

The Effects of Individual and Group Monetary Incentives on High Performance

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Surveys conducted over the past decade have consistently reported that about 35% of U.S. companies pay their employees individual monetary incentives and about 15%-20% pay their employees small group monetary incentives (Gross, 1995; Peck, 1990). While individual monetary incentive systems are currently more prevalent in business and industry, the use of small group incentives is increasing. In one survey, 39% of the respondents who did not use group incentives reported that they were considering them (Gross, 1995). Based on the results of another survey, Ledford and Hawk (2000) reported that the use of small group monetary incentives in Fortune 1000 firms increased by 50% between 1987 and 1996. This increase reflects the fact that many organizations have adopted group pay plans to support new organizational structures based on work teams (Flannery, Hofrichter, & Platten, 1996).

Given the prevalence of individual and small group monetary incentives, a solid research base investigating their efficacy is both warranted and necessary. To date, only 39 systematic studies investigating the effects of individual incentives (Jenkins, Gupta, Mitra, & Shaw, 1998) and 10 studies investigating the effects of group incentives (Honeywell-Johnson, McGee, Culig, & Dickinson, 2002) have been conducted. Additionally, only six studies have compared the relative effects of individual and equally-divided small group incentives (Allison, Silverstein, & Galante, 1992; Farr, 1976; Honeywell, Dickinson, & Poling, 1997; London & Oldham, 1977; Stoneman & Dickinson, 1989; Thurkow, Bailey, & Stamper, 2000).

Conceptually, some compensation experts have maintained that individual monetary incentives are likely to result in higher performance than small group incentives because the link between a person's pay and his or her performance is tighter (Dierks & McNally, 1987; Lawler, 1990; McCoy, 1992). That is, when individuals are paid individual monetary incentives, the incentives are based solely on the performance of the individual employee whereas when individuals are paid group incentives, the incentives are

This study examined whether high performers performed better (a) under individual and group incentive pay than under hourly pay and (b) under individual incentive pay than under group incentive pay. Participants were 11 college students. An ABCDC within-subject design was used in which A was hourly pay with individual feedback, B was individual incentives with individual feedback, C was individual incentives with individual and group feedback, and D was group incentives with individual and group feedback. Participants performed better under both individual and group incentive pay than under hourly pay ($p < .01$). They did not significantly decrease performance when switched from individual to group incentives, but increased their performance when switched back to individual incentives ($p < .01$). Individual incentive pay was rated as the most preferred and most satisfying of the three pay systems, and group incentive pay as the least preferred, least satisfying and most stressful. These data suggest that high performers perform better under individual than group incentive pay after exposure to both and are highly likely to prefer individual incentive pay.

based on the total performance of the group. Because workers have less control over the group's performance and hence their individual earnings, they may be less productive than when they are paid individual incentives.

Others have reasoned, however, that individuals may perform just as well when paid small group monetary incentives as when they are paid individual incentives (Honeywell-Johnson & Dickinson, 1999). Although the link between performance and pay is not as tight with small group incentives as it is with individual monetary incentives, workers in small groups can still substantially influence the group's performance, thereby significantly increasing or decreasing their own earnings by their individual efforts. Even though individuals do not have as much control over their earnings when they receive group incentives, the control they have may be sufficient to maintain the same level of performance. Additionally, social contingencies that operate within the group may function to support higher performance levels (Honeywell-Johnson & Dickinson, 1999).

Somewhat surprisingly, as indicated earlier, only six experimental studies (as opposed to survey studies) have directly compared the effects of individual and small group incentives on performance (Allison et al., 1992; Farr, 1976; Honeywell et al., 1997; London & Oldham, 1977; Stoneman & Dickinson, 1989; Thurkow et al., 2000). In business and industry, the median number of members in a work team is 10 (McAdams & Hawk, 1992; Peck, 1990); in these six studies, the size of the groups ranged from 2-12 members. In four studies, individuals performed comparably when they were paid individual incentives and group incentives that were equally divided among group members (Farr; Honeywell et al.; London & Oldham; Stoneman & Dickinson); in two, individuals performed better when they were paid individual incentives (Allison et al.; Thurkow et al.).

In a recent statistical meta-analysis of 45 published studies and additional survey data from organizations that had adopted both cash and non-cash incentive programs, Stolovitch, Clark, and Condly (2002) reported that incented teams increased their performance by 45% while incented individuals increased performance an average of only 27%. They hypothesized that the larger improvement shown by incented groups might be due to "peer pressure," that is, social contingencies that develop within the group. They also reported that team member retention is lower in organizations that provide group incentives, and suggested that assessment by others in the group may "drive out under-performing" team members.

The reasons why the performance data from the aforementioned direct experimental comparisons and Stolovitch et al. (2002) differ are unclear. Nonetheless, Stolovitch et al. proposed that team member attrition might account for the higher incented team performance because low performers leave the organization. Preference and satisfaction data from two studies indicate that high performers prefer individual incentives over either group incentives or hourly pay, while low performers prefer group incentives over individual incentives or hourly pay (Honeywell et al., 1997; Honeywell-Johnson et al., 2002). In these studies, high performers also reported that group incentives were more stressful than either individual incentives or

hourly pay. The reasons high performers found group incentives to be more stressful are not known because, unfortunately, the researchers did not ask participants to explain their responses; rather they only asked them to rank order the three pay systems in terms of how stressful they were. However, their rankings may have been due to the fact that they had to work harder to earn the same amount of money and had less individual control over the amount of money they earned.

The preceding preference, satisfaction and stress data suggest that under group incentives, high performers may well become dissatisfied with lower performing team members over time, exerting pressure on them to leave the organization, as suggested by Stolovitch et al. (2002). Thus, the current study could shed further light on the proposal offered by Stolovitch et al. regarding the reactions of group members as well as providing useful information to organizations regarding employee satisfaction with individual and group incentive pay.

Analysis of Experimental Studies: High Performance

In an attempt to reconcile the mixed results of the experimental studies, Honeywell-Johnson and Dickinson (1999) proposed that when individuals perform the same when paid individual and equally divided group monetary incentives it may be due to the fact that individuals within the group perform similarly to one another. If individuals within the group perform similarly to one another, the amount of pay they receive under individual and group incentives does not vary much. For example, assume that under an individual monetary incentive system, individuals receive 10 cents for each part they assemble. If each individual assembles 100 parts, each would earn \$10.00 in incentives. Now assume that individuals are paid equally divided group incentives based on the performance of a 10-person group. Given that each member assembles 100 parts, the total number of parts produced by the group would equal 1000, and the total amount of the incentives earned by the group would equal \$100.00. Each individual would earn \$10.00; the same amount each would earn under the individual incentive system. Given that the individual's pay does not vary under individual or group incentives, one would not expect performance to differ under the two incentive systems.

