The Supplemental Effects of Feedback on Work Performance Under a Monetary Incentive System

by

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B.A. University of Victoria, 1985
M.A. University of Victoria, 1988

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in the Department of Psychology

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ABSTRACT

Individual monetary incentive systems usually include performance feedback as part of the intervention package. However, there is no experimental evidence to suggest that feedback has any functional effect on work performance above and beyond the effects of the incentive systems. It may be that incentive systems have such powerful effects on work behavior that the additional contingencies provided by a feedback system are unnecessary. The present laboratory study investigated the supplemental effects of feedback on work performance under a monetary incentive system. Four subjects were hired to work seven hours a day for four and a half weeks. The experimental work task was a simulation of a proof operator's job at a bank and involved typing dollar values of "checks" into a computer. Subjects were paid a base salary per session plus incentive money for performance above a criterion. The main dependent variable was the number of correctly completed checks per session. The amount of time off task and rate of responding were also investigated. Subjects were exposed to an ABA experimental design involving; (A) the monetary incentive system without performance feedback, (B) the incentive system with performance feedback, and (A) return to the incentive system without performance feedback. The

introduction of feedback resulted in small to moderate performance improvements in two of the four subjects. Possible reasons for the small and inconsistent effects were explored with special attention paid to the functional role of feedback and monetary incentives. It was proposed that small amounts of incentive money and performance feedback may not improve productivity in the absence of other stimulus events inherent in real organizational settings, such as the possibility for pay raises, promotions, and/or the threat of being fired. These variables may have function-altering effects on incentive money and performance feedback. Future laboratory simulations might experimentally manipulate these variables to further investigate the efficacy of monetary incentive systems.

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Dedication

Many people have played a significant role in the shaping of my behavior analytic skills and the completion of my Ph.D.. This dissertation is dedicated to them with fondness and appreciation.

To Loren Acker for playing the role of advisor in matters beyond academics, and for teaching me the importance of "fine-grained" behavior analyses and giving me the skills to do it.

To Bram Goldwater and Joe Parsons for all their help and encouragement throughout my graduate career. I feel fortunate to have had the opportunity to work with, and learn from both of them.

To Alyce Dickinson for inviting me to Western Michigan University and for her extensive contributions to the completion of this dissertation.

To Bill Potter for writing the proof operator program, for helping me sort out methodological and theoretical issues, and for being such a good friend.

To Katie Cronin for her help during the data collection, and for making that stage of the project so enjoyable.

To Bill Redmon for his support and advice on a variety of issues, and for providing me with some invaluable professional experiences.

To all my friends at Western Michigan University (especially Asiah, Matthew, and Satoru) for welcoming me with open arms, and providing me with an environment which helped fine tune my behavior analytic skills and provided me with new inspiration.

To Bruce Hesse for his long-distance support which helped me maintain perspective and kept a smile on my face.

To my family for their constant support and encouragement throughout my university career.

And finally, to B.F. Skinner for his profound contributions to the development of the science of behavior and the philosophy of behaviorism which have changed my life forever.

In attempts to compete in an increasingly competitive world market, North American companies have investigated various techniques for increasing employee productivity (Nebeker & Neuberger, 1985). The techniques have ranged from sensitivity training to improving physical fitness. Unfortunately most of these techniques have not resulted in lasting productivity improvements, and thus have fallen by the corporate wayside. More recently, many organizations have turned to monetary incentive programs to boost productivity (Perry, 1988; Skryzcki, 1987). In 1982 Locke reviewed experimental research on various motivational techniques, including piece-rate monetary incentive systems. His report suggested that monetary incentive systems resulted in greater gains in productivity than goal setting, job enrichment, and employee participation programs. Locke concluded that despite an "ideological bias" which has favored techniques such as employee participation over monetary incentive systems, the research clearly supports the opposite.

In general, the phrase "monetary incentive program" refers to programs in which individuals are paid in part, or in whole, contingent upon some evaluation of their work performance. The phrase encompasses a wide range of programs, varying in popularity and effectiveness. Among the more well known are profit sharing, gain sharing, pay for knowledge, and lump sum bonuses (including merit pay, suggestion bonuses, and group bonuses)

(Abernathy, 1990; Jenkins & Gupta, 1982; Perry, 1988). Unfortunately, many of these better known programs do not effectively improve performance. In Perry's words, "experts say that roughly half of the incentive plans they see don't work" (p. 51). A behavioral analysis of the aforementioned incentive plans offers an explanation as to why they are ineffective at changing organizational behavior. Basic behavioral theory suggests that to maximize effectiveness, money should be delivered contingent on clearly specified, individual worker behavior, as soon after the behavior as possible (Bijou & Baer, 1978; Frederiksen, 1982; Martin and Pear, 1983; Skinner, 1972). Many of the "monetary incentive" programs listed previously violate these prescriptions in several ways. First, many of the programs include the delivery of incentive money contingent upon post-hoc impressions of performance or potentially unrelated criteria (e.g., pay for knowledge and merit pay plans) rather than clearly specified and carefully recorded performance. Second, the delay between the behavior of interest and delivery of the incentive money is usually long, sometimes as long as a year (e.g., year end bonus plans for outstanding performance). Third, many systems deliver money noncontingently (i.e., regardless of worker performance). For example, some systems are designed to pay for experience or "knowledge" as opposed to the target performance. Other systems are designed to deliver money contingent on performance, but degenerate into noncontingent delivery programs

(e.g., the "Christmas bonus" which is delivered to all workers regardless of performance).

One variety of monetary incentive systems which conforms to the behavior analytic standards are those that fall under the rubric of "individual monetary incentive systems". For the purposes of this paper, individual monetary incentive systems are defined as systems involving the timely delivery of money contingent upon individualized, overt work performance.

Although there is a growing body of literature demonstrating the effectiveness of individual monetary incentive systems (e.g., Bushhouse, Feeney, Dickinson, & O'Brien, 1982; Farr, 1976; Frisch & Dickinson, 1990; Gaetani, Hoxeng, & Austin, 1985; Nebeker & Neuberger, 1985; Orpen, 1982; Yukl, Wexley, & Seymore, 1972), few studies have investigated the relevant parameters of such systems. Practical questions concerning the design and implementation of individual incentive systems (such as what is the optimum incentive to base pay ratio, and what are the differential effects of linear versus accelerated incentive pay functions) are only beginning to be addressed (e.g., Evans, Kienast, & Mitchell, 1988; Frisch & Dickinson, 1990; Oah & Dickinson, 1990). Empirical answers to questions of design and implementation will enable practitioners to develop more effective incentive systems.

The role of performance feedback as a component of an incentive system is one design and implementation issue that

requires investigation. Performance feedback is defined here as the presentation of data on past performance, and historically has taken a variety of forms including self-generated or supervisor-generated reports of work behavior, and public posting of individual or group behavior (Balcazar, Hopkins, & Suarez, 1986). Most individual monetary incentive systems include feedback as part of the overall intervention, and experts strongly advocate its inclusion as part of the incentive "package" (Abernathy, 1990; Dierks & McNally, 1987). In their review of performance feedback, Balcazar, Hopkins, & Suarez (1986) suggest that feedback may have a supplemental effect on performance when used in conjunction with differential consequences (like incentive money) for work behavior. However, this proposition has never been investigated experimentally or theoretically. In studies that have reported positive effects of feedback and monetary incentives, the feedback has either been introduced before the incentive system (e.g., Gaetani & Johnson, 1983; Gaetani, Hoxeng, & Austin, 1986; Dierks & McNally, 1987), or concurrently (e.g., Haynes, Pine, & Fitch, 1982). It is not possible to determine, given these procedures, whether feedback has any supplemental effects above and beyond the powerful effects of incentive systems. In order to test for supplemental effects of feedback, the feedback must be introduced after the incentive system is in place. Thus, the purpose of the present study was to investigate the potential and presumed augmentative effects of a feedback system on worker

performance when superimposed on an individual monetary incentive system. Since implementing formal performance feedback systems is, at the very least, time consuming and administratively complex (A.M. Dickinson and W.K. Redmon, personal communications), it is worthwhile addressing the efficacy of supplementing individual monetary incentive systems with feedback. If additional benefits are not accrued, practitioners need not bother with this potentially time consuming procedure. If feedback does result in productivity improvements above and beyond that achieved by incentive systems alone, then the time taken to develop and implement a feedback system may be well spent.

This experiment differs from previous laboratory experiments on monetary incentive systems in that subjects were "hired" to work seven-hour sessions, five days a week (Monday through Friday), thus representing a typical work week and better simulating an organizational setting. Seven-hour sessions were chosen in response to limitations cited in previous monetary incentive experiments conducted in the same laboratory at Western Michigan University (Frisch & Dickinson, 1990; Gillette & Dickinson, 1990; Oah & Dickinson, 1990). In these studies subjects were volunteer university students who worked for short sessions ranging from forty-five minutes to four hours, one to three times per week. These designs may have been limited in that the money earned by these subjects was clearly discretionary income (Frisch & Dickinson, 1990). The

degree to which students would expend extra effort to make a few extra, dollars is uncertain. In contrast, the money earned through participation in the present study presumably represented more than just discretionary income. All four subjects had searched the Help Wanted advertisements in the paper (the method of recruitment) and agreed to work at the task (a repetitive, mundane task) for four and a half weeks. This behavior suggests that the establishing operations which influence the reinforcing effectiveness of money were different (more powerful) for these subjects, thus making the promise of money a stronger motivative variable. Furthermore, since participation required full time attendance (Monday through Friday, seven hours a day), it can be assumed that the experimental job was each subjects' only source of income for the duration of the study. Thus, incentive money should have had a "realistic" motivational effect.

An additional reason for the use of seven-hour sessions stems from the assumption that in organizational settings, incentive systems increase performance by decreasing "unauthorized" break times such as socializing, making personal telephone calls, taking coffee breaks, etc. In other words, when incentive systems generate higher productivity, it is due to increases in the time spent on-task, not increased task proficiency. Previous research has indicated that shorter sessions are not sufficient to generate the off-task behavior sometimes observed in a real work setting.

