and group incentives) on performance. In addition, the inclusion of the first individual incentive pay condition enabled the participant’s performance to stabilize under individual incentives. This stabilization was necessary in order to determine the group feedback that would be provided to participants in the next three phases.

During the last three phases (CDC), participants were given both individual and group feedback. The performance of the simulated group was contrived so that it was approximately 25% lower than the participant’s performance. This ensured that
all participants were high performers, and hence would receive less pay during the group incentive condition (D) than during the individual incentive condition (C) for comparable levels of performance. The specific method for calculating the contrived group performance is described in the Independent Variable section.

The inclusion of both individual and group feedback during the last three phases of the study (CDC) controlled for the fact that a participant may have performed more poorly under the group incentive condition simply because of the comparative feedback indicating that he/she was a high performer, and not necessarily because the participant received less pay for comparable levels of performance. By holding this information constant across the individual and group incentive conditions, any performance differences that occurred could be attributed to the pay system itself, rather than the participant’s awareness that he/she was a high performer.

Experimental sessions were 45 minutes. There was a minimum of five sessions per phase. If performance was not stable after five sessions, the phase was extended until the performance of the participant was stable or until the participant had completed 10 sessions (for economic reasons, phases could not be extended beyond 10 sessions, although there were some exceptions made). Performance was considered stable when the cumulative number of checks correctly processed per session across three sessions was within a range of + or – 10% for each of the three sessions.
**Independent Variable**

*Hourly Pay with Individual Feedback Condition*

During the hourly pay with individual feedback condition, participants were paid $5.75 for each 45-minute session if they correctly completed at least 490 checks. 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 supervisory criticism and being fired. This minimum requirement was designed to simulate that contingency. The 490-check minimum was one standard deviation below the average performance of pilot participants working under an hourly pay with individual feedback condition.

Before each session, participants were given a receipt that indicated the total number of correctly processed checks and the amount of money they earned in the preceding session. The receipt that was given to participants is provided in Appendix I. 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 individual and simulated group incentive conditions in which they received both individual and group feedback, it would decrease the likelihood that they would believe that their performance was being combined with the performance 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 feedback script that was used in this and all other conditions can be found in Appendix J. To further standardize procedures across phases, in all experimental conditions participants were paid in cash before their first session of the week or immediately before the first session of a new pay phase.

**Individual Incentive Pay with Individual Feedback Condition**

Participants were paid on a piece-rate pay system in which they earned $0.006 per check processed correctly. Participants earned approximately $5.75, an amount comparable to base pay, if they processed at least 958 checks per session. This equivalency was based on the average performance of pilot participants who were paid individual incentives with individual feedback and adjusted slightly based on the initial performance of the current participants. Participants who processed more than 958 checks earned more money because of the incentive pay.

As in the hourly pay with individual feedback condition, before each session, participants were given a receipt that indicated the total number of correctly processed checks and the amount of money they earned in the preceding session (Appendix I), and were paid in cash before their first session of the week or immediately before the first session of a new pay phase.

**Individual Incentive Pay with Individual and Group Feedback Condition**

As in the individual incentive with individual feedback condition, participants earned $0.006 per check processed correctly. Before each session, participants were given a receipt that indicated (a) the total number of correctly processed checks by the participant, (b) the average number of correctly processed checks by the simulated
group, and (c) the amount of money they earned in the preceding session. The receipt is provided in Appendix K.

The group average was set at approximately 25% (with a range of 23-27%, randomly determined in advance) below the mean performance of the participant. The following formula was used to determine the group average in each session:

\[
\text{[\text{(approximately } 0.75 \times \text{ mean performance of the last three stable sessions in the individual incentive pay with individual feedback phase } \times 9) + \text{ the participant's current session performance}] / 10.}
\]

Ensuring that the group average was lower than the individual’s performance by approximately 25% 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 he/she is given group feedback and paid group monetary incentives.

As in all experimental conditions, participants were paid in cash before their first session of the week or immediately before the first session of a new pay phase.

**Group Incentive Pay with Individual and Group Feedback Condition**

During the group incentive pay with individual and group feedback condition, the pay earned by each participant was based on the average performance of the simulated group. Similar to the individual incentive conditions, participants received $.006 per correctly processed check in the group average. Thus, the participants earned approximately $5.75 per session if the group average was 958 checks.

As in the individual incentive pay with individual and group feedback condition, before each session, participants were given a receipt that indicated (a) the
total number of correctly processed checks by the participant, (b) the average number of correctly processed checks by the simulated group, and (c) the amount of money they earned in the preceding session (Appendix K). The formula that was used to determine the simulated group's average performance was the same one that was described in the preceding section. As in all experimental conditions, participants were paid in cash before their first session of the week or immediately before the first session of a new pay 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 J.

The computer program automatically recorded participants' data (see *Dependent Variables* section). 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' number of correctly processed checks, recorded by the computer program, to a pay chart indicating the amount of pay the participants should receive based on their performance (see Appendix L).
During the group incentive condition, the experimenter computed the amount of pay the participants should receive by entering the participants’ number of correctly processed checks, recorded by the computer program, into a mathematical formula, described in the *Individual Incentive Pay with Individual and Group Feedback Condition* section that resulted in the simulated group’s average performance. The experimenter compared this performance to the pay chart to determine the amount of pay the participants should receive. Additionally, a second experimenter checked the formula and pay for 20% of the sessions. Interobserver agreement was calculated as the number of agreements divided by the number of agreements plus disagreements, and equalled 93.75%.

*Experimental Procedure*

*Introductory Session*

Potential participants were screened using the criteria described in the *Participants* section. Candidates who met the inclusion criteria were asked to participate in the study and scheduled for experimental sessions. They were asked to schedule at least three sessions per week. Participants were paid $5.75 for attending the introductory session, and were paid immediately following the session.

*Experimental Sessions*

Before beginning the study, all participants were informed of the different pay systems to be used during the sessions. The experimenter explained how to minimize and maximize the computer program and computer games. Additionally, laminated, full-color job aids for playing each of the games were located by the participants’
workstation. If it was the first session of the week or the first session of a condition (excluding the first session of the hourly pay condition), the participants were paid. Before the first session of each pay condition, participants were told which pay system was in effect and how they would be paid (i.e., during individual incentive pay conditions they were told that they would be paid $.006 for every check they correctly processed). Also, before each session within the pay phase, the participants were reminded of the pay system 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 were available on the computer (Appendix J).

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 have been less likely to engage in off task activities if the experimenter was present (Matthews & Dickinson, 2000). After 45 minutes had elapsed, the experimenter entered the room, ended the sessions, thanked the participants for their time, and reminded them of their next session dates/times.

*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 G). After participants completed the questionnaire, the experimenter explained the purpose of the study (see Appendix M) and answered participants’ questions.
Results

Task Performance

Total Number of Checks Correctly Processed

Table 1 displays the average number of correctly processed checks per phase by each participant.