If, however, individuals are high performers in comparison to others in the group, their earnings will be lower when they are paid group incentives. For example, if a high performer assembles 100 parts, while other group members each assemble 75 parts, the total number of parts produced by the group would be 775. Under the individual incentive system, the high performer would earn \$10.00 in incentives whereas under the group incentive system, the high performer would earn only \$7.75 in incentives. In this situation, high performers might decrease their performance over time because they see their earnings decrease due to the lower performance of

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others (Dierks & McNally, 1987). Although the preceding analysis focuses on the effects of the two pay systems on high performers, decreases in their performance could decrease the group's total performance, which would be of practical significance to the organization.

The individual performance data necessary to determine whether members of the group performed similarly to one another were reported in only three of the six studies that have been conducted (Honeywell et al., 1997; Stoneman & Dickinson, 1989; Turkow et al., 2000). Only group data were reported in the other three (Allison et al., 1992; Farr, 1976; London & Oldham, 1977). In the studies that reported individual data, the data support the proposition made by Honeywell-Johnson and Dickinson (1999).

In a preliminary study, Honeywell-Johnson et al. (2002) examined the possibility that group monetary incentives would decrease high performance. The performance of three of four high performers was 12%, 14% and 16% lower when they were paid group monetary incentives than when they were paid individual incentives. The performance of the fourth increased throughout the study. A major purpose of the current study, therefore, was to determine whether these results were reproducible.

Analysis of Literature: Satisfaction and Preference

Of the six aforementioned experimental studies that compared individual and group monetary incentives, five assessed participant reaction to the different pay systems (Allison et al., 1992; Farr, 1976; Honeywell et al., 1997; Honeywell-Johnson et al., 2002; Turkow et al., 2000). Two of the studies compared ratings of satisfaction for hourly pay, individual incentives and group incentives using Likert-type rating scales (Allison et al.; Farr), and one compared ratings of satisfaction for individual incentives and group incentives, again using a Likert-type scale (Honeywell et al.). In Allison et al. and Farr, ratings were comparable for all three pay systems. Similarly, in Honeywell et al. ratings were comparable for individual and group incentives.

Two of the five studies also examined forced-choice preference for the pay systems (Allison et al., 1992; Honeywell et al., 1997). In Allison et al., when the twelve performers were forced to choose among the three pay systems, they expressed a strong preference for the group monetary incentives. In contrast, preferences were split in Honeywell et al., with 10 subjects choosing the individual incentive system and 7 choosing the group incentive system as their most preferred pay system. A more detailed analysis, however, revealed that the high performers preferred the individual incentive system while the low performers preferred the group monetary incentive system. Turkow et al. (2000) collected only forced-choice preference data. In that study, over 80% of the performers preferred individual incentives to group incentives.

As indicated earlier, Honeywell-Johnson et al. (2002) examined the performance and satisfaction of four high performers when they were exposed to hourly pay, individual incentive pay and group incentive pay. In

that study, all four participants were more satisfied with the individual incentive system than with either the group incentive pay or the hourly pay. All four also selected the individual incentive pay as their most preferred type of pay. In addition, three of the four indicated that the individual incentive pay system was the *least* stressful and that the group incentive pay system was the *most* stressful. These data are consistent with the satisfaction and preference data for the high performers in the Honeywell et al. (1997) study. Thus, the data from Honeywell et al. and Honeywell-Johnson et al. suggest that high performers prefer individual monetary incentives while low performers prefer group monetary incentives.

The Current Study

The current study was conducted to determine whether the results from Honeywell et al.'s (2002) preliminary study were reproducible. Specifically, the first purpose was to determine whether high performers would perform better when they were paid individual incentives than when they were paid equally divided small group incentives. The second was to determine which of three pay systems (hourly pay, individual incentive pay, or group incentive pay) high performers preferred, found most satisfying and least stressful.

The effects of social contingencies were not investigated in the current study. While recognizing the importance of these variables, we first wanted to explore the effects of the pay contingencies themselves. If consistent and reliable effects of the pay systems can be obtained, then it enables researchers to better isolate the effects of the pay systems from the effects of social contingencies, which may vary from team to team depending upon its members. Nonetheless, it is important to be cognizant of the potential power of social contingencies, and interpret the results of the current study with that in mind. This study should be considered research that lays the groundwork for the future exploration of how social contingencies may alter the performance of individuals when they are paid group incentives and the types of contingencies that are generated by individual versus group monetary incentive systems.

The study was a laboratory simulation that permitted isolation of the effects of the monetary incentive systems as recommended by Opsahl and Dunnette (1966) in their classic paper "The role of financial compensation in industrial motivation." These authors appealed to researchers to conduct laboratory studies so that the effects of financial incentives could be isolated from administrative changes that accompany them in the work place. While there are legitimate concerns that results from the laboratory will not generalize to work settings, to date all reviews of incentive studies have reported that laboratory studies produce results that are consistent with those obtained in the field (Bucklin & Dickinson, 2001; Hantula, 2001; Jenkins, 1986; Jenkins et al., 1998).

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Method

Participants

Participants were 11 male and female college students. The students were juniors and seniors between the ages of 19 and 27. They 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 correctly processed checks during a 45-minute session. This criterion was one standard deviation above the mean performance of participants in a pilot study who performed the same task, thereby ensuring that the current participants were, in fact, high performers.

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. The purpose of including computer games as alternative tasks was to simulate off-task activities that real workers can engage in at the work place. Incentives may increase performance primarily by reducing the time workers spend performing attractive off-task activities. If, in the current study, attractive off-task activities were not available, participants might have spent all of their time performing the experimental task because they had nothing else of interest to do, negating any differences that would otherwise occur due to the different payment systems. It was not possible to duplicate the wide variety of attractive off-task activities that are available at work in a laboratory setting. Restricting participants to those who found computer games attractive insured that at least one attractive off-task activity was available as an alternative to the experimental task. Results of previous studies have shown that these computer games function effectively as attractive alternative tasks in this type of research (Bucklin, McGee, & Dickinson, 2003; Johnson, Culig, & Dickinson, 2005; Matthews & Dickinson, 2000). For example, both Johnson et al. and Matthews and Dickinson compared the effects of hourly pay and individual incentive pay on the time college student participants spent playing the games versus performing the experimental work task. In both studies, the majority of participants played the computer games at least part of the session. Additionally, in both, participants who were paid hourly spent significantly more time playing the games than those who received individual incentive pay. Another reason for using computer games as off-task activities is that they have ecological validity. Many workers have access to computers, and therefore computer games, at their workstation. And, while many companies ban games that come standard on computers, workers who have Internet access are still able to access computer games. Several studies have shown that workers do play computer games as an alternative to working (Betts, 1995; Eng & Schwartz, 1993; Klett, 1994).