Thus, the goal of the present study was to investigate the effects of performance feedback on worker productivity under conditions which simulated a "real world" organizational setting with the feedback superimposed on an individual monetary incentive system.

METHOD

Subjects

Subjects were four female volunteers from the Kalamazoo community who were recruited through an advertisement in the local paper. Subjects were paid for their participation (the payment system will be described in the "Experimental Design" section). Keyboard-proficient volunteers were used since this skill reduced the learning curve associated with the experimental work task, and allowed earlier introduction of experimental manipulations (Gillette & Dickinson, 1990). Before being hired, subjects were interviewed and asked to perform the experimental task for one hour in order to ensure keyboard proficiency.

This research was approved by both the Human Subject Institutional Review Board at Western Michigan University and the Committee on Research and Other Activities Involving Human Subjects at the University of Victoria. Further, each subject signed an informed consent form prior to participation (see Appendix A).

Setting

The study was conducted in an experimental laboratory located in the Psychology Department at Western Michigan University. The laboratory contained four small experimental rooms within a larger, common room. Each experimental room contained a Macintosh Plus computer on which subjects worked. The common room represented a "break room" and contained several chairs, tables, a couch, a refrigerator and a microwave oven. One or both of the researchers (the author and a research assistant) were present in the common room at all times.

Work Task and Dependent Variable

Subjects engaged in a computer simulation of a proof operator's job at a financial institution. Proof operators are responsible for encoding machine-readable numbers on the bottom of checks, thus enabling the checks to be processed by a computer. Outside the laboratory, the task involves reading numbers off the checks and typing those numbers using a machine that resembles a key-punch machine. The simulation used in this experiment presented "checks" on the computer screen (see Appendix B). Each check that appeared displayed a different cash value and the

subject's task was to type that cash value using the computer keyboard. The numbers typed by subjects appeared in a box located at the bottom of the screen. When the number was complete, subjects pressed the RETURN key. If the number was typed correctly, the next check appeared on the screen. If an error was made typing in the cash value, pressing the RETURN key resulted in a "beep" sound. Subjects were required to correct the error and then press the RETURN key again, at which point the next check appeared.

The main dependent variable in this experiment was the number of correctly completed checks per seven-hour session. Additional dependent variables included the total duration of work breaks taken throughout the session, the rate of check completion (calculated via dividing the total number of checks completed by the total time on-task), and the number of errors made. These measures were all recorded automatically by the computer. In addition, a debriefing questionnaire was administered in an attempt to address anecdotally issues such as self-stated rules which may have guided performance, subjects' verbal reports as to the variables controlling their performance, and preference for the two experimental conditions.

Experimental Design and Independent Variable

An ABA single-subject experimental design was used and was replicated across four subjects (Sidman, 1960). The presence or absence of performance feedback was the independent variable. For all subjects, the baseline phase consisted of eight sessions (all sessions were seven hours in length). The length of the intervention and reversal phases varied depending on performance stability and practical constraints. For Subject 1, the intervention lasted ten sessions, with a five session reversal. This subject's performance was not stable prior to the reversal phase, however financial constraints dictated the phase change. For Subject 2 the intervention phase lasted eight sessions. This subject experienced health problems which prevented her from completing the study, thus her data represent an AB design (no reversal). The intervention phase for Subject 3 was nine sessions with a six session reversal. This subject's performance was stable prior to phase changes. Finally, Subject 4 was exposed to six sessions of intervention. On the sixth day she reported having secured another job and was determined to be at risk of quitting the experiment. In addition, her performance during the intervention phase was similar to her performance during baseline, with only an initial, short-term increase in performance. These two factors lead to the decision to return her to

baseline conditions so that all experimental phases would be completed.

As noted above, when possible, a stability criterion was used to determine the timing of experimental phase changes. The criterion was three consecutive "stable" sessions. Stability was determined by taking an average of the total number of checks completed during the previous three sessions. This average was then used as the comparison mean. If the total for the current session fell within plus or minus four hundred (or 5%) of the comparison mean, then performance was considered stable for that day. This stability criterion was based on previous research (Gillette and Dickinson, 1990) and consultation with applied researchers (A.M. Dickinson and W.K. Redmon, personal communication, March, 1991).

An explanation of the three experimental conditions (ABA) is presented below.

Baseline (A) During the first eight sessions, subjects worked under the monetary incentive system, but received no performance feedback other than one paycheck, delivered at the end of the fifth session. Subjects earned a base salary of $26.60 (United States currency) per session for completing between 0 and 6700 checks ($26.60 is the equivalent of $3.80 per hour which was the local legal minimum wage at the time of the study). For each check completed above 6700, subjects earned .57 cents per check. The 6700 check performance criterion was established through brief pilot tests

conducted prior to the experiment. The per check incentive value was established by taking the difference between the base pay, and the maximum pay (as determined by funding constraints), (38.57 - 26.60 = 11.97), and the difference between the minimum performance criterion of 6700 checks, and the estimated maximum performance of 8800 checks (8800 - 6700 = 2100), and dividing the number of checks by the available incentive money (11.97 / 2100 = .0057). This represents a 45% incentive money to base pay ratio, which is above the 30% ratio commonly used (Frisch & Dickinson, 1990).

Subjects were paid each Tuesday by check. The paychecks indicated the total amount of base pay and the total amount of incentive pay earned for the pay period. It should be noted that phase changes were never implemented on payday or the following day, in order to avoid confounding experimental manipulations.

Intervention (B) The second phase of the experiment consisted of the same monetary incentive system with the addition of performance feedback. More specifically, feedback was presented three times per day. After two hours of work and again after five hours, the computer displayed the number of checks completed up to that point in time. In addition, at the end of each day, in the presence of the subject, one of the researchers plotted the total number of checks completed for the day (as recorded by the computer) on a graph on the wall of the experimental room. The researchers reported the daily total to subjects in a neutral manner (that is,

avoiding any verbal or gestural response that might be reinforcing or punishing) in attempts to reduce the amount of social consequation that was paired with performance feedback.

In order to help subjects translate the number of checks completed into the amount of money earned, a table was left in each experimental room next to the computer (see Appendix C). The table presented the possible range of number of checks completed (6700--8800) with corresponding dollar values ($26.60--$38.57). In addition, the table included "projective" information for the feedback delivered during the work session. Because subjects did not start earning incentive money until they completed 6700 checks, they had not actually earned any incentive money at the time of the first feedback presentation (two hours into the session), and possibly not at the time of the second feedback presentation (five hours into the session). Thus, the table listed the possible range of number of checks completed after two hours and after five hours, and listed the amount of money the subject *would* earn if they continued to work at the same rate they had been working at up to that point in time. This information was "projective" in that if subjects slowed down or sped up after receiving the feedback, the amount of money they actually earned would be different from the amount listed on the table. An explanation of how the table was to be used was given at the onset of the feedback intervention.

Return to Baseline (A) The final phase represented a return to baseline conditions. The monetary incentive system remained intact, but the performance feedback was no longer presented and performance graphs were removed from the experimental rooms.

Results and Discussion

Number of Checks Produced

The main dependent variable in this study was the number of checks correctly completed during each session. Results are presented separately for each subject. Figure 1 presents the number of checks completed per session, in addition to the mean number of checks completed in each experimental phase for Subject 1. The dotted horizontal line indicates the performance criterion for earning incentive money (6700 checks). Data points above the line represent sessions in which subjects earned incentive money. Points below the line represent sessions in which subjects earned the base pay only. Inspection of Figure 1 indicates that the delivery of feedback had no consistent differential effect on performance relative to the no feedback conditions. Performance means across the three conditions were 6938, 6931, and 6825 respectively. An initial increase in performance after the introduction of feedback was noted, however the trend reversed after several days. It was predicted that feedback

might serve to stabilize performance, if not improve performance, however neither effect was demonstrated. Inconsistent responding was demonstrated across all three experimental phases for Subject 1.

Insert Figure 1 about here

Figure 2 presents the number of checks completed per session for Subject 2. Due to recurring illness this subject completed the baseline and intervention phases only. Since the reversal phase was not implemented, these data must be interpreted with caution. Inspection of this graph indicates that the delivery of feedback resulted in an increase in the number of checks completed per session. Mean performance went from 6193 checks per session during baseline to 6881 checks per session during the feedback intervention. Further, during the baseline phase Subject 2 failed to earn any incentive money, but did earn incentive money for all but two sessions during the intervention. These data suggest that the feedback may have functioned to bring the subject into contact with incentive money. Balcazar, Hopkins, & Suarez (1986) discuss this as one possible functional role of performance feedback. They suggest that when performance is poor despite the existence of reinforcement for better performance, feedback may serve as a discriminative stimulus (on the basis of generalization from a previous history with

feedback), and may occasion more productive behavior, which then can be reinforced.

Insert Figure 2 about here

Figure 3 presents the number of checks completed per session, in addition to the mean number of checks completed in each experimental phase for Subject 3. A small increase in the number of checks completed during the feedback intervention was noted. Performance means across conditions were 7354, 7592, and 7475 respectively. While the demonstrated performance improvement was small, this subject was performing at high levels prior to the introduction of feedback, thus the magnitude of improvement may have been limited by a performance ceiling. This subject's high level of performance may have been a function of the monetary incentive system, or a function of what might be termed a "surveillance" effect. That is, the presence of the researchers may have been a discriminative stimulus which occasioned high levels of productivity and low duration and/or frequency of work breaks. Similar effects have been noted in the organizational behavior management literature (e.g., Ronan, Latham, & Kinne, 1973). The surveillance effect might result from a history in which working hard in the presence of "bosses" has been associated with avoidance of, or escape from aversive consequences such as frowns, gestures, or verbal

criticism. Such avoidance behavior is commonly maintained long after the aversive stimulus has been removed (Martin & Pear, 1983). Thus, for Subject 3, working hard and not taking work breaks may have been generalized avoidance behavior. The researchers provided no aversive social consequences for low levels of productivity or for taking work breaks, however the subject never engaged in those behaviors and thus never came into contact with the true contingencies.