Table 1

Average Number of Correctly Processed Checks Completed by Each Participant in Each Condition

<table>
<thead>
<tr>
<th>P#</th>
<th>Hr Pay IF</th>
<th>In Inc IF</th>
<th>In Inc IF+GF</th>
<th>Grp Inc IF+GF</th>
<th>In Inc IF+GF</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>663 (148.4)</td>
<td>773 (83.3)</td>
<td>835 (117.0)</td>
<td>706 (98.0)</td>
<td>838 (55.7)</td>
</tr>
<tr>
<td>21</td>
<td>918 (56.9)</td>
<td>1034 (21.0)</td>
<td>1061 (49.4)</td>
<td>969 (65.2)</td>
<td>1069 (71.3)</td>
</tr>
<tr>
<td>22</td>
<td>822 (82.3)</td>
<td>1048 (152.8)</td>
<td>1201 (42.8)</td>
<td>1197 (55.0)</td>
<td>1324 (35.0)</td>
</tr>
<tr>
<td>23</td>
<td>800 (151.4)</td>
<td>1082 (64.6)</td>
<td>962 (171.4)</td>
<td>842 (71.7)</td>
<td>805 (104.6)</td>
</tr>
<tr>
<td>25</td>
<td>975 (64.8)</td>
<td>1156 (41.3)</td>
<td>1194 (64.7)</td>
<td>1180 (54.7)</td>
<td>1225 (22.3)</td>
</tr>
<tr>
<td>26</td>
<td>895 (87.1)</td>
<td>1087 (38.4)</td>
<td>1086 (18.3)</td>
<td>986 (139.4)</td>
<td>1232 (42.3)</td>
</tr>
<tr>
<td>27</td>
<td>860 (87.8)</td>
<td>966 (149.4)</td>
<td>1037 (18.0)</td>
<td>1077 (83.1)</td>
<td>1095 (62.2)</td>
</tr>
<tr>
<td>28</td>
<td>865 (38.8)</td>
<td>1040 (62.1)</td>
<td>916 (45.2)</td>
<td>819 (34.9)</td>
<td>823 (112.7)</td>
</tr>
<tr>
<td>29</td>
<td>812 (53.8)</td>
<td>1089 (66.7)</td>
<td>1179 (33.4)</td>
<td>1108 (66.9)</td>
<td>1201 (77.9)</td>
</tr>
<tr>
<td>30</td>
<td>748 (103.0)</td>
<td>885 (44.4)</td>
<td>899 (63.9)</td>
<td>985 (47.5)</td>
<td>886 (143.6)</td>
</tr>
<tr>
<td>31</td>
<td>952 (58.9)</td>
<td>1028 (132.9)</td>
<td>1104 (13.8)</td>
<td>1074 (75.7)</td>
<td>1146 (33.6)</td>
</tr>
<tr>
<td>M = 846</td>
<td>M = 1017</td>
<td>M = 1043</td>
<td>M = 995</td>
<td>M = 1059</td>
<td></td>
</tr>
</tbody>
</table>

Note: IF = individual feedback. GF = group feedback. Standard deviations are in parentheses.

As can be seen in Table 1, all participants performed higher during the individual incentive with individual feedback phase (B) than during the hourly pay with individual feedback phase (A). These results indicate that the monetary...
incentives controlled performance effectively, enabling a valid comparison between the individual incentive with individual and group feedback condition (C) and the group monetary incentive with individual and group feedback condition (D). The performance patterns of participants differed across the subsequent three phases of the study (C, D, and C). The individual data are, therefore, presented in groups according to performance patterns observed across subjects.

Figure 1 displays the average performance of the participants, as a group, across phases. The average performance of the participants was higher during all of the incentive conditions (B, C, D, and C) than it was during the hourly pay condition (A). Additionally, the average performance of the group decreased slightly during the group incentive condition as compared to the individual incentive conditions.

Average Number of Correctly Processed Checks Completed by Participants in Each Phase

![Figure 1](image)

*Figure 1. Group average overall task performance across phases.*
Figures 2 and 3 display the total number of correctly processed checks per session by the four participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives. Figure 4 displays the total number of correctly processed checks per session by the two participants whose performance decreased during the group monetary incentives condition but failed to increase when reversed to individual monetary incentives. Figures 5 and 6 display the total number of correctly processed checks per session by the four participants whose performance was comparable during the two pay conditions. Figure 7 displays the total number of correctly processed checks per session by the one participant whose performance increased during the group monetary incentives condition.

Performance was considered to have increased or decreased during a phase based on visual inspection as well as whether the average performance across phases varied by at least fifty checks (a difference in pay of $.30). Each performance group will be discussed in turn.

*Participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives.* Participants 20, 21, 26, and 29 exhibited similar trends in performance across phases (Figures 2 and 3). All four participants' performance increased during the individual incentives with individual feedback condition (B). When switched to the individual incentives with individual and group feedback condition (C), the performance levels
Figure 2. Total number of checks correctly processed per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P20 and P21).
Figure 3. Total number of checks correctly processed per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P26 and P29).
of P21 and P26 remained the same, while the performance levels of P20 and P29 increased slightly. The performance of all four participants decreased during the group incentives with individual and group feedback condition (D). This decrease is most notable for P26. Performance levels of all four participants increased to previously higher levels when reversed to the individual incentives with individual and group feedback condition (C). For P26, this increase surpassed previous levels of performance under the first two individual incentive conditions.

Participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives. Participants 23 and 28 both demonstrated increases in performance when switched from the hourly pay with individual feedback condition (A) to the individual incentives with individual feedback condition (B) (Figure 4). Both participants' performance decreased during the individual incentives with individual and group feedback (C), although P23's performance recovered toward the end of the phase. Similarly, both participants' performance decreased even further when switched to the group incentives with individual and group feedback condition (D). However, performance did not increase to previously higher levels for either participant when reversed to individual incentives.

Participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions. Participants 22, 25, 27, and 31 exhibited similar trends in performance across phases (Figures 5 and 6). All four participants' performance increased during the first
Figure 4. Total number of checks correctly processed per session by participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives.
Figure 5. Total number of checks correctly processed per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P22 and P25).
Figure 6. Total number of checks correctly processed per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P27 and P31).
individual incentive condition (B). The participants continued to perform at the same levels when switched to the second individual incentive condition (C) and their performance was relatively stable throughout this condition. For all four participants, performance failed to decrease during the group incentives with individual and group feedback condition (D). Performance levels stayed the same when reversed to individual incentives with individual and group feedback (C) for three of the four participants (P25, P27, and P31). However, when reversed to individual incentives with individual and group feedback (C), P22's performance increased to even higher levels.

Participant whose performance increased during the group monetary incentives condition. Participant 30's performance increased when switched from the hourly pay with individual feedback condition (A) to the individual incentives with individual feedback condition (B) (Figure 7). This participant's performance remained at approximately the same level during the individual incentives with individual and group feedback condition (C), and then increased when switched to the group incentives with individual and group feedback condition (D). Upon reversal to individual incentives with individual and group feedback (C), P30's performance decreased to previously lower levels, but recovered during the final three sessions.

Rate

Table 2 displays the average rate of check completion per phase for each participant. Rate was computed as the total number of correctly processed checks per minute spent on task.
Figure 7. Total number of checks correctly processed per session by the participant whose performance increased during the group monetary incentives condition.