Participants were screened according to one more criterion in addition to keyboard proficiency and computer game play. After the experimenter had explained the three pay systems (hourly pay, individual incentive pay and group incentive pay) that were to be used in the study, participants were required to score 100% on a quiz that tested their understanding of them. The 100% criterion ensured that all performers could accurately calculate

their wages under all pay conditions. The questions were very basic. For example, participants were asked to calculate what a person would earn if he correctly completed 854 checks in an hour and was paid \$.006 per check, or if he correctly completed 923 checks in an hour and was paid \$5.75 per hour. The questions were piloted with participants in a pilot study and 100% of the pilot participants were able to answer the questions correctly. No one was screened out of the current study based on this criterion.

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. Participants entered the cash values in a box at the bottom of the computer screen, using the computer's numeric keyboard. When the participant had entered the number, he or she pressed the enter key to complete the transaction and move onto the next check. This task was chosen because it was a rate oriented task in which performers had a high level of control over their performance. Because participants could easily alter their rate of performance, task performance was very sensitive to changes in the independent variables. In addition, many individuals have very good keyboarding skills, which decreased learning time. While the monotonous nature of the task did not mimic some of today's more diverse and creatively challenging jobs, the literature suggests that this equivalence is "not necessarily required in order to achieve generalizability" (Locke, 1986, p. 6). Based on several literature reviews that examined whether the results of laboratory investigations generalize to work settings, Locke (1986, p. 6) concluded:

Restricting participants to those who found computer games attractive insured that at least one attractive off-task activity was available as an alternative to the experimental task.

Both college students and employees appear to respond similarly to goals, feedback, incentives, participation, and so forth, perhaps because the similarities among these subjects (such as in values) are more crucial than their differences. Task differences do not seem to be overwhelmingly important. Perhaps all that is needed is that the participants in either setting become involved in what they are doing.

Nonetheless, caution should still be exercised when generalizing to other types of tasks until additional studies are conducted.

As indicated earlier, participants also had access to computer games. Participants were allowed to play any one of seven popular computer games at any time during the sessions.

Dependent Variables

The primary dependent variable was the total number of correctly completed checks per session. Three variables that may have affected the

number of correctly completed checks were also measured: percent correct, time on task (number of minutes spent performing the task rather than the alternative tasks), and rate of performance (number of correctly completed checks per minute spent performing the task). The accuracy measure also permitted an assessment of whether the three pay systems (hourly pay, individual incentive pay and group incentive pay) affected quality differently. The computer program automatically recorded all data necessary to calculate the dependent measures.

In addition, at the end of the study, participants were asked to rank the three pay systems in terms of preference, satisfaction and the extent to which they found them stressful.

Independent Variables

The independent variables were type of pay system (hourly, individual incentive, and group incentive) and type of feedback (individual or individual and group). Each is described in detail in the *Experimental Procedures* section.

Experimental Design

A within-subject design was used (Kazdin, 1994; Morgan & Morgan, 2001). 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 in an ABCDC sequence. See Figure 1 for data from sample participants which illustrate the phases of the study. The conditions are described in the *Experimental Procedures* section.

Unlike between group studies, in which large numbers of participants are used to control for between-participant variability, in within-subject designs, each participant serves as his or her own control. In other words, a participant's performance in one phase of the study is compared with his or her own performance in other phases (Kazdin, 1994; Morgan & Morgan, 2001), thus eliminating the need to control for this between participant variability. This permits the use of smaller numbers of participants when assessing the effects of the independent variable (Kazdin; Morgan & Morgan).

Large numbers of participants are also used to assess the external validity of the results. Given economic and practical constraints, we chose to examine the performance of a smaller number of individuals over multiple trials to assess the effects of repeated exposure to the independent variables, believing that performance may differ with repeated exposure rather than one or two exposures as is typically done in between-group studies.

Experimental sessions were 45 minutes. In order to interpret data correctly using a within-subject design, the performance of the participant must be stable before a new phase is implemented. In the current study, there was a minimum of five sessions per phase. Performance was considered stable when the number of checks correctly processed by the participant was within + or - 10% for three consecutive sessions. Participants attended from 29 to 42 total sessions with 5 to 14 sessions per phase.

Experimental Procedures

General procedures. Participants worked independently during all five experimental phases, but during the two individual incentive pay with individual and group feedback phases (Condition C) and the group incentive pay with individual and group feedback phase (Condition D), they were told that they were part of a 10-person work group. The groups, however, were simulated. Simulated group procedures have been used successfully in a number of previous research studies (e.g., Honeywell et al., 2002; Mullen, Johnson, & Anthony, 1994). Groups were simulated via verbal instruction. Before the group feedback sessions the experimenter told the participant, "Today you will be working in a group of ten and your performance will be combined with theirs. We will give you individual feedback as well as feedback about the average performance of the group members." Before the group incentive sessions, the experimenter explained, "You will now be paid based on the average number of checks correctly completed by the group of 10 to which you are assigned. For every check in the group average, you will be paid \$.006." The group's average performance was contrived in a manner that informed the participant that he or she was performing approximately 25% higher than the other members of the group. The specific formula used to calculate the group average performance is provided below in the *Individual incentive pay with individual and group feedback (Condition C)* section.

With the exception of the first week, participants were paid in cash before the first session of the week or, if phases were changed during the week, before the first session of a new phase. Before each session began, the experimenter gave participants performance feedback from their preceding session (either individual or individual and group feedback, depending upon the phase) and reminded them of the pay system in effect. The experimenter gave feedback to participants before they began their next session rather than immediately after each session because if participants received feedback immediately after the sessions during the simulated group conditions, it would have decreased the likelihood that they would have believed that their score was being combined with the scores of nine other individuals. In order to control for potential confounds due to the timing of the feedback, the same feedback procedure was used in all conditions.

Before each session, the experimenter also told participants that they could take work breaks whenever they wanted for as long as they wanted and that the computer games were available on the computer. The experimenter then left the room and returned only to end the session. The experimenter was not present during sessions to control for reactivity. That is, participants may have been less likely to engage in off task activities if the experimenter had been present.