Insert Figure 3 about here

The number of checks completed per session, and the mean number of checks completed in each experimental phase for Subject 4 are presented in Figure 4. The performance means across phases were 6624, 6864, and 5651 respectively, suggesting an intervention effect. However, closer inspection of the graph indicates that the intervention mean was large as a result of the first two sessions only. Performance quickly dropped to baseline levels after the third session of the intervention indicating that feedback may have had an initial effect which was not maintained. It may be that the response cost involved in performing at such high levels was too great. This issue and other possible reasons for a lack of consistent effects of feedback will be discussed in greater detail in the General Discussion section.

As with Subject 1, Subject 4 demonstrated highly variable performance across all experimental phases.

Insert Figure 4 about here

Taken together these data suggest that the introduction of feedback had inconsistent effects on work performance. As mentioned above, possible reasons for the inconsistent results will be presented in the General Discussion section of this paper.

Time Off-Task

In addition to the main dependent variable, three other measures were recorded and analyzed. Figure 5 presents the amount of time spent "off task", or the "total break time" per session for all four subjects. Also included within each graph is the mean break time for each experimental phase. Inspection of these data indicate that the feedback intervention had no effect on the amount of time spent off task. In fact, all four subjects showed a mean increase in time off task over the duration of the experiment. This trend may have been a function of the monotonous nature of the task (i.e., the lack of reinforcing stimuli inherent to the work task). Alternatively, it may have resulted from a reduction in the surveillance effect described earlier. Over time subjects may have learned that taking breaks did not result in punishing social consequences from the

researchers. Thus, the presence of the researchers would no longer serve as a discriminative stimulus for high levels of productivity and low duration and/or frequency of work breaks. Furthermore, taking breaks could be both negatively reinforced (via escape from the aversive stimulation associated with the work task), and positively reinforced (breaks usually involved pleasant conversation and/or eating and drinking). One or all of these factors may have contributed to an increase in frequency and duration of work breaks.

Inspection of graphs for Subjects 1 and 4, when viewed in conjunction with Figures 1 and 4 (which present the number of checks completed per session) suggests a negative correlation between the number of checks completed and the amount of time off task. In other words, the less time spent off task, the greater the number of checks completed. Correlational data for all subjects are presented and discussed below.

Insert Figure 5 about here

Rate of Check Completion

Figure 6 presents the average number of checks completed per hour (rate) for each session for all four subjects. These rates were calculated by dividing the total number of checks completed in each session by the total time on task for that session (time on task was

calculated by subtracting the total break time from the total possible work time--seven hours). Because break time was removed for this calculation, these are not simple rate measures, but are analogous to running rates. As indicated by the graphs, Subject 1 maintained a fairly constant rate over all sessions. Subject 2 demonstrated an increase in rate during the baseline phase, however this trend stabilized somewhat prior to the phase change. Presentation of feedback resulted in a more dramatic increase in rate of responding. This increase corresponds to the increase in the main dependent variable (number of checks completed) for this subject. Correlational data which further explores the relationship between rate and number of checks completed are presented below. Subject 3 showed an increasing trend in rate of responding during the feedback intervention, and a decreasing trend during the reversal phase which is similar to the results presented in Figure 3 (number of checks completed). Again, a correlation coefficient of this relationship is presented below. Subject 4 demonstrated wide fluctuations in rate of responding with no apparent differential effect due to feedback.

Insert Figure 6 about here

Analyses of time off task and rate of responding relative to total number of checks completed addresses the issue raised in the

introduction of this paper regarding which of two variables might be responsible for variations in productivity (whether within or across phases)--a decrease in time spent off task or an increase in task proficiency. Two sets of correlation coefficients were calculated to help answer this question: (1) a correlation between the number of checks completed and the total time off task, and (2) a correlation between the number of checks completed and rate of responding. These statistics were calculated for each subject separately and the results are presented in Table 1.

Insert Table 1 about here

These data show that, for each subject, one or both variables co-varied with fluctuations in productivity. As suggested by inspection of the graphs presented above, two subjects (1 and 4) showed a high negative correlation between the number of checks completed and time off task, while the other two subjects (2 and 3) showed a high positive correlation between the number of checks completed and rate of responding. These data suggest that there are individual differences in terms of how time off task and rate of responding vary with the number of checks completed. Productivity increases may be accompanied by either a reduction in the amount of time spent off task, or an increase in the rate of responding. A combination of the two is also possible and is suggested by data from Subjects 1 and 4 for

whom moderate correlations were observed between productivity and rate of responding in addition to the high correlations between productivity and time off task.

Quality of Work Produced

The quality of work produced in this study was protected in that incentive money was made contingent on the number of checks *correctly* completed. When subjects made a mistake they were forced to correct the mistake before moving on. Making errors reduced the number of checks that could be completed per session, thereby reducing the amount of incentive money that could be earned. A popular criticism of monetary incentive systems is that they lead to increases in quantity of work produced at the expense of quality. This is a valid criticism for systems which deliver incentive money contingent on quantity only. The incentive system used in this study is an example of how the quality of work produced can be ensured; incentive money must be delivered contingent on both quantity and quality.

To investigate the relationship between quality and quantity given the contingencies in place to guard against a reduction in quality, a correlation coefficient was calculated between the number of errors made per session and the number of checks completed. A high positive correlation between the number of checks completed and the number of errors made would indicate that as quantity

increased, quality decreased. No high positive correlations were noted. In fact, the only significant correlation was negative (-.695) indicating that, for Subject 2, an increase in quantity was associated with improved quality.

At the end of the experiment all subjects filled out a questionnaire (see Appendix D). Since post hoc verbal reports do not necessarily correspond to observed nonverbal behavior (Deacon & Konarski, 1987), and from a behavioral perspective, should not be given causal status (Skinner, 1974), discussion of questionnaire responses will be presented in the General Discussion section.

General Discussion

Due to the inconsistent results, both within and between subjects, no firm conclusions about the supplemental effects of feedback superimposed on a monetary incentive system can be drawn. While data generated from two subjects (2 & 3) suggests that feedback may have had an effect on performance, this evidence is somewhat weak given that Subject 2 failed to complete a reversal and Subject 3's performance improvement was small. Data from the other two subjects indicate that neither the incentive system nor the feedback system were effective in maintaining high level performance. Possible reasons for this lack of effect, as well as a

more detailed functional analysis of incentive systems and feedback systems will be discussed below.

As with most applied research, the current study was ultimately modeled after basic nonhuman research. Given the degree of control possible in such nonhuman research, this study can only be described as analogous to basic research and as such represents a form of systematic replication (Sidman, 1960, p. 135). The feedback phase of this experiment is roughly analogous to a second-order schedule in which the feedback represents a brief stimulus presented at the completion of each first-order schedule (i.e., after a fixed amount of time) and the incentive money represents the ultimate reinforcer for the second-order schedule (i.e., after a fixed number of correctly completed checks) (Catania, 1984). Research on second-order schedules has demonstrated that the addition of the brief stimulus results in an increase in rate of responding (Catania, Cohen, Calisto, & Lentz, 1979; 1984; Hendry, 1969). In the present study, the presentation of the feedback resulted in only marginal and/or inconsistent increases in performance suggesting that second-order schedule effects were either absent (possibly because feedback did not function as a discriminative stimulus and/or conditioned reinforcer as a typical brief stimulus would), or were masked by other effects. As Catania points out, "the effectiveness of second-order schedules with brief stimuli varies with the particular component schedules, whether or not the brief

stimulus is followed by the primary reinforcer, and with other variables" (p. 182). The variables which may have influenced the effects of the feedback in this study will be discussed below.

The behavioral mechanisms responsible for the efficacy of incentive systems undoubtedly vary depending on the exact nature of the incentive system used, the manner in which they are delivered, and the reinforcement histories of the persons exposed to the system. Despite these variations, some commonalities are assumed to exist when incentive systems are implemented. At least two separate functional stimuli common to all incentive systems must be examined--the *promise* of incentive money, and the actual *delivery* of incentive money. The *promise* of incentive money is assumed to serve as a discriminative stimulus for work behavior for most individuals, due to a common history in which the promise of money in a work environment has been associated with the actual delivery of money contingent on appropriate behavior. The *delivery* of money is assumed to be (among other things) a conditioned reinforcer for work behavior. Because money is paired with so many other reinforcers within the culture at large, it is typically a very powerful conditioned generalized reinforcer.

Performance feedback may also serve as a conditioned reinforcer. Its functional effects, however, may be considerably more tenuous. Feedback is not consistently paired with other reinforcers in the culture at large. In fact, feedback may be frequently paired

with aversive stimuli (e.g., criticism) and as a result may function as a punishing stimulus for some individuals. Since each individual's history with feedback (and thus the stimulus function of feedback) is unknown, when feedback is used in an applied setting it should be explicitly paired with other functional stimuli in order to acquire the desired behavioral effects (Balcazar, Hopkins, & Suarez, 1986). Without such pairing, its function may vary unpredictably from individual to individual. Returning to the nonhuman, second-order schedule analogy, the brief stimulus must be paired with reinforcement if it is to acquire the appropriate stimulus function (Hendry, 1969). In the current study, it was assumed that the promise of incentive money would serve as a discriminative stimulus and the delivery of money would serve as a reinforcer, and that the association between the incentive money and feedback would result in the feedback acquiring reinforcing value. Experimental results suggest this assumption may have been incorrect. The degree to which the promise of money served as a discriminative stimulus must be questioned given that three subjects did not consistently work hard enough to earn incentive money. When subjects actually earned incentive money, the reinforcing value of that money seemed to vary from subject to subject. Subject 3's performance suggests that the promise of money exercised sufficient stimulus control, and the delivery of money was reinforcing enough to maintain, and at times increase the amount of checks completed. On the other hand, Subject

1, 2 and 4 all earned incentive money occasionally, but the promise and delivery of that money did not result in the maintenance or improvement of performance over time. If, after receiving incentive money contingent on work performance, the future frequency of work behavior does not remain constant or increase, that incentive money is probably not functioning as a conditioned reinforcer[1]. If the delivery of incentive money was not functioning as a reinforcer, the promise of incentive money might lose its discriminative function, and the feedback with respect to incentive money would also fail to effect performance. Again, basic nonhuman literature supports this analysis (Catania, 1984; Hendry, 1969).