Table 2

Average Rate for Each Participant in Each Condition

<table>
<thead>
<tr>
<th>P#</th>
<th>Hr Pay IF</th>
<th>In Inc IF</th>
<th>In Inc IF+GF</th>
<th>Grp Inc IF+GF</th>
<th>In Inc IF+GF</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>23.47(3.3)</td>
<td>23.15(1.2)</td>
<td>22.83(1.2)</td>
<td>21.32(1.5)</td>
<td>24.46(0.6)</td>
</tr>
<tr>
<td>21</td>
<td>21.53(0.5)</td>
<td>23.50(0.4)</td>
<td>24.46(1.0)</td>
<td>23.90(1.4)</td>
<td>24.86(1.4)</td>
</tr>
<tr>
<td>22</td>
<td>25.82(1.1)</td>
<td>26.95(1.2)</td>
<td>27.90(0.8)</td>
<td>27.61(1.0)</td>
<td>30.29(0.3)</td>
</tr>
<tr>
<td>23</td>
<td>22.09(2.9)</td>
<td>25.42(2.5)</td>
<td>26.15(1.5)</td>
<td>26.12(2.1)</td>
<td>26.18(0.3)</td>
</tr>
<tr>
<td>25</td>
<td>22.90(1.6)</td>
<td>25.77(0.9)</td>
<td>26.60(1.4)</td>
<td>26.50(1.2)</td>
<td>27.38(0.6)</td>
</tr>
<tr>
<td>26</td>
<td>21.36(1.1)</td>
<td>24.18(0.8)</td>
<td>24.52(0.6)</td>
<td>25.12(0.5)</td>
<td>27.47(0.9)</td>
</tr>
<tr>
<td>27</td>
<td>20.47(1.2)</td>
<td>22.51(2.7)</td>
<td>23.59(0.2)</td>
<td>24.95(2.2)</td>
<td>25.69(0.7)</td>
</tr>
<tr>
<td>28</td>
<td>19.55(0.9)</td>
<td>23.27(1.3)</td>
<td>21.34(0.9)</td>
<td>19.61(1.2)</td>
<td>21.14(1.8)</td>
</tr>
<tr>
<td>29</td>
<td>20.85(2.0)</td>
<td>26.52(1.8)</td>
<td>27.53(1.1)</td>
<td>26.99(0.8)</td>
<td>29.23(0.7)</td>
</tr>
<tr>
<td>30</td>
<td>19.41(1.5)</td>
<td>20.27(0.7)</td>
<td>20.60(1.2)</td>
<td>22.86(1.2)</td>
<td>20.92(1.3)</td>
</tr>
<tr>
<td>31</td>
<td>21.20(1.3)</td>
<td>23.08(2.9)</td>
<td>24.76(0.7)</td>
<td>24.22(2.8)</td>
<td>25.54(0.7)</td>
</tr>
</tbody>
</table>

M = 21.70 M = 24.06 M = 24.57 M = 24.47 M = 25.74

Note: IF = individual feedback. GF = group feedback. Standard deviations are in parentheses.

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As can be seen in Table 2, all but one participant (P20) performed at a higher rate during the individual incentive with individual feedback phase (B) than during the hourly pay with individual feedback phase (A). Additionally, the majority of participants performed at a higher rate during the individual incentives with individual and group feedback conditions (C) than during the group incentives with individual and group feedback condition (D).

Figure 8 displays the average rate of performance of the participants, as a group, across phases.

![Average Rate of Performance by Participants in Each Phase](image)

*Figure 8. Group average rate of performance across phases.*

Similar to overall task performance, an increase in rate of performance between the hourly pay with individual feedback condition (A) and the individual
incentives with individual feedback condition (B) can be seen. Also similar to overall task performance is the increase in rate during the individual incentives with individual and group feedback condition (C). Unlike overall task performance, however, rate of performance during the group incentive condition (D) did not decrease as compared to rate of performance during the individual incentives with individual and group feedback condition (C), but did increase during the reversal phase.

Figures 9 - 14 show the rate of performance per session across all phases for all participants. For consistency, data are presented in the same groupings that were used to display total number of checks processed correctly. In each case, changes in rate of performance are compared to overall changes in performance on the task. The purpose of this is to determine whether changes in rate account, to some extent, for overall task performance changes. Following the presentation of rate of performance data, accuracy on the task and time spent on task data are presented and analyzed to determine whether changes in performance on these measures account for overall task performance changes. Changes in overall task performance may be due to performance changes in one or more of these measures: rate, accuracy, or time spent on task.

Participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives. The rate of performance for Participants 21, 26, and 29 increased during the individual incentives with individual feedback condition (B) (Figures 9 and 10), and
Figure 9. Rate of performance per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P20 and P21).
Figure 10. Rate of performance per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P26 and P29).
increased slightly again during the individual incentives with individual and group feedback condition (C). During the group incentives with individual and group feedback condition (D), the rate decreased for two of these participants (P21 and P29). The rate for all three increased when reversed to individual incentives (C). The rate for P20 decreased slightly across the first three incentive conditions (B, C, and D), and increased during the second individual incentives with individual and group feedback condition (C).

The changes in the rate of performance from hourly pay with individual feedback to individual incentive pay with individual feedback for P21, P26, and P29 could account for some of the increases in their overall performance between these two conditions. Similarly, the changes in the rate of performance for three of the four participants (P20, P21, and P29) could account for some of the decreases in their overall performance between the first individual incentives with individual and group feedback condition (C) and the group incentives with individual and group feedback condition (D). Changes in the rate for all four of these participants could account for increases in the overall performance between the group incentives with individual and group feedback condition (D) and the second individual incentives with individual and group feedback condition (C). However, as previously stated, changes in accuracy or time spent on task may also have contributed to changes in the overall performance on the task.
Participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives. The rate of performance for Participants 23 and 28 increased during the individual incentives with individual feedback condition (B) (Figure 6). Participant 23’s rate of performance increased again toward the end of the individual incentives with individual and group feedback condition (C), decreased slightly during the group incentives with individual and group feedback condition (D) (except for the second to last data point of this condition), and remained at this level when reversed to individual incentives with individual and group feedback (C). Participant 28’s rate of performance decreased during both the individual incentives with individual and group feedback condition (C) and the group incentives with individual and group feedback condition (D), and became variable when reversed to the individual incentives condition (C).

For both participants, the changes in rate of performance may account for some of the changes in overall performance on the task between the hourly pay condition and the incentive conditions. The relatively small changes in rate of performance for P23 in the remaining phases do not appear to account for the larger changes seen in overall performance on the task. However, the changes in rate of performance for P28 do appear to account for at least some of the changes in performance in the remaining phases, as the changes in rate mimic changes in overall performance on the task.
Figure 11. Rate of performance per session by participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives.
Participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions. The rate of performance for P22 increased slightly toward the end of the hourly pay condition (A), remained relatively unchanged during the next three conditions (B, C, and D), and increased during the final individual incentives with individual and group feedback condition (C) (Figure 12). It would appear that this increase in rate of performance during the last condition accounts for the slight increase in overall performance on the task during this condition. Participants 25, 27, and 31 all showed slight increases in rate of performance between the hourly pay condition and the individual incentives with individual feedback condition (Figures 12 and 13). Rate of performance levels for all three participants then closely resemble overall changes in performance on the task for the remaining phases, suggesting that changes in rate may account for at least some of these overall performance changes.

Participant whose performance increased during the group monetary incentives condition. The rate of performance for P30 increased throughout the hourly pay condition (A) (Figure 14). This does not match the participant’s overall performance on the task during this condition (which increased during the first three sessions, but then decreased during the remaining sessions), suggesting that either a change in accuracy or time spent on task, was responsible for the overall change in performance (a visual inspection of the data suggests that the change was due to a decrease in the amount of time spent on task). This participant’s rate of performance remained relatively unchanged throughout the first two individual incentives
Figure 12. Rate of performance per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P22 and P25).
Figure 13. Rate of performance per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P27 and P31).
conditions (B and C). Rate of performance then increased during the group incentives with individual and group feedback condition (D), and decreased during the reversal to individual incentives (C). This change in performance mimics the overall changes in task performance for P30, suggesting that changes in rate were, at least in part, responsible for overall changes in performance.