Hourly pay with individual feedback (Condition A). Participants were paid \$5.75 for each 45-minute session if they processed at least 490

Unlike between group studies, in which large numbers of participants are used to control for between-participant variability, in within-subject designs, each participant serves as his or her own control.

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 minimum was one standard deviation below the mean performance of pilot participants who were paid hourly and attended ten sessions. For feedback, before each session, the experimenter gave participants a receipt that indicated the total number of correctly processed checks and the amount of money they earned in their previous session.

Individual incentive pay with individual feedback (Condition B). Participants were paid \$.006 for each check processed correctly. Participants earned \$5.75, an amount comparable to the hourly pay, if they processed at least 960 checks per session. This equivalency was based on the average performance of participants who were paid individual monetary incentives in a pilot study. Participants who processed more than 960 checks earned more money because of the incentive pay. They received the same feedback as they did in the preceding condition (Condition A).

This condition was included for two reasons. First, comparison of performance during this condition and the preceding one permitted an assessment of whether monetary incentives controlled performance. If they did not, then one could not logically compare the differential effectiveness of two types of incentive pay systems; in this case, individual and group incentives. If participants performed better during this phase than during the hourly pay phase, control by the incentives would be demonstrated.

Second, this condition was necessary to determine the participants' performance when participants were paid individual incentives. As indicated below, their performance during this condition was used to determine the simulated group's performance.

Individual incentive pay with individual and group feedback (Condition C). As in the preceding phase, participants were paid \$.006 for each check processed correctly. For feedback, the experimenter gave participants a receipt that indicated the number of checks they correctly processed, the average number of checks correctly processed by the simulated group and the amount of money they earned. The simulated group average was calculated so that it was approximately 25% below (with a range of 23%-27% randomly determined in advance) the average performance of the participant during the last three sessions of the preceding phase (individual incentives with individual feedback). We used the data from the last three sessions because the participant's performance was considered stable according to our stability criterion. The following formula was used to determine the group average: $[(\text{about } .75 \times \text{average performance} \times 9) + \text{the participant's current session performance}] / 10$. Although the inclusion criteria ensured that the participants were high performers, the formula insured that all of the participants differed from the "group's average" by the same degree. Ensuring that the group average was approximately 25% lower than the participant's performance 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 or she is given group feedback and paid group incentives.

Group incentive pay with individual and group feedback (Condition D). The pay earned by each participant was based on the average performance of the simulated group, which was calculated the same way as in the preceding condition. Similar to the individual incentive conditions, participants received \$.006 per correctly processed check in the simulated group average. Thus, the participants earned \$5.75 per session if the group average was 960 checks. The feedback was the same as in the preceding condition.

Individual incentive pay with individual and group feedback (Condition C). The procedures described previously for this condition were re-implemented as the final phase.

The inclusion of both individual and group feedback during the last three incentive phases provided control for the fact that participants may have performed more poorly under the group incentive condition simply because they became aware of the fact that they were high performers, and not necessarily because they were receiving less money because of the group incentive pay. By holding this information constant across the individual and group incentive conditions, any significant performance differences that occurred could be attributed to the pay system itself, rather than to the knowledge that the participant was a high performer in the group.

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Data Analysis

The effects of the interventions on the main dependent variable, the number of correctly completed checks, were analyzed using the time-series methods described in Huitema and McKean (2000a,b) and McKnight, McKean and Huitema (2000). These statistical procedures were developed specifically to analyze within-subject data, which violate basic assumptions of statistical procedures used to analyze between-group data (such as the analysis of variance). The data were analyzed using the double bootstrap software package TIMESERIES (Department of Statistics, Western Michigan University).

In addition, correlations were calculated to determine relationships among the (a) number of correctly completed checks, (b) percentage of correctly completed checks, (c) time spent performing the task (as opposed to performing off-task activities), and (d) the number of correctly completed checks per minute. The individual within-subject zero-lag cross correlations among the four dependent variables were computed. These correlations were then averaged by transforming each correlation to Fisher's Z, averaging the Zs, and then back-transforming the average Z to obtain the average r.