Why would money, a typically powerful conditioned generalized reinforcer (Bijou & Baer, 1978; Martin & Pear, 1983), fail to function as a reinforcer in this study? One explanation is that the dollar value was too small. More specifically, the per check incentive used (.57 cents) did not have reinforcing value. However, a larger per check incontive (e.g., 1.0 cents) may have represented a functionally different stimulus that may have had reinforcing value. A considerable amount of experimental attention has been paid to the effects of reinforcer magnitude on response rates in both human and nonhuman populations. Unfortunately, no definitive conclusions

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[1]Alternative explanations are, of course, possible. One such explanation is that the incentive money did indeed have reinforcing value, but that other environmental events such as aversive stimuli associated with the work task, worked to suppress performance, thereby masking the reinforcing effects of the incentive money.

can be drawn because some studies report increases in response rate with increases in magnitude of the reinforcer while others report decreases in response rate (Kliner, LeMaire, & Meisch, 1988). Despite the lack of conclusive results, there are enough studies in which an increase in magnitude of reinforcement has resulted in higher response rates (e.g., Buskist, Oliveira-Castro, & Bennett, 1988) to suggest that a change in the monetary value of the incentive money in the present study may have had an effect on performance.

The amount of incentive money used in this experiment was determined by two factors--budgetary constraints, and the magnitude of incentive money proven to be effective in previous incentive system research (Dickinson, 1991; Evans, Kienast, Mitchell, 1988; Frisch & Dickinson, 1991; Jenkins & Gupta, 1982; Nebeker & Neuberger, 1985). Contrary to common belief, laboratory and applied research has suggested that the dollar amount of incentive money is unimportant. For example, Frisch & Dickinson (1990) found performance improvements with incentive values as small as 3% of base salary. In their study the actual amount of incentive money earned during each forty-five minute session was an average of 11 cents. Surprisingly, subjects in that incentive condition performed at significantly higher levels than subjects who received a fixed wage (no incentive money). In an applied setting, Dickinson (1991) again reported significant performance improvements when workers earned only 3% of their total pay in incentive money. Other applied

studies have reported significant improvements in performance with small amounts of incentive money (e.g., Gaetani & Johnson, 1983; Haynes, Pine, & Fitch, 1982). Based on this empirical evidence, it was assumed that the amount of incentive money offered to subjects in this experiment would be reasonable and sufficient to effect performance. Base salary was $26.60 per day and the total potential incentive money was $11.97. As mentioned earlier, this represents a 45% incentive money to base pay ratio. The ratio of incentive money actually earned by subjects was smaller than the maximum potential of 45% because no subjects performed at the maximum level. Average earned incentive ratios for subjects during the intervention phase were as follows: Subject 1 = 5%, Subject 2 = 3.9%, Subject 3 = 18%, and Subject 4 = 3.5%. According to previous research these incentive ratios should have been sufficient to maintain moderate to high levels of performance. In retrospect, however, evidence from prior studies may have been misleading due to significant procedural differences between those studies (both laboratory and applied) and the present study. The differences from previous laboratory research will be explored first.

While other laboratory studies using similar or the same experimental task reported performance effects with small amounts of incentive money (Frisch & Dickinson, 1990; Oah & Dickinson, 1990; Gillette & Dickinson, 1990), the present study differed significantly in that subjects were required to work at the task for seven-hour

sessions. In previous research, sessions ranged from forty-five minutes to four hours. To speculate, it may be that the response cost involved in working hard enough to earn incentive money increases dramatically over a longer experimental session. In this context, "response cost" would include both the effort required to complete the task and the loss of potential reinforcers associated with taking breaks, both of which have been shown to decrease behavior (Luce, Christian, Lipsker, & Hall, 1981). The response cost of working hard for four hours once or twice a week may be small, and thus may not detract from the motivational effects of monetary incentive systems. In lay terms, subjects consider it "worthwhile" to work hard for a short period of time in order to earn a few extra dollars. However, the response cost of working hard for seven hours a day, five days a week may be much greater and may act as an establishing operation which reduces the motivational effects of the promise and delivery of incentive money. In lay terms, subjects may *not* consider it "worthwhile" to work hard for seven hours every day in order to earn a few extra dollars--the pay off is simply too small.

In any work setting, the contingencies designed to support work behavior must be strong enough to compete with contingencies which support incompatible behavior, such as those presented by the worker's personal life (e.g., family responsibilities, outside interests, personal problems). Furthermore, when the work task is dull and repetitive, as it was in the present study, contingencies designed to

support such work must be strong enough to compete with the aversiveness of doing the task, and the associated negative reinforcement for escaping from the task (via work breaks). Such competing contingencies are often very powerful due to the immediacy of outcomes, the schedule of reinforcement, and the establishing operations in effect (Redmon & Lockwood, 1986). It may be that small amounts of incentive money represent competitive contingencies for short work sessions, but that over longer periods of time the controlling variables change in both kind and magnitude and alternative behaviors are more readily maintained. In the present study, the amount of incentive money offered may not have been large enough to compete with contingencies which support such behavior as making personal phone calls, daydreaming, or socializing with other people in the work setting.

Closer examination of Subject 4's behavior provides an example of the effects of such competing contingencies. This subject's work performance was highly unstable throughout the study, seemingly due to her chaotic and demanding personal life which interfered frequently with her work. Evidence for this is anecdotal in that no objective measures were recorded, however, both researchers were witness to frequent work interruptions due to phone calls (regarding child care, moving, transportation of family members to and from work, and attempts to secure a permanent job), and several instances where the subject actually left the work setting

to attend to personal matters. In addition, the subject herself reported in her questionnaire that her personal life had an effect on her work performance, both because of interruptions and because her "hectic" personal life resulted in her being tired at work. If the work sessions had been shorter these variables may not have had their possible disruptive effect on her work performance. Four-hour sessions, for example, may have left enough time during the day to take care of personal business.

An example of how the monotonous nature of the task may have had an effect on work behavior comes from Subject 1 who seemed particularly influenced by this aspect of the task. Her performance was also highly variable throughout the study, and she indicated, both during the experiment and on her questionnaire that she was frequently bored with the task and that the promise of money was often not incentive enough to keep working.

This study suggests then, that over seven-hour work sessions, small amounts of incentive money alone may not be powerful enough to compete with contingencies supporting behavior that is incompatible with the work task. An interesting follow up study would involve replicating the present study while systematically varying the amount of incentive money to establish the point at which that incentive money becomes reinforcing (if at all) and thereby maintains higher levels of productivity. Had more research money

been available, this manipulation would have been made in the current study.

As indicated above, several studies conducted within organizational settings have reported improvements in performance with small amounts of incentive money (e.g., Dickinson, 1991; Gaetani & Johnson, 1983; Haynes, Pine, & Fitch, 1982). Since subjects in t ese applied studies worked full time, the contingencies should have been similar to those in this study. Upon closer inspection however, there are significant differences between actual work settings and the simulated work setting used in this experiment which may be responsible for the conflicting results. In a real organizational setting, neither monetary incentives nor performance feedback are presented as "pure" environmental stimuli--they are almost always associated with other environmental events. These events are potentially powerful reinforcers, punishers, discriminative stimuli, and/or establishing operations (for example, pay raises, promotions, termination of employment, or the promise/threat of any of these events). While employers may not explicitly link feedback or incentives to any of these other stimulus events, the use of both incentive systems and feedback systems by supervisors requires the measurement of work performance. Many workers have a history with respect to their performance being measured and associated with variations in such variables as pay, position in the company, access to work amenities, ability to secure

time off, allocation of preferred work tasks, and frequency and quality of interactions with supervisors. Workers who do not have such a history may have developed rules about this relationship such as; "if the boss is watching you, better work hard or you might get fired". The stimulus function of small amounts of incentive money, and/or performance feedback may be altered when they are associated with such environmental events. For example, the threat of being fired may serve as an establishing operation which alters the reinforcing value of positive feedback and leads to an increase in the frequency of behavior which results in such feedback. Thus, the threat of being fired, as an establishing operation, might result in feedback becoming more effective at controlling behavior. This speculative analysis is consistent with conclusions drawn by Kliner, LeMaire, & Meisch (1988) regarding the relationship between magnitude of reinforcement and response rate. Based on a significant body of research, they suggest that response rate is a function of an interaction between a variety of variables and not just the reinforcing effects of the consequent stimulus.

The present study was designed to explicitly control for the presence of such confounding variables in order to assess the "pure" effects of incentives and feedback on work performance. Although other factors may have been responsible for the lack of consistent effects of the incentive and feedback systems noted in this study, one plausible explanation is that when these two variables are not

associated with other, functional environmental stimuli, they fail to exert control or exert only weak control over work behavior.