![Figure 14. Rate of performance per session by the participant whose performance increased during the group monetary incentives condition.]

**Percent Correct**

Table 3 displays the average percent correct per phase for each participant.

The accuracy of all participants remained high and stable across all conditions. The fact that quality did not decrease during the monetary incentive conditions although quantity increased may be due to the fact that a quality control measure was included in the study. Participants were paid $.006 per correctly processed check, rather than per check regardless of accuracy. The average difference
in accuracy across phases varied by less than 1% for seven of the eleven participants (P20, P21, P22, P23, P28, P30, and P31), less than 2% for three of the eleven participants (P25, P27 and P29), and less than 6% for one participant (P26).

Table 3

Average Percent Correct Earned by Each Participant in Each Condition

<table>
<thead>
<tr>
<th>P#</th>
<th>Hr Pay</th>
<th>In Inc</th>
<th>In Inc</th>
<th>Grp Inc</th>
<th>In Inc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IF</td>
<td>IF</td>
<td>IF+GF</td>
<td>IF+GF</td>
<td>IF+GF</td>
</tr>
<tr>
<td>20</td>
<td>99.79 (0.1)</td>
<td>99.33 (0.5)</td>
<td>99.11 (0.3)</td>
<td>99.01 (0.4)</td>
<td>99.16 (0.3)</td>
</tr>
<tr>
<td>21</td>
<td>98.24 (0.6)</td>
<td>98.10 (0.7)</td>
<td>98.41 (0.6)</td>
<td>98.58 (0.3)</td>
<td>98.79 (0.5)</td>
</tr>
<tr>
<td>22</td>
<td>98.15 (0.4)</td>
<td>97.95 (0.4)</td>
<td>98.40 (0.5)</td>
<td>97.80 (0.5)</td>
<td>97.52 (0.4)</td>
</tr>
<tr>
<td>23</td>
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<td>98.76 (0.6)</td>
<td>98.53 (0.4)</td>
<td>98.03 (0.8)</td>
</tr>
<tr>
<td>25</td>
<td>97.41 (0.6)</td>
<td>97.21 (0.8)</td>
<td>97.52 (0.2)</td>
<td>96.91 (0.5)</td>
<td>96.48 (0.9)</td>
</tr>
<tr>
<td>26</td>
<td>95.84 (5.8)</td>
<td>91.48 (4.2)</td>
<td>91.96 (5.9)</td>
<td>94.79 (1.7)</td>
<td>96.79 (0.8)</td>
</tr>
<tr>
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<td>97.38 (0.5)</td>
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<td>98.58 (0.6)</td>
</tr>
<tr>
<td>29</td>
<td>99.42 (0.2)</td>
<td>98.97 (0.4)</td>
<td>99.27 (0.2)</td>
<td>98.89 (0.5)</td>
<td>98.35 (0.3)</td>
</tr>
<tr>
<td>30</td>
<td>98.74 (0.5)</td>
<td>98.31 (0.6)</td>
<td>98.36 (0.5)</td>
<td>99.12 (0.7)</td>
<td>98.30 (0.5)</td>
</tr>
<tr>
<td>31</td>
<td>99.20 (0.3)</td>
<td>99.22 (0.4)</td>
<td>99.46 (0.3)</td>
<td>99.37 (0.2)</td>
<td>99.34 (0.2)</td>
</tr>
</tbody>
</table>

M = 98.45 M = 97.84 M = 97.89 M = 98.07 M = 97.99

Note: IF = individual feedback. GF = group feedback. Standard deviations are in parentheses.

Figure 15 displays the average percent correct of the participants, as a group, across phases. As can be seen in the figure, this dependent measure remained relatively unchanged across phases.

Figures 16 - 21 show the percent correct per session across all phases for all participants. For consistency, data are presented in the same groupings that were used to display total number of checks processed correctly and rate. However, given the lack of any significant performance differences across sessions or phases for ten of the eleven participants, only P26 will be discussed. This participant’s accuracy...
decreased sharply during the sixth session, decreased steadily across sessions 11-14, and decreased sharply again during session 19. The sharp decreases in accuracy do not correspond with any marked changes in the total number of checks correctly completed in comparison to other sessions in the respective conditions, but the steady decrease in accuracy during the individual incentives with individual feedback condition does correspond with an initial increase in the total number of checks correctly completed per session. This suggests that as the participant began to increase the quantity of checks completed, quality briefly suffered. However, by the fifth session of the first incentive condition, the participant’s accuracy had recovered.

Average Percent Correct by Participants in Each Phase

<table>
<thead>
<tr>
<th>Phase</th>
<th>Average Percent Correct</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>98.45</td>
<td>98.45</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>97.84</td>
<td>97.84</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>97.89</td>
<td>97.89</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>98.07</td>
<td>98.07</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>97.99</td>
<td>97.99</td>
<td></td>
</tr>
</tbody>
</table>

Figure 15. Group average percent correct across phases.
Figure 16. Percent correct per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P20 and P21).
Figure 17. Percent correct per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P26 and P29).
Figure 18. Percent correct per session by participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives.
Figure 19. Percent correct per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P22 and P25).
Figure 20. Percent correct per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P27 and P31).
Figure 21. Percent correct per session by the participant whose performance increased during the group monetary incentives condition.

**Time on Task**

Table 4 displays the average time in minutes spent on task per phase for each participant. As can be seen in Table 4, all but one participant (P31) spent more time on task during the individual incentive with individual feedback phase (B) than during the hourly pay with individual feedback phase (A). Additionally, the majority of participants spent more time on task during the individual incentives with individual and group feedback conditions (C) than during the group incentives with individual and group feedback condition (D), although a decreasing trend in the amount of time spent on task across these three conditions can be seen for 5 of the 11 participants (P23, P27, P28, P29, and P30).
Table 4