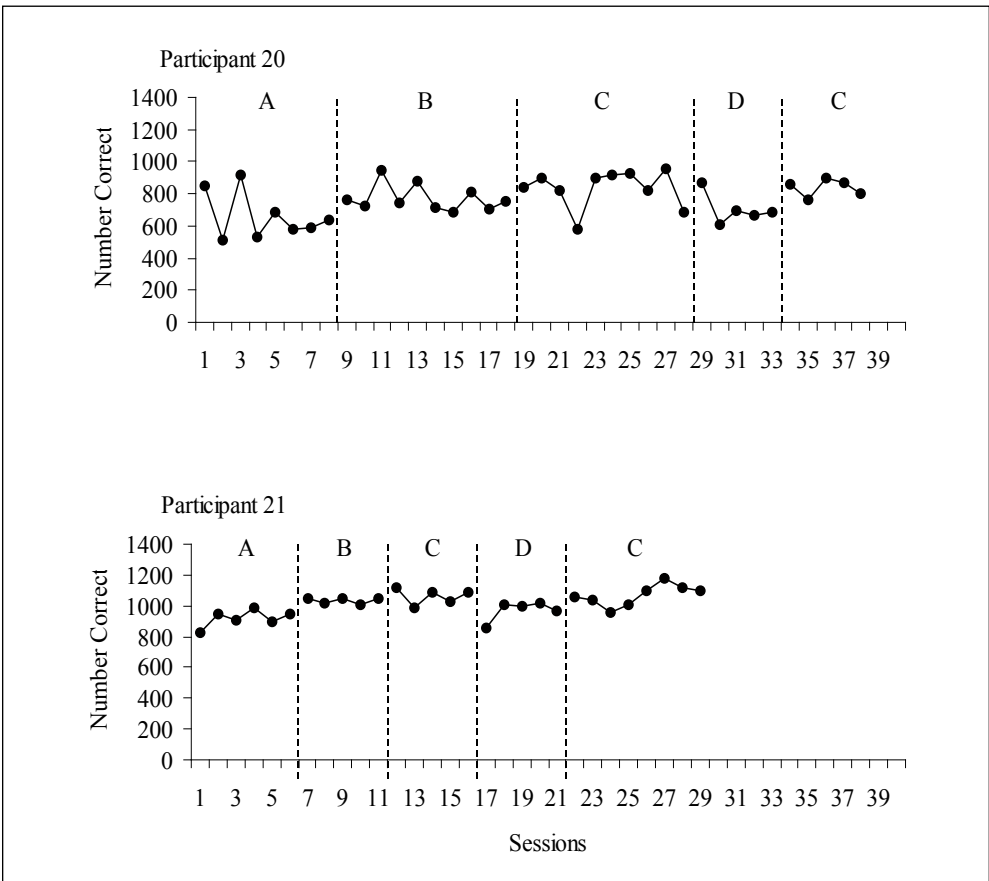
Results

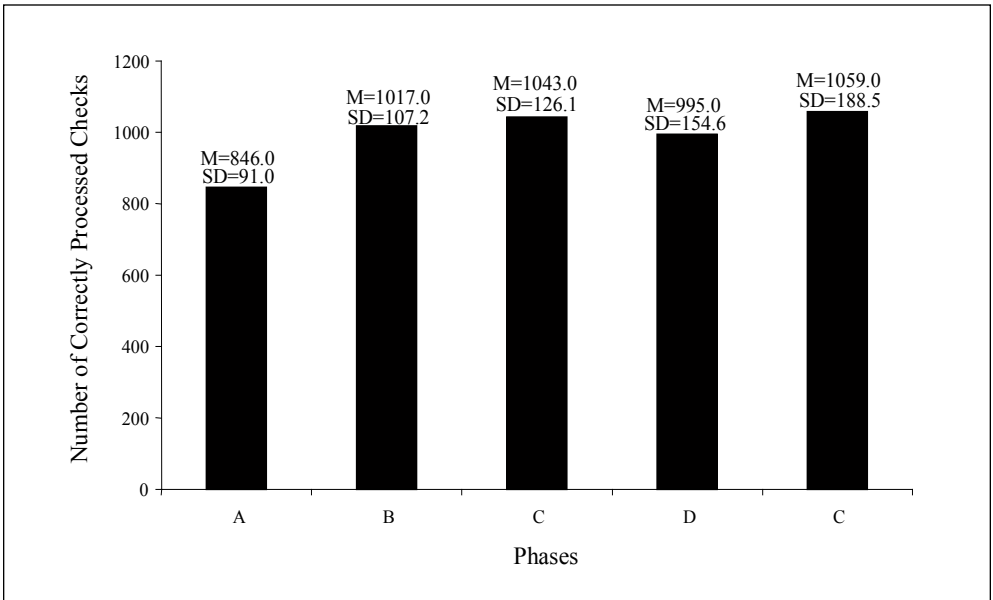
Number of Correctly Completed Checks per Session

To review, there were five phases: (A) hourly pay with individual feedback; (B) individual incentive pay with individual feedback; (C) individual incentive pay with individual and group feedback; (D) group incentive pay with individual and group feedback; and a reversal back to (C) individual incentive pay with individual and group feedback. Figure 1 displays a sample of the individual data across phases for three participants. Figure 2 displays the average number of checks correctly completed by all participants during each phase.

For the statistical analyses, two types of intervention effects were calculated to depict the differences in the number of checks completed correctly between a given phase and the subsequent phase: the change in (a) slope and (b) level. There are several data points within each phase. The slope measures if the data points within the phase are trending up or down. Differences between the slopes for adjacent phases were statistically compared to assess whether the independent variable affected the trends in the data.

FIGURE 1.
Sample performance data across phases.





Specifically, a regression line which best fit the data was fitted to the series of data points in each phase and the slope of the lines determined and compared (e.g., slope of the line in Phase A with the slope of the line in Phase B; slope of the line in Phase B with the slope of the line in Phase C, etc.). The line of best fit was also used to determine the level change. The difference between where the end of the regression line in one phase and the beginning of the regression line in the next phase crossed the y-intercept served as the measure of level change (e.g., difference between where the end of the Phase A regression line and the beginning of the Phase B regression line crossed the y-intercept; the difference between where the end of the Phase B regression line and the beginning of the Phase C regression line crossed the y-intercept). The level change is affected by the degree of trending (slope) in each phase. When there is no discernable trend in the data in the two adjacent phases, the level change and the raw mean performance differences will be equivalent. However, when trending occurs in either phase, these two figures will not be equivalent, as was the case in this study. Thus, the raw mean data presented in Figure 2 do not match the level change data presented in Table 1. Essentially, the level change is the mean difference between the phases, adjusted for trending in the data.

Although this type of analysis is usually restricted to adjacent phases, to assess whether high performers performed better under group incentive pay than under hourly pay, a comparison between Phases A and D was also conducted.

As can be seen from Table 1, the average number of correctly completed checks increased from A to B by over 150. This level change was associated with a *p*-value of less than .000001 and a standardized effect size of 1.07, which provides strong evidence of an effect. The level change from A to D

FIGURE 2. The average number of checks completed by all participants during each phase.

TABLE 1
INTERVENTION EFFECTS FOR CONTRASTS A-B, B-C, C-D, D-C AND A-D

	Condition Change				
	A-B	B-C	C-D	D-C	A-D
Average Change Coefficient					
Level Change	150.5**	-15.9	-42.9	71.4**	193.8**
Slope Change	10.9	-8.5	-7.7	9.6	-4.72*
SD of Coefficient					
Level Change	140.6	73.2	104.3	160.3	156.6
Slope Change	24.6	29.8	19.3	41.1	21.41

Note. * $p < 0.05$, ** $p < 0.01$

was over 193 checks with a p -value of less than .00001 and a standardized effect size of 1.24. The slope change was also statistically significant for the A to D comparison, indicating that level change was due to decreases in performance across sessions during the group incentive phase. The preceding analyses indicate that participants performed appreciably better when paid individual (Phase B) and small group monetary incentives (Phase D) than when paid hourly (Phase A).

Neither the level nor the slope change from B to C was statistically significant, indicating that participants performed comparably when they received individual incentives with individual feedback and individual incentives with individual and group feedback. Thus, participants did not alter their performance when they became aware of the fact that they were high performers.

Although the level change associated with the shift from C (individual incentives with individual and group feedback) to D (group incentives with individual and group feedback) was not statistically significant, the level change associated with the shift from D to C was accompanied by an increase of over 70 checks ($p = .01$, standardized effect size = .45). This increase is almost double the decrease that occurred when the phases changed from C to D. These data indicate that participants performed better when paid individual incentives than when paid group incentives during the last two phases, but this difference emerged only after participants had been exposed to both types of pay systems.

As noted above, there was a change in slope associated with the comparison of A (hourly pay) and D (group incentive pay). There were no other statistically significant changes in slope throughout the study. Hence, the changes associated with the interventions tended to be rapid shifts in the level of performance rather than gradual increases or decreases throughout a phase.