This interpretation is consistent with conclusions drawn by Balcazar, Hopkins, & Suarez (1986) in their review of the effectiveness of performance feedback as a behavioral intervention. They concluded that feedback is only effective in changing behavior if it is paired with functional, differential consequences for that behavior. Basic nonhuman research supports this proposition in that that when brief stimuli are not paired with reinforcement the augmented responding of second-order schedules is not seen (Catania, 1984; Hendry, 1969). As mentioned above, the incentive money in this study was intended to provide the system of "functional differential consequences" advocated by Balcazar et al, however, results indicate that the incentive money did not serve as a functional differential consequence. As previously stated, it may be that the magnitude of the incentive money was too small. Had the per check incentive been larger, work performance may have differed dramatically, and the feedback may have had differential effects. Alternatively, smaller amounts of incentive money may be effective if associated with other differential consequences or discriminative stimuli such as promotions, or preferential treatment by a supervisor. Since no other consequences were present in this laboratory study, the incentive system may have only exerted weak and/or inconsistent control over work behavior.

The questionnaire administered to subjects upon completion of the study presents an appropriate context within which to discuss some of the more speculative implications of this research and of monetary incentive systems and feedback systems in general. Only selected items from the questionnaire (see Appendix D) will be discussed.

When asked if the incentive system motivated them to work harder, all subjects responded in the affirmative. When asked if the feedback motivated them to work harder, three subjects said yes, with Subject 4 stating that the feedback was "motivating" only when it indicated good performance. When her performance dropped she stated the feedback was "discouraging". This raises an interesting issue with respect to the functional role of feedback. While it is often intended to serve as an analogue to a reinforcer, a discriminative stimulus, and/or an establishing operation for appropriate work behavior (Peterson, 1982), feedback that reflects poor performance may serve as a punisher, or a discriminative stimulus for escape or avoidance behavior[2], and/or an establishing operation for behavior other than work behavior. Thus, as pointed out by Peterson (1982) and Duncan & Bruwelheide (1986), feedback may take on several

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[2] If successful avoidance results then negative feedback should become a conditioned positive reinforcer through its association with the avoidance of an aversive stimulus (Bijou & Baer, 1978). If avoidance is not successful, negative feedback should likely become a punishing stimulus.

different functional roles, even within the context of the same intervention.

Recently, considerable attention has been paid to the role of verbal behavior in the control of other behavior (as evidenced by the recent publication of a book on the topic edited by Hayes, 1989). Research on human responding under various schedules of reinforcement has shown that verbal humans exposed to the various schedules of reinforcement demonstrate responding different from that demonstrated by nonverbal humans and other animals (Bentall, Lowe, & Beasty, 1985, Catania, Shimoff, & Matthews, 1989). This so-called "insensitivity" of behavior to programmed contingencies is taken as evidence of the existence of rules (Bentall et al, 1985; Catania et al, 1989; Vaughan, 1989). It is proposed that verbal humans may develop rules about the contingencies of reinforcement to which they are exposed and then behave in accordance with their self-stated rules, regardless of the programmed contingencies. While empirical studies of the effects of rules are few, Vaughan (1989) suggests, "self-talk may underlie and influence much of human adult responding" (p. 110). She adds that self-talk "at least sometimes determine[s] the form of the response as well as its probability of occurrence", and that "we can no longer ignore this additional controlling variable" (p. 110).

In order to explore the use of self-stated rules in the present experiment, subjects were asked two questions: (1) whether they set goals for themselves while working, and (2) what kind of statements

they made to themselves while working. Three subjects reported setting goals for themselves in terms of the number of checks completed during a certain period of time. Subject 2 reported setting no goals. Subjects 2 and 4 reported making self-statements regarding taking as few work breaks as possible. Data on duration of breaks actually taken indicate that these subjects' mean time off task was significantly greater as compared to Subjects 1 and 3 (see Figure 5). Taken together these data suggest that Subjects 2 and 4 had identified the relationship between the duration of breaks they were taking and the subsequent effect on the number of checks they completed, and set goals according to that relationship. Subject 1 reported a covert verbal "struggle" between thoughts of taking a break and continuing to work and earn incentive money. She reported that "the overwhelming urge to walk around sometimes outweighed the desire to make a few more dollars". This statement addresses an issue raised earlier about the magnitude of the incentive money with respect to response cost. This subject's report suggests that her verbal behavior may have revolved around this very issue. It is interesting to speculate about the relationship of such verbal behavior to work performance. To further explore this issue, a comment made by Subject 3 will be presented and a comparison drawn between the performances of Subject 1 and Subject 3. When asked if she would have worked any harder if the situation had been a permanent work situation, Subject 3 replied "No. I have always felt that if you're

being paid, you should work for it, and do the best you can". This subjects' work behavior was consistent with her comments. She rarely took work breaks, and her performance was high and very stable across all experimental conditions. In contrast, Subject 1's performance was highly variable across conditions. Some days she performed at very high levels while on other days she performed below the incentive criterion. Since the programmed contingencies within the work setting can be assumed to have been constant across subjects, the difference in performance may have been partially a function of differing self-statements or "rules". In situations where planned contingencies are delayed, as was the case in the present experiment (the incentive money was received once per week and the feedback, when delivered, was received after at least two hours of work), it has been proposed that rules, or verbal statements (covert or overt) may mediate the delay (Peterson, 1982; Malott, 1989). Proposing that rules control behavior can be considered an explanatory fiction unless the term "rule" is operationally defined. Schlinger & Blakely (1987) suggest that rules be defined as function-altering, contingency-specifying stimuli. By "function-altering" they mean that rules effect behavior by altering the function of other stimuli in the environment and it is those other stimuli, whose function has been altered, that ultimately control the behavior. To speculate, Subject 1's statements about the "urge to walk around outweighing the desire to make a few more dollars" may have altered

the function of the feedback, actually reducing its effectiveness as a conditioned reinforcer. The amount of money earned was considered small, and thus the feedback regarding money earned was not a reinforcer. In contrast, Subject 3's statements that "if you are being paid you should work for it" may have decreased the reinforcing value of taking work breaks and/or increased the reinforcing value of evidence of consistent performance.

Since the present study did not experimentally manipulate the use of rules, the above explanation is only speculative. It may be that the rules reported by subjects were developed post hoc. That is, when responding to the questionnaire item on the use of rules, subjects may have created rules which described how they had behaved, without having previously stated or used that rule. The analysis of rules and their relationship to work behavior is an area in need of experimental attention. Important questions include what controls the development of rules, and the extent to which those rules control behavior (if at all). Undoubtedly the answers to these questions lie, at least partially, within workers' reinforcement histories with respect to work behavior, and to rule following in general. (For a more detailed explanation of rules and their possible involvement in the control of work behavior see Agnew & Redmon, 1991.)

Several questionnaire items were designed to address preferences regarding feedback. When asked "if you continued to work at this job would you prefer to work with the feedback or without

the feedback" all subjects reported they would prefer to work with feedback. When queried as to the amount of feedback preferred, the choices being once per hour, once per day, three times per day (as was the case in this experiment), continuous, or the opportunity to check performance at any time (via a computer key, which when hit would display a cumulative total), three subjects chose the opportunity to check at any time with Subject 1 choosing continuous feedback. Thus, while feedback had no consistent effects on performance, subjects reported preferring the feedback condition, and claimed they would have liked even more feedback. Again, feedback may play multiple functional roles. In this study, feedback may have served as an establishing operation or a reinforcer for actual work behavior (although the results are inconclusive), and it may have served as a conditioned elicitor for respondent behavior which may be labeled "satisfaction". While the literature clearly shows that "satisfaction" does not cause productivity or vice versa, the two variables have been found to have small (approximately .3), but consistently positive correlation coefficients (Cherrington, Reitz, & Scott, 1971). Furthermore, workers who report being "satisfied" with their jobs are also observed to continue to work; that is, display less time off task, less absenteeism, and less tardiness (Gaetani, Hoxeng, & Austin, 1986). Again, while causal conclusions cannot be drawn, the relationship is suggestive. Statements regarding satisfaction with a job imply that, in a molar sense, the work environment and/or

the work itself provide reinforcing stimuli. Statements regarding dissatisfaction with a job suggest that the work environment and/or the work are aversive stimuli, and are thus avoided or escaped from whenever possible. Thus, in a real work environment, attending to and promoting worker "satisfaction" is likely to reduce escape behavior, and may be associated with productivity improvements. Furthermore, from an ethical perspective, worker "happiness" and "satisfaction" are important variables (in our culture, respondents and operants which are labeled as happiness and satisfaction are highly valued) and are worthy of management attention. Performance feedback may be a way to increase worker satisfaction regardless of its effect on performance.

When asked if they would have worked harder if this had been a permanent work situation, Subjects 1 and 4 said yes and cited the following reasons: "possibility for pay raise or promotion", and "when a job is permanent it becomes essential to work hard in order to secure your job and work in a comfortable work setting. Also, your performance is continuously being observed." These comments are in keeping with the analysis presented above regarding the differences between the present study and real work settings in terms of additional environmental events such as pay raises and promotions. The statements suggest that Subjects 1 and 4 might have performed differently had other typical work place contingencies been in effect. Their highly variable work performance

suggests that their behavior was sensitive to the actual environmental contingencies in place in this experiment. There were no differential consequences for performance that fell below the incentive criterion. Poor work performance did not result in termination of employment, a cut in pay, or even disapproval from the researchers. The consequences for completing 100 checks per session were the same as those for completing 6700 checks. The only consequence for high level performance was the incentive money delivered once per week. These subjects may have behaved according to the more salient contingencies which may have included their level of fatigue, demands of their personal lives, and the availability of persons with whom to have interesting conversations. Subject 3, whose performance was the highest of all subjects and was consistent throughout the study, reported that she would not have worked any harder had it been a real work setting. Her behavior may have been more rule-governed in that she stated the rule: "if you are being paid you should work for it" and behaved according to that rule despite the fact that she would have been paid even if she performed poorly. Again, this analysis is only speculative. It may be that the rule was developed post hoc, and had no functional effect on the work behavior.