Average Time on Task for Each Participant in Each Condition

<table>
<thead>
<tr>
<th>P#</th>
<th>Hr Pay IF</th>
<th>In Inc IF</th>
<th>In Inc IF+GF</th>
<th>Grp Inc IF+GF</th>
<th>In Inc IF+GF</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>28.54 (6.7)</td>
<td>33.43 (3.6)</td>
<td>36.57 (5.0)</td>
<td>33.13 (3.9)</td>
<td>34.30 (2.5)</td>
</tr>
<tr>
<td>21</td>
<td>42.70 (1.9)</td>
<td>44.00 (0.7)</td>
<td>43.43 (2.5)</td>
<td>41.27 (2.1)</td>
<td>42.96 (1.3)</td>
</tr>
<tr>
<td>22</td>
<td>31.88 (3.4)</td>
<td>38.81 (4.8)</td>
<td>43.03 (0.9)</td>
<td>43.33 (1.0)</td>
<td>43.70 (1.2)</td>
</tr>
<tr>
<td>23</td>
<td>36.41 (5.9)</td>
<td>42.54 (2.1)</td>
<td>36.68 (5.8)</td>
<td>32.23 (2.3)</td>
<td>30.86 (3.5)</td>
</tr>
<tr>
<td>24</td>
<td>42.76 (2.3)</td>
<td>44.83 (0.2)</td>
<td>44.86 (0.1)</td>
<td>44.53 (0.4)</td>
<td>44.73 (0.1)</td>
</tr>
<tr>
<td>25</td>
<td>41.85 (2.7)</td>
<td>44.93 (0.2)</td>
<td>44.30 (1.0)</td>
<td>39.19 (5.0)</td>
<td>44.83 (0.2)</td>
</tr>
<tr>
<td>26</td>
<td>42.01 (3.6)</td>
<td>42.74 (2.5)</td>
<td>43.96 (1.1)</td>
<td>43.27 (2.7)</td>
<td>42.66 (2.5)</td>
</tr>
<tr>
<td>27</td>
<td>44.35 (0.6)</td>
<td>44.70 (0.3)</td>
<td>42.93 (1.3)</td>
<td>41.89 (2.9)</td>
<td>38.91 (4.0)</td>
</tr>
<tr>
<td>28</td>
<td>39.15 (2.5)</td>
<td>41.64 (1.6)</td>
<td>42.86 (1.8)</td>
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</tr>
<tr>
<td>29</td>
<td>38.78 (6.2)</td>
<td>43.64 (1.5)</td>
<td>43.64 (0.7)</td>
<td>43.10 (1.2)</td>
<td>42.19 (4.9)</td>
</tr>
<tr>
<td>30</td>
<td>44.90 (0.1)</td>
<td>44.52 (0.7)</td>
<td>44.61 (0.8)</td>
<td>44.31 (3.0)</td>
<td>44.89 (0.1)</td>
</tr>
<tr>
<td>31</td>
<td>M = 39.39</td>
<td>M = 42.34</td>
<td>M = 42.44</td>
<td>M = 40.66</td>
<td>M = 41.01</td>
</tr>
</tbody>
</table>

Note: IF = individual feedback. GF = group feedback. Standard deviations are in parentheses.

Figure 22 displays the average time spent on task by the participants, as a group, across phases. As can be seen in the figure, participants spent more time on task when the individual incentives with individual feedback condition (B) was introduced. This is consistent with overall changes in the performance of the group on the task. However, while the average amount of time spent on task decreased considerably during the group incentive condition (D), the reversal to individual incentives shows only a slight increase in time spent on task, while overall performance on the task showed greater increases. This increase in overall performance by the group can be attributed more to changes in rate of performance than to changes in the amount of time spent on task.
Figure 22. Group average time spent on task across phases.

Figures 23 - 28 show the time spent on task per session across all phases for all participants. For consistency, data are presented in the same groupings that were used to display total number of checks processed correctly, rate of performance, and percent correct. In each case, changes in time spent on task are compared to overall changes in performance on the task. The purpose of this is to determine whether changes in time on task account, to some extent, for overall task performance changes.

Participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives. During the initial sessions of the hourly pay condition (A), the time spent on task by
P20 mimics that participant's overall performance on the task (Figure 23). Sharp changes in overall performance are accompanied by sharp changes in the amount of time spent performing the task. However, as overall performance leveled off toward the end of the hourly pay condition (A), time spent on task actually decreased. At the same time, rate of performance for this participant increased, suggesting that these two measures evened each other out, resulting in stable overall performance on the task. During each of the remaining conditions, sharp changes in overall performance on the task again correspond to sharp changes in time spent working on the task, while more subtle changes appear to be due to some combination of changes in both time on task and rate of performance.

For P21, P26, and P29 (Figures 23 and 24), increases in overall performance on the task between the hourly pay condition (A) and the individual incentives with individual feedback condition (B) correspond to increases in the amount of time spent working on the task. Time spent on task then remained relatively stable throughout the first two individual incentive conditions (B and C), mimicking overall stability in performance on the task. When switched to the group incentive condition (D), time spent on task decreased for each of these participants, which accounts for the decrease in overall task performance during this condition. Upon reversing to individual incentives (C), the amount of time spent on task by P26 increased sharply, corresponding to the increase in overall performance by this participant. For P21 and P29, changes in time on task are much more subtle, indicating that once again overall
Figure 23. Time spent on task per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P20 and P21).
Figure 24. Time spent on task per session by participants whose performance decreased during the group monetary incentives condition and increased when reversed to individual monetary incentives (P26 and P29).
performance changes were likely due to a combination of changes in both rate of performance and time spent on task.

*Participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives.* The time spent performing the task by P23 during the hourly pay condition (A) reflects overall performance on the task except for the sixth data point (Figure 25). During this session, overall performance did not vary, but time spent on task increased significantly. Concurrently, rate of performance decreased sharply, evening out the overall performance (similar to what was seen with P20). During the remaining conditions, changes in overall performance on the task seem to correspond fairly well with changes in the amount of time the participant spent working on the task. In other words, increases in performance were marked by increases in time on task and decreases marked by decreases in time on task.

For P28, while overall performance increased during the individual incentives with individual feedback condition (B), time spent on task did not change. This indicates that performance differences between the hourly pay condition (A) and the individual incentives with individual feedback condition (B) were due to the participant's rate of performance. During the remaining conditions (C, D, and C), changes in overall performance appear to be affected by changes in time spent on task, but, as seen in the *Rate* section, additionally by changes in rate of performance. In other words, throughout the final three phases of the study, P28 spent less time on task.
Figure 25. Time spent on task per session by participants whose performance decreased during the group monetary incentives condition, but failed to increase when reversed to individual monetary incentives.
task and was less productive while on task, resulting in a decrease in overall performance.

*Participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions.* The time spent on task by P22, P25 and P27 during the hourly pay condition (A) covaries with overall performance on the task with the exception of the third to last data point for P22 (Figures 26 and 27). In this session, time on task increased but overall performance did not. Once again, this is due to a change in rate of performance in the opposite direction, holding overall performance at the same level. For P31, overall performance on the task increased slightly during the hourly pay condition (A), but this increase is due to change in rate of performance rather than change in time on task.

During the individual incentives with individual feedback condition (B), the overall performance of P22 increased dramatically in the fifth session, which is attributable to a marked increase in time spent on task. After this point, the time spent on task by P22 remains high and stable, much like overall performance on the task. During the reversal to individual incentives condition (C), however, overall performance increased slightly, while time on task remained unchanged. This change is due to an increase in rate of performance.

Beginning in the individual incentives with individual feedback condition (B), P25’s time on task remained at or very near the full 45 minutes. Therefore, any minor
Figure 26. Time spent on task per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P22 and P25).
Figure 27. Time spent on task per session by participants whose performance was comparable during the individual incentives and group incentives with individual and group feedback conditions (P27 and P31).
changes in performance occurring during the final four phases are necessarily due to changes in rate of performance.

During the fourth session of the individual incentives with individual feedback condition (B), the sharp decrease in performance by P27 appears to be due in part to a decrease in time spent on task, although this does not account for the entire decrease. Rate of performance also decreased during this session. During the individual incentives with individual and group feedback condition (C), all performance measures remained stable for this participant. When exposed to group incentives (D), overall performance became slightly more variable, and this variability is reflected in slight changes in both time spent on task and rate of performance. Once again, in the fourth from last session of the group incentive condition (D), overall performance did not change, but time on task decreased while rate of performance increased.

No significant changes in performance by P31 can be explained by changes in time spent on task. Rather, any performance changes are accounted for by changes in rate of performance.