TABLE 2
LAG-0 CROSS-CORRELATIONS AMONG DEPENDENT VARIABLES

	Checks	Percent	Rate	Time
Checks	1	-.10	.83**	.74**
Percent	-.10	1	-.08	-.04
Rate	.83**	-.08	1	.12*
Time	.74**	-.04	.12	1

Note. * $p < 0.05$, ** $p < 0.001$

Correlations Between the Number of Correctly Completed Checks, Percent Correct, Time on Task and Rate of Performance

Three variables may have affected the number of correctly completed checks: percent correct, time spent performing the experimental task (as opposed to time spent engaging in off-task performance) and rate of performance (number of correctly completed checks per minute when participants were actually performing the task). Table 2 displays the cross-correlations among the four dependent variables.

Strong significant relationships were detected between (1) the number of correctly completed checks and rate of performance and (2) the number of correctly completed checks and time spent performing the task. These data suggest that changes in the number of correctly completed checks were due to both changes in the speed of performance and the time allocated to the experimental task in comparison to time allocated to off-task activities.

Accuracy was very high throughout the study. The average percentage of correctly completed checks ranged from only 97.84 to 98.45 across the five phases. The standard deviations were also very small, ranging from 3.0 to 5.2. These results indicate that accuracy was not differentially affected by hourly pay, individual incentive pay or group incentive pay.

Preference, Satisfaction, and Stress

Participants ranked the three pay systems in terms of preference, satisfaction and the extent to which they found the systems stressful. As can be seen in Table 3, the majority of participants found the individual incentive pay to be the most preferred (9 of 11) and most satisfying (8 of 11) of the three pay systems, and the group incentive pay to be the least preferred (11 of 11), least satisfying (8 of 11) and most stressful (7 of 11). These data suggest that high performers are likely to strongly prefer individual incentive pay over group incentive pay.

TABLE 3**NUMBER OF PARTICIPANTS WHO RANKED THE THREE PAY SYSTEMS MOST, SECOND, AND LEAST PREFERRED, SATISFYING, AND STRESSFUL**

Pay	Preferred			Satisfying			Stressful		
	Most	Second	Least	Most	Second	Least	Most	Second	Least
In Inc	9	2	0	8	3	0	3	6	2
Hr Pay	2	9	0	3	5	3	1	2	8
Grp Inc	0	0	11	0	3	8	7	3	1

Verification of the Integrity of Simulated Groups

In a post-experimental questionnaire, participants were asked to indicate the number of individuals in their group. All responded that there were 10. In addition, anecdotal comments from participants during the study support the success of the simulated group manipulation. One participant, for example, asked if he could be switched to a different group, demanded to know who was in his group, and cheered when the individual incentive condition was re-implemented. Another participant made very derogatory comments about the other members in the group. Although these verbal reports are not definitive, they suggest that the participants believed they were in a 10-person group.

Summary of the Results

High performers performed significantly better (a) when they were paid individual monetary incentives with individual feedback than when they were paid hourly wages with individual feedback and (b) when they were paid group monetary incentives with individual and group feedback than when they were paid hourly wages with individual feedback. They performed comparably when paid individual incentive pay with individual feedback and individual incentive pay with individual and group feedback. In other words, in terms of performance, Phase B>Phase A, Phase D>Phase A, and Phase B=Phase C.

Participants performed comparably when initially switched from individual incentive pay with individual and group feedback to group incentive pay with individual and group feedback; however, they significantly increased their performance when switched back to individual incentive pay during the last two phases of the study.

Changes in the number of correctly completed checks per session were strongly correlated with both (a) the time spent performing the task in contrast to time spent engaging in off-task activities and (b) the speed of performance while working. They were not correlated according to the percentage of correctly completed checks. Accuracy remained high

throughout the study, averaging 98.05%, and varied by no more than .61% across the five phases.

The majority of participants found the individual incentive pay to be the most preferred and most satisfying of the three pay systems and the group incentive pay to be the least preferred, least satisfying and most stressful.

Discussion

Previous studies have suggested that performance is comparable under equally divided group monetary incentives and individual monetary incentives (Farr, 1976; Honeywell et al., 1997; Honeywell-Johnson et al., 2002; Stoneman & Dickinson, 1989). Recent analyses and studies suggested, however, 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. (1999, 2002), London and Oldham (1977), and Thurkow et al. (2000), although not definitive, supported the contention that high performers perform lower when paid group monetary incentives than when paid individual monetary incentives. The results of our study are primarily important because they showed that (a) high performers performed better under individual incentive pay than under group incentive pay after exposure to both, and (b) the differences in their performance were not due to the knowledge that they were high performers. In other words, the differences in performance were a function of the type of incentive system (individual vs. group) rather than the feedback they received informing them that they were high performers. This latter control was unique to this study.

The results of the current study 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

High performers performed lower when paid group incentives than when paid individual incentives after exposure to both. The lower performance appeared to be due to the fact that they were earning less money because of the lower performing members in their group. It is unlikely that the knowledge that they were high performers could account for the lower performance because (a) they did not decrease their performance when they were paid individual incentives and switched from individual feedback to individual and group feedback (Phases B to C), and (b) they increased their performance significantly when switched from individual to group incentives during the last two phases even though they were receiving individual and group feedback in both of those phases (Phases D to C).

During the group incentive phases, participants earned less money than they did during the individual incentive phases, raising the possibility that the amount of money earned per se, not the lowered earnings due to the group incentives, were responsible for the observed changes in perfor-

mance. While the amount of money earned is a confound, in organizations, high performers would always earn less money if they were paid group incentives than if they were paid individual incentives. Thus, this confound exists in actual settings as well, and one would expect similar results. The question then becomes, however, whether high performers would perform lower if they earned less money when paid individual monetary incentives (the same amount they earned when paid group incentives). The current study did not control for this possibility. Previous research, however, suggests that the amount of money earned is not a critical determinant of performance when individuals are paid individual incentives (Bucklin & Dickinson, 2001; Dickinson, 2005; Hantula, 2001). For example, in a laboratory study, Frisch and Dickinson (1990) examined the effects of four different amounts of individual incentive pay on performance. Although participants earned different amounts of money, they performed comparably. Similarly, in a field study, LaMere, Dickinson, Henry, Henry, and Poling (1996) found that truck drivers performed comparably when paid three different amounts of individual incentives.

High performers did not decrease their performance when initially switched from individual to small group incentives (CD), but increased their performance significantly when switched from group incentives back to individual incentives. Thus, a history of exposure to both types of pay systems may be necessary for such performance differences to emerge. The reasons why exposure to the group monetary incentives may have influenced performance under the individual incentive system are unclear; however, the suppression of wages over time due to the group contingencies may have been a factor. That is, after experiencing decreased wages due to the group contingencies, the benefits of having complete control over wages may have been more salient and resulted in increased performance once the individual incentives were re-introduced.