In conclusion, the research question posed at the onset of this study cannot be definitively answered by the results. In the spirit of single subject research, changes to the experimental design were

considered during data collection when the programmed contingencies appeared to be exerting weak effects on work performance. In particular, a change in the form of the feedback was considered. The first three data points following the introduction of the feedback intervention indicated little if any effect of feedback for three subjects, and an initial, but decreasing effect for the fourth, thus plans were made to attempt to increase the effects by increasing the amount of feedback delivered. The computer simulation was modified so that a small area in the corner of the screen would keep a running total of the number of checks completed. Thus, feedback would have been presented continuously as opposed to three times per day. This phase change to continuous feedback was never implemented because three subjects began to show upward trends in performance just prior to the planned phase change (see the fourth and fifth data points in the feedback portions of Figures 1, 2, and 3). Once these trends reversed and the stability criterion for phase changes were met, research funds were significantly depleted and further changes were not financially feasible. Although additional manipulations may have lead to a more conclusive answer to the research question, several interesting and important issues were raised by these data. Future research might attempt to address some of these issues.

Manipulations that could be made using the current experimental design include variations in the magnitude of the

incentive money to determine whether larger monetary values would result in higher levels of performance both alone, and in combination with feedback. In addition, the form of feedback may be an important variable. For example, public posting of performance may have lead to changes in productivity (in fact, such a manipulation was also considered during the data collection phase of this study, but again, monetary constraints prevented an additional phase). The question of the functional role of feedback is also worthy of experimental attention. The experimental task used in the current study could be modified in the following way to investigate whether feedback serves as a conditioned reinforcer. A computer key could be designated as the feedback key, which when depressed, would display the number of checks completed up to that point in time. Thus, subjects would be required to make an "observing response" (Wyckoff, 1952) to obtain feedback. If feedback was functioning as a reinforcer, the frequency of the observing response would increase, at least initially, and then be maintained. Such a manipulation would also allow investigation of the changes in the stimulus function of feedback as a function of a variety of stimulus events such as the nature of the feedback (i.e., whether it indicates good performance or poor performance), the time of day, the value of incentive money, and proximity and duration of work breaks. A better understanding of the various stimulus functions of feedback would lead to more effective feedback interventions. A final suggestion for future research involves

systematically associating incentive money and feedback with events such as pay raises, promotions, and preferential treatment in the work environment to determine their function-altering effects on incentives and feedback.

Despite the inconsistent results of this particular study, the body of experimental literature supports the efficacy of individual monetary incentive systems for improving work performance. Research investigating the relevant parameters of individual monetary incentive systems is worthwhile and it is hoped that the present study helps sharpen the focus for future investigations.

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Appendix A

Informed Consent Form

I am Judy Agnew and I am a visiting graduate student in the Department of Psychology at Western Michigan University and I am doing a study on work performance. You are being assessed to participate in this project.

The purpose of this research is to investigate how monetary incentive pay systems affect work performance. If you decide to participate in this study you will be requested to participate in approximately fifteen seven-hour sessions (three weeks of working five days a week). The exact number of sessions that you will be asked to attend will depend upon the data that are collected once the study has begun. While it will be no less than fifteen sessions, it may be a few more, but I am unable to tell you the exact number of sessions at this time. If you complete all sessions as required and have no unexcused absences for the duration of the study, you will receive a $100.00 bonus in addition to your wages. If you must miss part or all of a scheduled session, but you and the researcher can make mutually satisfying arrangements to make up that session you will still receive the bonus. The loss of the bonus will in no way affect your regular wages.

During each seven-hour session you will be free to take work breaks whenever you want for as long as you want. You will be required to take at least one half hour lunch break, although you may take longer. Your lunch break will not be included in the seven hours (that is, if you take a full hour for lunch, your total time at the university will be eight hours--seven hours spent working and one hour for lunch). The work task will be completed at Western Michigan University in Wood Hall, Room 272.

You will be paid to complete a simulation of a task of a bank employee, a proof operator. Bank checks will be displayed on a computer screen. Your task will be to key in the amounts shown on the checks using the computer keyboard. The amount of pay that you earn will depend on the number of checks that you correctly complete. If you complete an average of 1000 checks or less per hour you will earn $3.80 per hour. Individuals who are keyboard proficient have completed an average of 1100 checks per hour. If you complete more that 1000 checks per hour you will receive .57 cents for each check above 1000. Thus, if you work at the average rate that

other people have worked at (1100), you would earn $4.37 per hour. If you work harder, you will earn more.

In order for me to collect accurate work performance data, participants in this study must already have some proficiency at the check task or a similar task. Therefore, to be included in the study you need to have prior experience with cash registers, adding machines, calculators, or any similar device. The critical skill is to be able to enter numbers correctly without looking at the keyboard (specific experience with computers however, is not required). During the interview a researcher will determine if you are proficient enough on the task to be included by asking you to work at the task for one hour. If you complete 900 checks within that hour you will be eligible to be included. If not, you will be paid for your performance during this hour but will not be included in the remainder of the study.

Your participation in this study will not expose you to much risk. Although there is a chance that you will experience an increase in stress if you try to work faster in order to earn more money, you can eliminate or reduce this source of stress by adjusting your work pace. Further, as indicated previously you may take work breaks whenever you want for as long as you want.

In order to protect your confidentiality when the results of this study are presented publicly (for example when they are presented in the written report of this research, or are presented at a professional meeting) your data will be identified only by a code number which will be randomly assigned to you. Only the two researchers, and Dr. Alyce Dickinson will know what code number has been assigned to you. A master list of participant names and code numbers will be kept in a locked file cabinet and will be destroyed at the conclusion of this study.

Your participation in this study is completely voluntary and you may withdraw at any time by telling the researcher in person or by phoning Judy Agnew (349-4917). Further, you may stop any session at any time by telling the researcher that you do not want to continue. If you withdraw you will be paid for the work you have completed but you will not be eligible for the $100.00 bonus. **PLEASE NOTE:** if you withdraw before completion of the study I will not be able to use your data. Therefore, please do not volunteer unless you are sure you can complete the study.

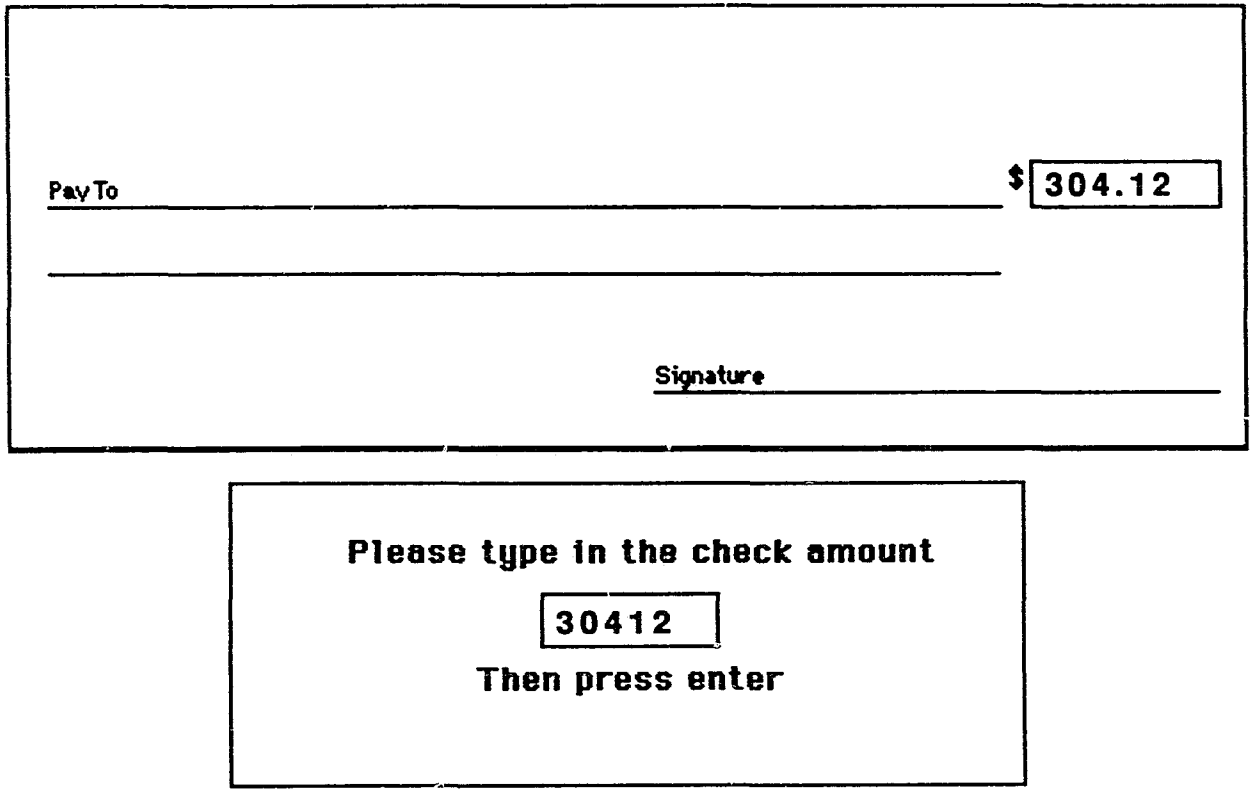
If you have any questions regarding this research, please feel free to contact Judy Agnew at 349-4917 or Dr. Dickinson at 387-4473.

If you would like to participate in this study please sign this form in the space provided below and keep the copy of the form that is attached.

YOUR SIGNATURE BELOW INDICATES THAT YOU UNDERSTAND THE ABOVE INFORMATION AND HAVE DECIDED TO VOLUNTARILY PARTICIPATE.