*Participant whose performance increased during the group monetary incentives condition.* The time spent on task by P30 during the hourly pay condition (A) decreased steadily beginning in the fourth session (Figure 28). This corresponds to a marked decrease in overall performance on the task. Time on task increased when switched to individual incentives (B) and remained high and stable during this condition as well as during the first individual incentives with individual and group feedback condition (C) and the group incentives condition (D). However, overall
performance increased during the group incentives with individual and group feedback condition (D) and this increase is accountable to an increase in rate of performance. Overall performance on the task and time on task then dramatically decreased during the first session of the reversal to individual incentives (C), but recovered in both cases throughout the rest of the phase.

Figure 28. Time spent on task per session by the participant whose performance increased during the group monetary incentives condition.

*Individual Comparisons of Overall Task Performance to Rate and Time on Task*

Figures 29-39 display the mean performance of individual participants across phases in terms of the number of checks processed correctly, the rate of performance, and the amount of time spent working on the task (percent correct data did not vary across phases, and, therefore, are not included). These summary data help to exemplify whether, for each participant, overall changes in task performance across phases were due to changes in rate, time spent on task, or both.
Correctly Processed Checks

Rate of Performance

Time Spent on Task

Figure 29. Average performance across phases for P20.
Figure 30. Average performance across phases for P21.
Figure 31. Average performance across phases for P22.
Figure 32. Average performance across phases for P23.
Correctly Processed Checks

Rate of Performance

Time Spent on Task

Figure 33. Average performance across phases for P25.
Figure 34. Average performance across phases for P26.
Figure 35. Average performance across phases for P27.
Figure 36. Average performance across phases for P28.
Figure 37. Average performance across phases for P29.
Correctly Processed Checks

Rate of Performance

Time Spent on Task

Figure 38. Average performance across phases for P30.
Figure 39. Average performance across phases for P31.
Table 5 displays the average amount of money earned per session by each participant across phases.

<table>
<thead>
<tr>
<th>P#</th>
<th>Hr Pay IF</th>
<th>In Inc IF</th>
<th>In Inc IF+GF</th>
<th>Grp Inc IF+GF</th>
<th>In Inc IF+GF</th>
</tr>
</thead>
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<td>M = $6.10</td>
<td>M = $6.25</td>
<td>M = $4.90</td>
<td>M = $6.35</td>
</tr>
</tbody>
</table>

Note: IF = individual incentives. GF = group incentives.

All but two participants (P20 and P30) earned, on average, more money during the individual incentives with individual feedback condition than they had earned during the hourly pay condition. All but three of the participants (P23, P26, and P28) earned still more money during the individual incentives with individual and group feedback condition, reflecting their higher levels of performance. All participants earned less money during the group incentives with individual and group feedback condition than they had during any of the previous three conditions. Finally, all but one participant (P23) earned more during the final individual incentive
condition than during the group incentive condition. Participant 23 earned, on average, $0.05 less during the final phase of the study. This participant completed only four sessions during this final condition, and performance during the fourth session was exceptionally low.

Figure 40 displays the average amount of money earned by the participants, as a group, across phases. These averages are reflective of the average changes in overall performance on the task, with participants earning more during the individual incentives with individual feedback condition (B) than they had earned during the hourly pay condition (A), earning still more during the individual incentives with individual and group feedback condition (C), earning considerably less during the group incentive condition (D), and earning more when reversed to individual incentives (C). It should be noted, however, that although all of the participants earned less under the group incentive condition than they had under the individual incentive conditions (and the hourly pay condition as well), only 6 of the 11 participants actually decreased their performance during the group incentive condition and only four of those six increased their performance when reversed to individual incentives.

Preference, Satisfaction, and Stress

All participants took part in a debriefing session during which they completed a preference, satisfaction, and stress questionnaire (Appendix G). These data are summarized in Table 6.
Figure 40. Average amount of money earned by participants across phases.

Table 6

Number of Participants Who Ranked the Three Pay Systems Most, Second, and Least Preferred, Satisfying, and Stressful

<table>
<thead>
<tr>
<th>Pay</th>
<th>Preferred</th>
<th>Satisfying</th>
<th>Stressful</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most</td>
<td>Second</td>
<td>Least</td>
</tr>
<tr>
<td>Inc</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hr Pay</td>
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<td>9</td>
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</tr>
<tr>
<td>Grp Inc</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

In terms of preference, 9 of the 11 participants indicated that they most preferred individual incentives, while all of the participants indicated that the group
incentive pay system was their least preferred pay system. In terms of satisfaction, 8 of the 11 participants indicated that they found individual incentives to be most satisfying of the three pay systems, while 8 of the 11 participants indicated that the group incentive system was the least satisfying pay system. In terms of stress, 7 of the 11 participants indicated that they found group incentives to be the most stressful of the three pay systems, while 8 of the 11 participants indicated that the hourly pay system was the least stressful of the three pay systems. Appendix N displays the preference, satisfaction, and stress data for each participant.

Several of the participants complained about the group incentive condition during the study, and one participant asked if he could be switched to a different group. When this participant was told that it was not possible to switch groups, he asked to be told who was in his group. This request was also denied. Upon reversal to individual incentives, this same participant simply said “Yay!” Another participant, upon receiving her first receipt from the group incentive condition stated, “This sucks!” These sentiments are reflected in the fact that the majority of participants reported that the group incentive condition was the least preferred, least satisfying, and most stressful of the three pay systems.
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.

The present study examined the performance levels of high performers under equally-divided group monetary incentives, individual monetary incentives, and hourly pay to determine: (a) whether the performance levels of high 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 changes in performance would be due to comparative feedback indicating that the participant is a high performer.

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.

The results of the current findings and their implications will be discussed first in terms of performance, then in terms of preference, satisfaction, and stress. Following this discussion, suggestions for future research will be made.

**Performance**

The results of the current study indicate that high performers increase their performance when paid monetary incentives as compared to hourly pay. All but one participant (P28) performed better when paid individual and group incentives than when paid hourly.

The results also indicate that high performers, when paid group monetary incentives, may or may not decrease their performance. Six of the 11 participants decreased their performance when exposed to the group monetary incentive condition. Of the six participants whose performance did decrease during the group incentive condition, only four increased their performance when reversed to individual monetary incentives. Of the remaining five participants, the performance of four was comparable under group incentives to their performance under the individual incentive conditions, and the performance of one increased during the
group incentive condition. Those participants who did decrease their performance during the group incentive condition did not appear to do so as the result of receiving comparative feedback indicating that they were high performers in the group. The performance levels of only two of these six participants (P23 and P28) decreased during the individual incentives with individual and group feedback condition (when the comparative feedback was first introduced), and P23’s performance levels recovered toward the end of the same phase. It would appear that the majority of participants who decreased their performance during the group incentives with individual and group feedback condition did so as the result of earning less money under the group incentive condition, rather than as a result of receiving comparative feedback.

Because only a minority of the participants’ performance decreased during the group incentive condition and then increased when reversed to individual monetary incentives, it is not possible to confidently state that high performers will decrease their performance when exposed to group incentives. When questioned, participants who failed to decrease performance during the group monetary incentive condition indicated that they were afraid it would decrease overall group performance even more, thereby further decreasing their pay. This suggests that verbal behavior (self-stated rules) may be a factor in determining whether or not an individual’s performance will change under various pay for performance systems.