Preference, Satisfaction, and Stress

The majority of participants found the individual incentive system to be the most satisfying and most preferred of the three pay systems, and group incentive pay system to be the most stressful, least satisfying, and least preferred. These data may reflect the fact that participants earned more money when they were paid individual incentives than when they were paid group incentives and hourly wages. Previous studies have reported that participant preference and satisfaction for different pay systems are influenced by the amount earned (Bucklin & Dickinson, 2001; Dickinson & Gillette, 1993; Honeywell et al., 1997; Honeywell-Johnson et al., 2002). Nevertheless, as pointed out by Honeywell-Johnson et al., high performers will always earn more money when they are paid individual incentives than when they are paid group incentives. Thus, for high performers, the amount of pay and type of pay system will always be confounded in work settings.

The current results are similar to those reported by Honeywell-Johnson et al. (2002) in their preliminary study. 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 participants 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 that asked them to choose between hypothetical job offers that differed only in terms of the pay system. 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.

Limitations and Research Recommendations

The limitations of the study provide direction for future research. Thus, we discuss the limitations within the context of research recommendations.

With a within-subject research design, it is possible to determine the effects of the independent variable with fewer participants than when using a between-group design because each participant serves as his or her own experimental control. This eliminates between-subject variability that must be statistically controlled for in between-group designs, permitting valid results with fewer participants. Nonetheless, the extent to which the results generalize to other individuals must be determined through replication with additional participants. There were only eleven participants in the current study. Replications should certainly be conducted.

The current study was a laboratory simulation and, as such, caution must be exerted when generalizing the results to actual work settings, although as indicated in the introduction, the results of studies of monetary incentives have been similar in laboratory and applied settings. Nonetheless, replication in an actual work setting is certainly warranted.

The experimental task was a simple production task. Additionally, it was a task that each worker performed independently. Future research should examine more complex tasks and interdependent tasks, that is, tasks that require cooperation among group members.

Different feedback procedures may yield different results. For example, two participants, when questioned about their failure to decrease their performance when switched from individual incentives to group monetary incentives, stated that they would have performed only to the level of the group average during the group incentive phase if they had known what their performance was during the session. However, they only received feedback prior to each session. On-going feedback about individual performance may exaggerate performance differences when high performers are paid individual versus group monetary incentives. Thus, future researchers should consider using different feedback procedures, for example, within session feedback, to determine whether an individual's access to such information affects performance.

Future research should examine (a) the effects of individual and group feedback and (b) the effects of individual and group monetary incentive pay on the performance of low and average performers. If these performers increase their performance when they receive individual and group feedback or when they are paid group monetary incentives, then even if high performers decrease their performance, overall group performance (and hence organizational performance) may not be affected.

Our high performers earned less money during the group incentive condition and found group incentives to be less satisfying and more stressful than individual incentives. In a work setting, when high performers are subjected to such lowered earnings and stress over time, they may leave the organization due to their dissatisfaction (as discussed above) or, alternatively, come to criticize lower performing members, "driving them out" of the team and organization as suggested by Stolovitch et al. (2002). Although this would raise the group's productivity, it would come with an unfortunate and perhaps, destructive, cost in terms of the general wellness of employees. Because our study did not address social contingencies, we can only speculate about the relationship of our results to the suggestion offered by Stolovitch et al. Clearly, future researchers should investigate the effects that such social contingencies have on both performance and satisfaction levels under hourly, individual incentive, and group incentive pay as well as the types of social contingencies that emerge from each pay system.

Applied Implications

High performers performed significantly higher when they were paid either individual or small group monetary incentives than when they were paid hourly wages. These results are consistent with previous findings (e.g., Honeywell et al., 1997; Honeywell-Johnson et al., 2002; Smoot & Duncan, 1997; Wagner & Bailey, 1998). Organizations should, thus, implement incentive pay when possible.

Although high performers decreased their performance when initially switched from individual monetary incentive pay with individual and group feedback to group monetary incentive pay with individual and group feedback, the decrease was not significant. However, when switched back to individual monetary incentive pay, they significantly increased their performance. The increase was almost double the initial decrease. Thus, performance may suffer under group monetary incentives in contrast to individual monetary incentives, but exposure to both pay systems may be necessary for performance to differ. As stated in previous sections, more research is required to determine whether the results of this study are reproducible and the limits of their generality.

Subjective rankings revealed that high performers strongly preferred individual incentive pay to group incentive pay and hourly pay. Additionally, they preferred hourly pay to group monetary incentive pay. These results are consistent with those reported in two other laboratory studies (Honeywell et al., 1997; Honeywell-Johnson et al., 2002). While these results should be viewed cautiously until replicated in field studies, if an organization has the option of implementing either individual incentive pay or small group incentive pay, for the purposes of keeping job satisfaction levels as well as performance levels high of high performers, an individual incentive pay system may be a better choice. However, it is not yet known how small group incentive pay affects the performance of average and low performers. If these performers perform better when paid small group incentives than when paid individual incentives, then overall group performance may be as high under small group incentives.

As indicated earlier, this study was one of the first attempts to isolate the effects of individual and small group monetary incentives on worker performance and satisfaction. As such, it provided some new insights and new research directions, but there are still many unanswered questions.

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References

- Allison, D. B., Silverstein, J. M., & Galante, V. (1992). Relative effectiveness and cost-effectiveness of cooperative, competitive, and independent monetary incentive systems. *Journal of Organizational Behavior Management*, 13(1), 85-112.
- Betts, M. (1995, January 23). Drop that mouse! The boss is coming! Government agencies and employers crack down on computer game playing at the office. *Computerworld*, 29, 12.
- Bucklin, B. R., & Dickinson, A. M. (2001). Individual monetary incentives: A review of different types of arrangements between performance and pay. *Journal of Organizational Behavior Management*, 21(3), 45-137.