_____
(Please print your name)

_____ _____
(Your signature) (Date)


Pay To
$ 304.12
Signature
Please type in the check amount
30412
Then press enter

Appendix C

	A	B	C	D	E	F
1	Number of	Total Daily	Number of	Hourly Pay	After Two	After Five
2	Checks/Day	Pay	Checks/Hour		Hours	Hours
3	6700	26.60	957	3.80	1914	4786
4	6720	26.71	960	3.82	1920	4800
5	6740	26.83	963	3.83	1926	4814
6	6760	26.94	966	3.85	1931	4829
7	6780	27.06	969	3.87	1937	4843
8	6800	27.17	971	3.88	1943	4857
9	6820	27.28	974	3.90	1949	4871
10	6840	27.40	977	3.91	1954	4886
11	6860	27.51	980	3.93	1960	4900
12	6880	27.63	983	3.95	1966	4914
13	6900	27.74	986	3.96	1971	4929
14	6920	27.85	989	3.98	1977	4943
15	6940	27.97	991	4.00	1983	4957
16	6960	28.08	994	4.01	1989	4971
17	6980	28.20	997	4.03	1994	4986
18	7000	28.31	1000	4.04	2000	5000
19	7020	28.42	1003	4.06	2006	5014
20	7040	28.54	1006	4.08	2011	5029
21	7060	28.65	1009	4.09	2017	5043
22	7080	28.77	1011	4.11	2023	5057
23	7100	28.88	1014	4.13	2029	5071
24	7120	28.99	1017	4.14	2034	5086
25	7140	29.11	1020	4.16	2040	5100
26	7160	29.22	1023	4.17	2046	5114
27	7180	29.34	1026	4.19	2051	5129
28	7200	29.45	1029	4.21	2057	5143
29	7220	29.56	1031	4.22	2063	5157
30	7240	29.68	1034	4.24	2069	5171
31	7260	29.79	1037	4.26	2074	5186
32	7280	29.91	1040	4.27	2080	5200
33	7300	30.02	1043	4.29	2086	5214
34	7320	30.13	1046	4.30	2091	5229
35	7340	30.25	1049	4.32	2097	5243
36	7360	30.36	1051	4.34	2103	5257
37	7380	30.48	1054	4.35	2109	5271
38	7400	30.59	1057	4.37	2114	5286
39	7420	30.70	1060	4.39	2120	5300
40	7440	30.82	1063	4.40	2126	5314
41	7460	30.93	1066	4.42	2131	5329
42	7480	31.05	1069	4.44	2137	5343
43	7500	31.16	1071	4.45	2143	5357

	A	B	C	D	E	F
44	7520	31.27	1074	4.47	2149	5371
45	7540	31.39	1077	4.48	2154	5386
46	7560	31.50	1080	4.50	2160	5400
47	7580	31.62	1083	4.52	2166	5414
48	7600	31.73	1086	4.53	2171	5429
49	7620	31.84	1089	4.55	2177	5443
50	7640	31.96	1091	4.57	2183	5457
51	7660	32.07	1094	4.58	2189	5471
52	7680	32.19	1097	4.60	2194	5486
53	7700	32.30	1100	4.61	2200	5500
54	7720	32.41	1103	4.63	2206	5514
55	7740	32.53	1106	4.65	2211	5529
56	7760	32.64	1109	4.66	2217	5543
57	7780	32.76	1111	4.68	2223	5557
58	7800	32.87	1114	4.70	2229	5571
59	7820	32.98	1117	4.71	2234	5586
60	7840	33.10	1120	4.73	2240	5600
61	7860	33.21	1123	4.74	2246	5614
62	7880	33.33	1126	4.76	2251	5629
63	7900	33.44	1129	4.78	2257	5643
64	7920	33.55	1131	4.79	2263	5657
65	7940	33.67	1134	4.81	2269	5671
66	7960	33.78	1137	4.83	2274	5686
67	7980	33.90	1140	4.84	2280	5700
68	8000	34.01	1143	4.86	2286	5714
69	8020	34.12	1146	4.87	2291	5729
70	8040	34.24	1149	4.89	2297	5743
71	8060	34.35	1151	4.91	2303	5757
72	8080	34.47	1154	4.92	2309	5771
73	8100	34.58	1157	4.94	2314	5786
74	8120	34.69	1160	4.96	2320	5800
75	8140	34.81	1163	4.97	2326	5814
76	8160	34.92	1166	4.99	2331	5829
77	8180	35.04	1169	5.01	2337	5843
78	8200	35.15	1171	5.02	2343	5857
79	8220	35.26	1174	5.04	2349	5871
80	8240	35.38	1177	5.05	2354	5886
81	8260	35.49	1180	5.07	2360	5900
82	8280	35.61	1183	5.09	2366	5914
83	8300	35.72	1186	5.10	2371	5929
84	8320	35.83	1189	5.12	2377	5943
85	8340	35.95	1191	5.14	2383	5957

	A	B	C	D	E	F
86	8360	36.06	1194	5.15	2389	5971
87	8380	36.18	1197	5.17	2394	5986
88	8400	36.29	1200	5.18	2400	6000
89	8420	36.40	1203	5.20	2406	6014
90	8440	36.52	1206	5.22	2411	6029
91	8460	36.63	1209	5.23	2417	6043
92	8480	36.75	1211	5.25	2423	6057
93	8500	36.86	1214	5.27	2429	6071
94	8520	36.97	1217	5.28	2434	6086
95	8540	37.09	1220	5.30	2440	6100
96	8560	37.20	1223	5.31	2446	6114
97	8580	37.32	1226	5.33	2451	6129
98	8600	37.43	1229	5.35	2457	6143
99	8620	37.54	1231	5.36	2463	6157
100	8640	37.66	1234	5.38	2469	6171
101	8660	37.77	1237	5.40	2474	6186
102	8680	37.89	1240	5.41	2480	6200
103	8700	38.00	1243	5.43	2486	6214
104	8720	38.11	1246	5.44	2491	6229
105	8740	38.23	1249	5.46	2497	6243
106	8760	38.34	1251	5.48	2503	6257
107	8780	38.46	1254	5.49	2509	6271
108	8800	38.57	1257	5.51	2514	6286

Appendix D

Please answer the following questions as honestly as possible. Do not be afraid of "hurting my feelings" in any way, your answers will be most helpful to me if you answer honestly.

1. Did the incentives (the extra money earned after 6700 checks per day) motivate you to work harder?

2. Did the feedback motivate you to work harder?

3. Did you set goals for yourself (e.g., a certain number of checks each day or by each feedback time)?

4. What kind of statements did you make to yourself about how hard you worked (for example, we often make statements to ourselves about things we are doing like "I'm not going to eat any sweets today" or "I have to exercise at least three times this week")?

5. What kind of feedback would you prefer:

   A) once per hour

   B) once per day

   C)continuous (i.e., a counter which you could see all the time that told you the total number of checks you had completed)

   D) the opportunity to check at any time you wanted (e.g., if there was a key on the computer you could hit and the total number of checks you had completed would appear on the screen and you could make use of this key at any time)

   E) twice during the day and once at the end (as was the case during this study)

   F) no feedback

6. Do you think you would have worked harder if you were being paid for each check (i.e., were on a piece rate system where each and every check was worth a certain amount of money)?

7. What things, other than money influenced how hard you worked (for example, working conditions, personal life, etc)?

8. Would it have made any difference if the researcher had given you praise or encouragement for working harder?

9. Did you believe that the researcher wanted you to work harder (i.e., was it your impression that it "mattered" to the researcher or the research project how hard you worked)?

10. Do you think you would have worked any harder if this had been a permanent work situation? Why?

11. If you continued to work at this job would you prefer to work with the feedback or without the feedback? Why?

12. Is there anything that could be changed in the work environment to make the job easier or make you more comfortable while working?

13. Would you be willing to participate in a similar study in the future? If not, why?

14. What do you think the purpose of this study was (that is, what do you think was being studied)?

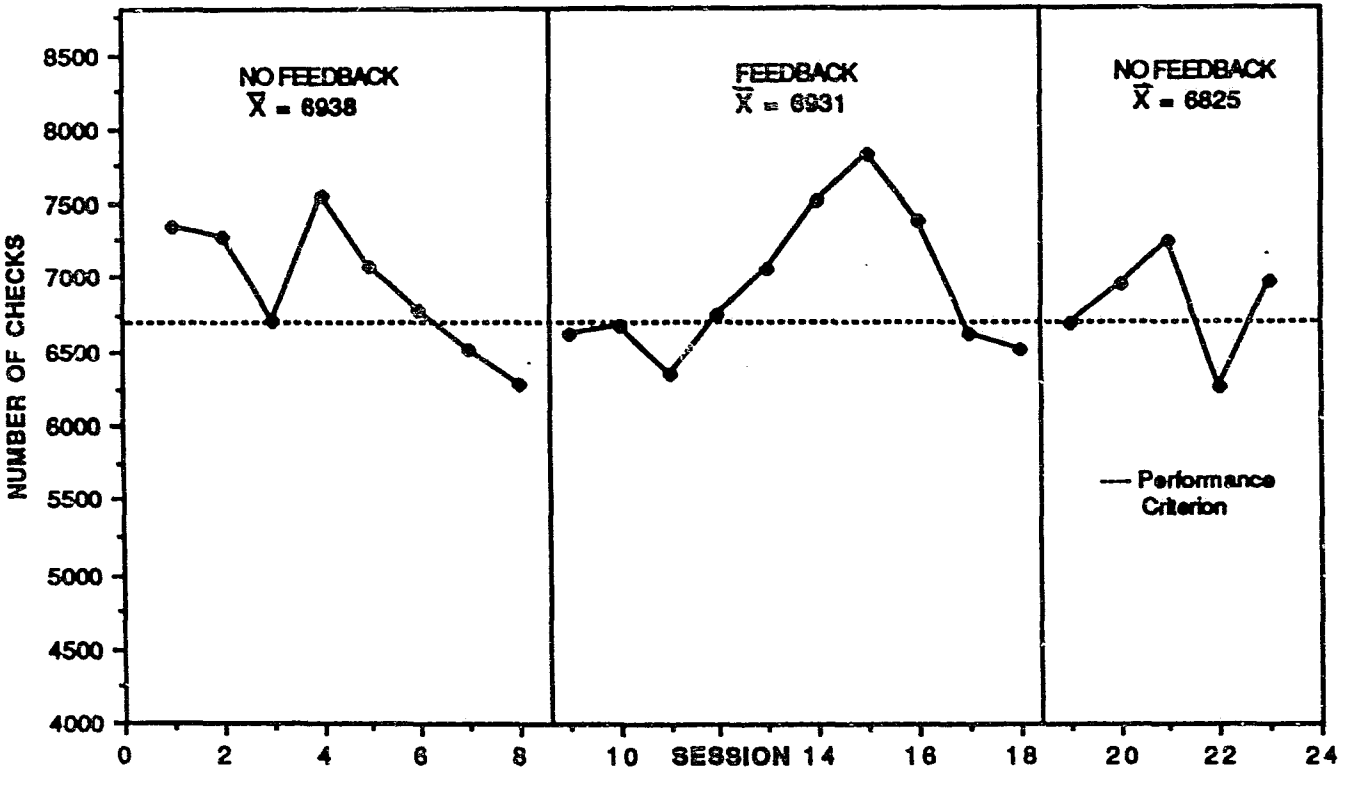


Figure 1. Number of checks completed per session for Subject 1.