Another potential reason for the lack of performance decrease may be that, in the current study, it was possible for a participant to be both on task and off task at
the same time. Because the participants were proficient at using the numeric keypad of the computer, and because participants attended sessions while other participants were attending sessions on nearby computers, they could talk to one another while they continued to perform the task. Additionally, participants were not told that they could not use their cell phones during sessions and use of cell phones was sometimes observed during sessions. This ability to engage in an alternative activity (talking with others) while still being able to perform the task may have prevented the participants from playing computer games (the intended alternative activity), which was not possible to do while still performing the task. However, it should be noted that this is likely to hold true in real work situations in which individuals can talk to others while they work. Another potential problem with running concurrent sessions may be that participants did not feel comfortable playing games while others were in the room and could see them being off task, especially since participants were not told who was in their group.

The amount of time spent working under group incentives may have also been a factor in the lack of performance change between individual and group monetary incentives. Had the participants been forced to work under a condition that resulted in less money for more sessions, they may have been less likely to maintain their high levels of performance. In the current study, participants attended 5-14 sessions under the group incentive condition. It is possible that this is not a sufficient amount of time to produce changes in performance for some individuals.
Preference, Satisfaction, and Stress

As stated previously, the majority of participants found the group incentive pay system to be the most stressful, least satisfying, and least preferred of the three pay systems. Therefore, although many of the participants performed comparably under the individual and group incentive conditions, they indicated that they found the group incentive condition less desirable under which to work.

These results are similar to those reported by Honeywell-Johnson et al. (2002). In that study, high performers were exposed to hourly pay with individual feedback, individual incentives with individual feedback, and group incentives with group feedback. All four indicated that the individual incentive pay system was their most preferred pay system and the one with which they were most satisfied. Three of the four reported that the group incentive system was the most stressful and the hourly pay was the least stressful. Participants were also asked to choose the pay system they would like to work under in the future. All four chose the individual incentive system. Thus, even though the participants found hourly pay to be the least stressful, all favored the individual incentive pay.

These results also support the recent findings of Kuhn and Yockey (2003). In one of their investigations of pay system preference, participants completed a survey questionnaire on which they were asked to choose between hypothetical job offers that differed only in terms of the pay system used. Participants were asked to indicate whether they would prefer the job that offered a fixed salary or a job in which they...
could possibly earn a substantial bonus. In one condition the bonus was said to be contingent on individual performance, while in another condition the bonus was said to be contingent on the performance of a team of approximately 10 employees. When the bonus was said to be contingent on individual performance, 72% of the participants chose this option. However, when the bonus was said to be contingent on the performance of the team, only 46% chose this option.

These results have implications for real work settings. If high performing individuals are unhappy with the way they are paid, over time it is feasible that they would become less satisfied with their job, which may lead to increases in turnover (Miceli & Mulvey, 2000). This suggests that while performance differences may not occur when high performers are paid group monetary incentives, businesses may still want to exercise caution when deciding whether to use such a pay system if high performers exist. For the purposes of keeping job satisfaction levels, as well as performance levels, high, an individual incentive pay system may be a better choice.

_Suggestions for Future Research_

Based on the results of the current study, some suggestions for future research should be considered. Future researchers, when using performance tasks that do not require the participant to attend only to the task, may want to consider isolating participants during their sessions and disallowing the use of cell phones. In this way, the participant's only choice is to be on task or off task. It would not be possible to do both.
When questioned about their failure to decrease their performance during the group incentive condition when they had indicated that they found it to be less preferred, less satisfying, and more stressful than the other pay systems, two participants stated that they would have stopped performing if they had known that they had reached the minimum criterion during the hourly pay condition or the group average during the group incentive condition. These participants stated that part of the reason they didn’t perform worse on the task was because they didn’t know how many checks they were correctly completing during the session. This is due to the fact that participants were not given within session feedback about their own performance. Rather, they received both individual and group feedback before their next session. These participants stated that they were afraid that if they stopped performing, they might not have processed enough checks to earn their pay for the session during the hourly pay condition, or to perform comparably to the other group members during the group incentive condition. Future researchers may want to consider using within session feedback to determine whether an individual’s access to such information affects performance.

Social contingencies that may be in effect in work situations in which individuals perform as a team were not investigated in the current study. It is likely that, in work teams, all members of the group would know who the other members were and that they would often work collaboratively. In this type of situation, it would be possible for individuals to exert control over other individuals’ performance by helping other group members, making comments to or about other group members, making comments to or about other group members.
members, etc. Future researchers may want to investigate the effects such contexts have on both performance and satisfaction levels under hourly pay, individual incentive, and group incentive systems.
Appendix A

Recruitment Script
Recruitment Script

Hello! My name is Heather McGee and I am a doctoral student in psychology at Western Michigan University. My area of specialization is organizational behavior management. I am looking for individuals to participate in a study designed to determine how individuals perform a data entry task when they are paid different ways. The data entry task simulates the job of a proof operator at a bank and consists of entering numbers using the numeric keypad on a computer. Computer games will also be available during the sessions if individuals want to play them. The study will be conducted in Wood Hall on WMU's campus.

Participation will require you to attend a minimum of 25 45-minute sessions and a maximum of 50 sessions, for a total of at least 18 hours 45 minutes, not to exceed 37 hours 30 minutes of your time, over a 7 to 14 week period of time. The amount of money you will be paid will depend upon your performance, but it is likely that you will earn at least $150.00 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 25 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 learn more about this study and play computer games at least one hour a week, please print your name, phone number and email address on a sheet of paper and give it to me. I am also handing out a sheet of paper with my name, telephone number and email address, and you can contact me by telephone or email if you prefer.

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

Participant Computer Game Use Screening Questionnaire
Participant Number ________________

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

1. Do you play any of the following computer games?
   - Tetris ______ Yes ______ No
   - Solitaire ______ Yes ______ No
   - Pinball ______ Yes ______ No
   - Minesweeper ______ Yes ______ No
   - Hearts ______ Yes ______ No
   - Spider Solitaire ______ Yes ______ No
   - Freecell ______ 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 know anyone that has signed up to participate in the study? Please list their names.

4. If you know anyone that might be interested in signing up for the study, please refer them to Heather McGee at (269) 470-0506.

Thank you!
Appendix C

Pay Condition Quiz
Pay Condition Quiz

Participant: _____________

HOURLY PAY SYSTEM:
Individuals are paid $5.75 for a 45-minute session.

INDIVIDUAL INCENTIVE PAY SYSTEM:
Individuals are paid $.006 for every check correctly processed during the session.

GROUP INCENTIVE PAY SYSTEM:
Individuals are paid $.006 for every check correctly processed during the session, determined by the group’s average number of correctly processed checks.

Answer the following questions based on the above pay systems.

1. Sally correctly processed 1120 checks during a session. Sally’s group correctly processed 1000 checks.
   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 correctly processed 800 checks during a session. Don’s group correctly processed 1200 checks.
   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 correctly processed 650 checks during a session. Virginia’s group correctly processed 620 checks.

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 D

Consent Document
The Effects of Hourly Pay, Individual Monetary Incentives and Group Monetary Incentives on Performance

Western Michigan University
Department of Psychology

Principal Investigator: Dr. Alyce M. Dickinson
Student Investigator: Heather M. McGee

I have been invited to participate in a research study intended to investigate the effects of different types of pay on work performance. This project is Heather McGee’s dissertation project. Dr. Dickinson is her advisor.