- Bucklin, B. R., McGee, H. M., & Dickinson, A. M. (2003). The effects of individual monetary incentives with and without feedback. *Journal of Organizational Behavior Management*, 23(2/3), 65-94.
- Dickinson, A. M. (2005). Are we motivated by money? Some results from the laboratory. *Performance Improvement*, 44(3), 18-24.
- Dierks, W., & McNally, K. (1987, March). Incentives you can bank on. *The Personnel Administrator*, 32, 61-65.
- Eng, P. M., & Schwartz, E. L. (1993, October 11). The games people play in the office: As computer amusements eat into productivity, companies crack down. *Business Week*, 3340, 40.
- Farr, J. L. (1976). Incentive schedules, productivity and satisfaction in work groups. *Organizational Behavior and Human Performance*, 17, 159-170.
- Flannery, T. P., Hofrichter, D. A., & Platten, P. E. (1996). *People, performance, and pay: Dynamic compensation for changing organizations*. New York: The Free Press.
- Frisch, C. J., & Dickinson, A. M. (1990). Work productivity as a function of the percentage of monetary incentives to base pay. *Journal of Organizational Behavior Management*, 11(1), 13-33.
- Gross, S. E. (1995). *Compensation for teams: How to design and implement team-based reward programs*. New York: AMACOM.
- Hantula, D. A. (2001). Schedules of reinforcement in organizational performance, 1971-1994: Application, analysis and synthesis. In C. M. Johnson, W. K. Redmon, & T. C. Mawhinney (Eds.), *Handbook of organizational performance: Behavior analysis and management* (pp. 139-166). New York: The Haworth Press.
- Honeywell-Johnson, J. A., & Dickinson, A. M. (1999). Small group incentives: A review of the literature. *Journal of Organizational Behavior Management*, 19(2), 89-120.
- Honeywell, J. A., Dickinson, A. M., & Poling, A. (1997). Individual performance as a function of individual and group pay contingencies. *The Psychological Record*, 47, 261-274.
- Honeywell-Johnson, J. A., McGee, H. M., Culig, K. M., & Dickinson, A. M. (2002). Different effects of individual and small group monetary incentives on high performance. *The Behavior Analyst Today*, 3(1), 88-103.
- Huitema, B. E., & McKean, J. W. (2000a). Design specification issues in time-series intervention models. *Educational and Psychological Measurement*, 60, 38-58.
- Huitema, B. E., & McKean, J. W. (2000b). A simple and powerful test for autocorrelated errors in OLS intervention models. *Psychological Reports*, 87, 3-20.
- Jenkins, G. D. Jr. (1986). Financial incentives. In E. A. Locke (Ed.), *Generalizing from laboratory to field settings* (pp. 167-180). Lexington, MA: Lexington Books.
- Jenkins, G. D. Jr., Gupta, N., Mitra, A., & Shaw, J. (1998). Are financial incentives related to performance? A meta-analytic review of empirical research. *Journal of Applied Psychology*, 83, 777-787.
- Johnson, D. A., Culig, K. M., & Dickinson, A. M. (2005, May). The effects of feedback on hourly pay and individual incentive pay. In G. A. Matthews (Chair), *Current advances in OBM research: The effects of monetary incentives and feedback on organizational performance*. Symposium conducted at the meeting of the Association for Behavior Analysis, Chicago, IL.
- Kazdin, A. E. (1994). *Behavior modification in applied settings* (5th ed.). Pacific Grove, CA: Brooks/Cole.
- Klett, S. P. Jr. (1994, August 29). Video games toy with networks: Playware can spell doom for strained resources. *Computerworld*, 28, pp. 1, 12.
- Kuhn, K. M., & Yockey, M. D. (2003). Variable pay as a risky choice: Determinants of the relative attractiveness of incentive plans. *Organizational Behavior and Human Decision Processes*, 90, 323-341.
- LaMere, J. M., Dickinson, A. M., Henry, M., Henry, G., & Poling, A. (1996). Effects of a multi-component monetary incentive program on the performance of truck drivers: A longitudinal study. *Behavior Modification*, 20, 385-406.
- Lawler, E. E. III. (1990). *Strategic pay: Aligning organizational strategies and pay systems*. San Francisco: Jossey-Bass.
- Ledford, G. E., & Hawk, E. J. (2000). Compensation strategy: A guide for senior managers. *American Compensation Association Journal*, 9, 28-38.

- Locke, E. A. (1986). Generalizing from laboratory to field: Ecological validity or abstraction of essential elements? In E. A. Locke (Ed.), *Generalizing from laboratory to field settings* (pp. 3-9). Lexington, MA: Lexington Books.
- London, M., & Oldham, G. R. (1977). A comparison of group and individual incentive plans. *Academy of Management Journal*, 20, 34-41.
- Matthews, G. A., & Dickinson, A. M. (2000). Effects of alternative activities on time allocated to task performance under different percentages of incentive pay. *Journal of Organizational Behavior Management*, 20(1), 3-27.
- McAdams, J. L., & Hawk, E. J. (1992). *Capitalizing on human assets*. Scottsdale, AZ: American Compensation Association.
- McCoy, T. J. (1992). *Compensation and motivation: Maximizing employee performance with behavior-based incentive plans*. New York: AMACOM.
- McKnight, S., McKean, J. W., & Huitema, B. E. (2000). A double bootstrap method to analyze linear models with autoregressive error terms. *Psychological Methods*, 5, 87-101.
- Miceli, M. P., & Mulvey, P. W. (2000). Consequences of satisfaction with pay systems: Two field studies. *Industrial Relations*, 39, 62-87.
- Morgan, D. L., & Morgan, R. K. (2001). Single-participant research design. *American Psychologist*, 56, 119-127.
- Mullen, B., Johnson, C., & Anthony, T. (1994). Relative group size and cognitive representations of in group and out group: The phenomenology of being in a group. *Small Group Research*, 25(2), 250-266.
- Opsahl, R. L., & Dunnette, M. D. (1966). The role of financial compensation in industrial motivation. *Psychological Bulletin*, 66, 94-118.
- Peck, C. (1990). *Variable pay: New performance rewards* (Research Bulletin No. 246). The Conference Board.
- Smoot, D. A., & Duncan, P. K. (1997). The search for the optimum individual monetary incentive pay system: A comparison of the effects of flat pay and linear and non-linear pay systems on worker productivity. *Journal of Organizational Behavior Management*, 17(2), 5-75.
- Stolovitch, H. D., Clark, R. E., & Condly, S. J. (2002). *Incentives, motivation and workplace performance: Research & best practices*. Silver Spring, MD: International Society for Performance Improvement and the SITE Foundation.
- Stoneman, K. G., & Dickinson, A. M. (1989). Individual performance as a function of group contingencies and group size. *Journal of Organizational Behavior Management*, 10(1), 131-150.
- Thurkow, N. M., Bailey J. S., & Stamper, M. R. (2000). The effects of group and individual monetary incentives on productivity of telephone interviewers. *Journal of Organizational Behavior Management*, 20(2), 3-25.
- Wagner, K. I., & Bailey, J. S. (1998). The effects of a monetary incentive system on work performance of mental health counselors. *Performance Improvement Quarterly*, 11(3), 64-78.

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