Participation requirements. During today’s introductory session, my eligibility to participate in this study will be determined. First, I must indicate that I spend a certain amount of time using computer games and that I am available to attend scheduled sessions. Second, the experimenter will explain the ways I will be paid during the study. After that explanation, I must pass a quiz that tests my understanding of the ways I will be paid. Additionally, participants in the study need to perform at certain levels on the data entry task. My performance on the data entry task will be assessed during today’s session. If I perform at a certain level and meet the other eligibility requirements, I will be invited to participate. If not, I will be paid $5.75 for attending the session, but will not be invited to participate in the study.

Explanation of study procedures and length of participation. I will perform a computerized data entry task. Simulated bank checks will be displayed on the computer screen and I will type the amounts of the checks using the computer keyboard. Each session will be 45 minutes and I will be asked to attend at least 25 sessions. Thus, my total time commitment will be at least 18 hours 45 minutes. I may be asked to attend up to 50 sessions, for a total of 37 hours 30 minutes. I will be asked to schedule at least three sessions per week, thus I will be involved in the study for 8 to 13 weeks. I will be able to take a break and engage in other activities (i.e., computer games) at any time during my scheduled sessions.

Compensation. I will receive monetary compensation for my participation in the study. I will receive $5.75 immediately following today’s introductory session. During the study, I will be paid three different ways. In some sessions, I will be paid $5.75 per session as long as I correctly process a minimum of 490 checks. In other sessions, the amount of money I will earn will depend upon how many checks I correctly process. In other sessions, the total amount of money I earn will depend on the average number of correctly processed checks completed by the group to which I am assigned. I will be paid in cash once a week. 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 $120.00 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 25 sessions. The more sessions I attend, the more money I will make.

**Benefits.** The only benefit I will receive for participating in this study will be the amount of money I earn. The data obtained from this study will help determine how different pay systems affect the performance of individuals. This knowledge may allow businesses to design better pay systems.

**Risks.** The amount of time it will take to participate in this study will be inconvenient. I may experience physical discomfort associated with the data entry task. This will be offset by the fact that the computer workstations have been set up in accordance with accepted ergonomic standards provided by the Occupational Safety and Health Administration. In addition, I may take work breaks whenever I want and will be prompted by the experimenter to take breaks during the session. During the 45-minute sessions, I may also 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 want. Because of past experience with the type of task that will be used in this study, individuals perform differently on it. My performance may be different than the performance of others and this may be stressful to me as well.

**Confidentiality.** All information obtained in this study will remain strictly confidential. When results of the study are presented publicly, I will not be identified. I will be assigned a number and that number will be used to identify my data. By signing this consent document, 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 penalty. 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. At the end of the study, the experimenter will answer any questions I have and explain how my data will help to learn more about pay systems.

**Who to contact with questions.** If I have any questions concerning this study I may call Heather McGee at (269) 470-0506. 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.

<table>
<thead>
<tr>
<th>Participant Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Consent obtained by:

<table>
<thead>
<tr>
<th>Initials of researcher</th>
<th>Date</th>
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*Please keep the attached copy of this form for your records.*
Appendix E

HSIRB Approval Letter
Date: November 17, 2003

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

From: Mary Lagerwey, Ph.D., Chair

Re: HSIRB Project Number: 03-11-04

This letter will serve as confirmation that your research project entitled "The Effects of Hourly Pay, Individual Monetary Incentive Pay and Group Monetary Incentive Pay on High 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 17, 2004
Appendix F

Computer-Based Task Sample Screen
Pay to the order of $267.79
Two hundred sixty-seven and 79/100

Enter the amount in the check shown above:

Enter only numbers and decimal example: 150.77
Appendix G

Data Recording Form
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</tr>
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</table>
Appendix H

Preference, Satisfaction, and Stress Level Questionnaire
Satisfaction and Stress Questionnaire  

Participant: ______

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 Hourly pay condition
   - During the first Individual Incentive pay condition
   - During the second Individual Incentive pay condition
   - During the Group Incentive pay condition
   - During the third Individual Incentive 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 I

Pay Receipt (Hourly Pay and First Individual Incentive Condition)
SESSION RECEIPT

Participant Number: ____________________________

Session Date: ____________________________

Number of Checks Completed Correctly: __________

Amount Earned (Hourly): ____________________________

Amount Earned (Ind. Incentives): $0.06 X __________ = __________
Appendix J

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

McGee Dissertation

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 number of checks you correctly process during this session. For every check you correctly process, you will be paid $0.006.

GROUP INCENTIVE CONDITION: Today you will be working in the group monetary incentive condition. You will be paid based on the average number of checks correctly processed by the group of 10 to which you are assigned. For every check in the group average, you will be paid $0.006.

HOURLY PAY CONDITION: Today you will be working in the hourly pay condition. You will be paid $5.75 for the session, provided you correctly process a minimum of 490 checks.

Feedback Script

Before the session begins, give the subject his/her receipt for the last session and read the following (do not read the part in parentheses during the hourly pay condition):

During your last session the _________ pay condition was in effect. You correctly processed _________ checks. (The group correctly processed _________ checks.) 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 are available on the computer.
Appendix K

Pay Receipt (Individual and Group Incentives)
SESSION RECEIPT

Participant Number: __________________________

Session Date: __________________________

Number of Checks Completed Correctly: ______

Number of Checks Completed Correctly by Group: ______

Amount Earned: $.006 X ______ = ______
Appendix L

Pay Scale
## Pay Scale

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Appendix M

Debriefing Script
Script for Debriefing

McGee Dissertation

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.

   E. The purpose of this study is to determine if high performance decreases when individuals are paid group incentives as compared to performance when individuals are paid individual incentives.

   F. If high performance decreases when individuals are paid group incentives 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 five phases of the study as follows:

A. Phase 1 was an hourly pay with individual feedback condition in which you were paid $5.75 per session, as long as you correctly completed 490 checks. In work settings, employees must perform at minimum levels to avoid supervisory criticism and being fired. This minimum requirement was designed to simulate that contingency.

B. Phase 2 was an individual monetary incentive with individual feedback condition. In this phase, you were paid based on how many checks you correctly processed in each session. This phase was included to determine whether your performance would increase, decrease, or remain the same when you were paid monetary incentives.

C. Phase 3 was an individual monetary incentive with individual and group feedback condition. In this phase, you were paid based on how many checks you correctly processed in each session. You were given both individual and group feedback during this phase. However, there wasn’t actually a group, and the average performance of the group was contrived. It was calculated so that the group’s performance was 25% lower than your performance.

D. Phase 4 was a group monetary incentive with individual and group feedback condition. In this phase, you were paid based on how many checks the simulated group correctly processed. Again, however, there wasn’t actually a group and the average performance of the group was contrived to be 25% lower than your performance.

E. Phase 5 was a reversal to individual monetary incentives with individual and group feedback (Phase 3).

F. During Phases 3-5, both individual and group feedback were included to control for the fact that individuals may perform differently as a function of being made aware of the fact that they are a high performers as compared to others in their group. By holding this information constant across phases, any performance changes that occurred when you were paid different ways would necessarily be due to the pay condition in effect, not the feedback that was provided.

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

4. Show the participant graphs of his/her performance (scores, rate, 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 N
Pay System Preference, Satisfaction, and Stress Rankings
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base pay plus incentives. *Journal of Organizational Behavior Management, 14*(1), 3-82.