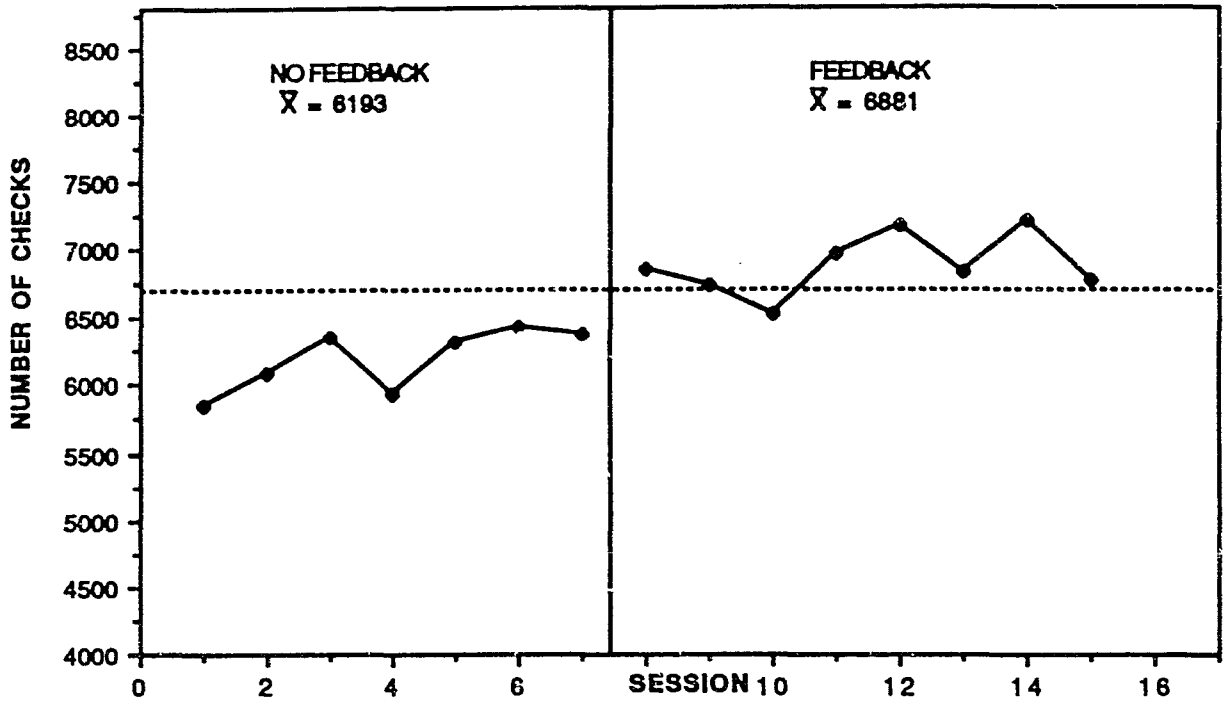


Figure 2. Number of checks completed per session for Subject 2.

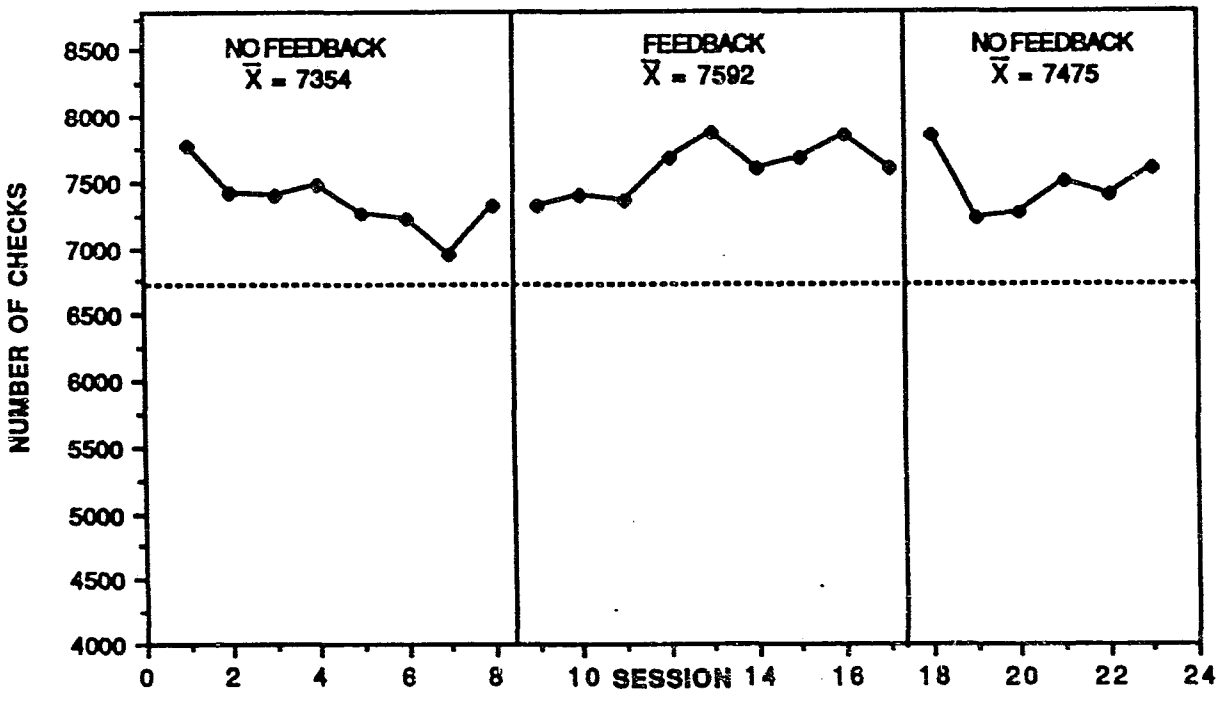


Figure 3. Number of checks completed per session for Subject 3.

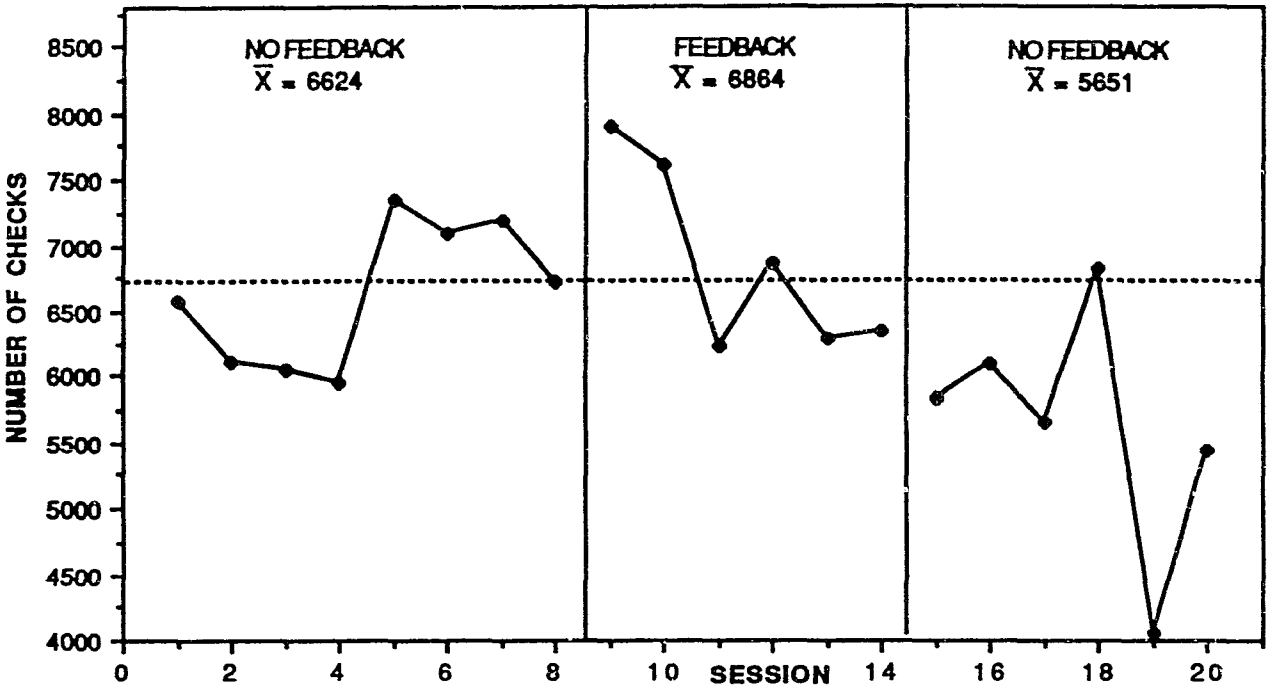


Figure 4. Number of checks completed per session for Subject 4.

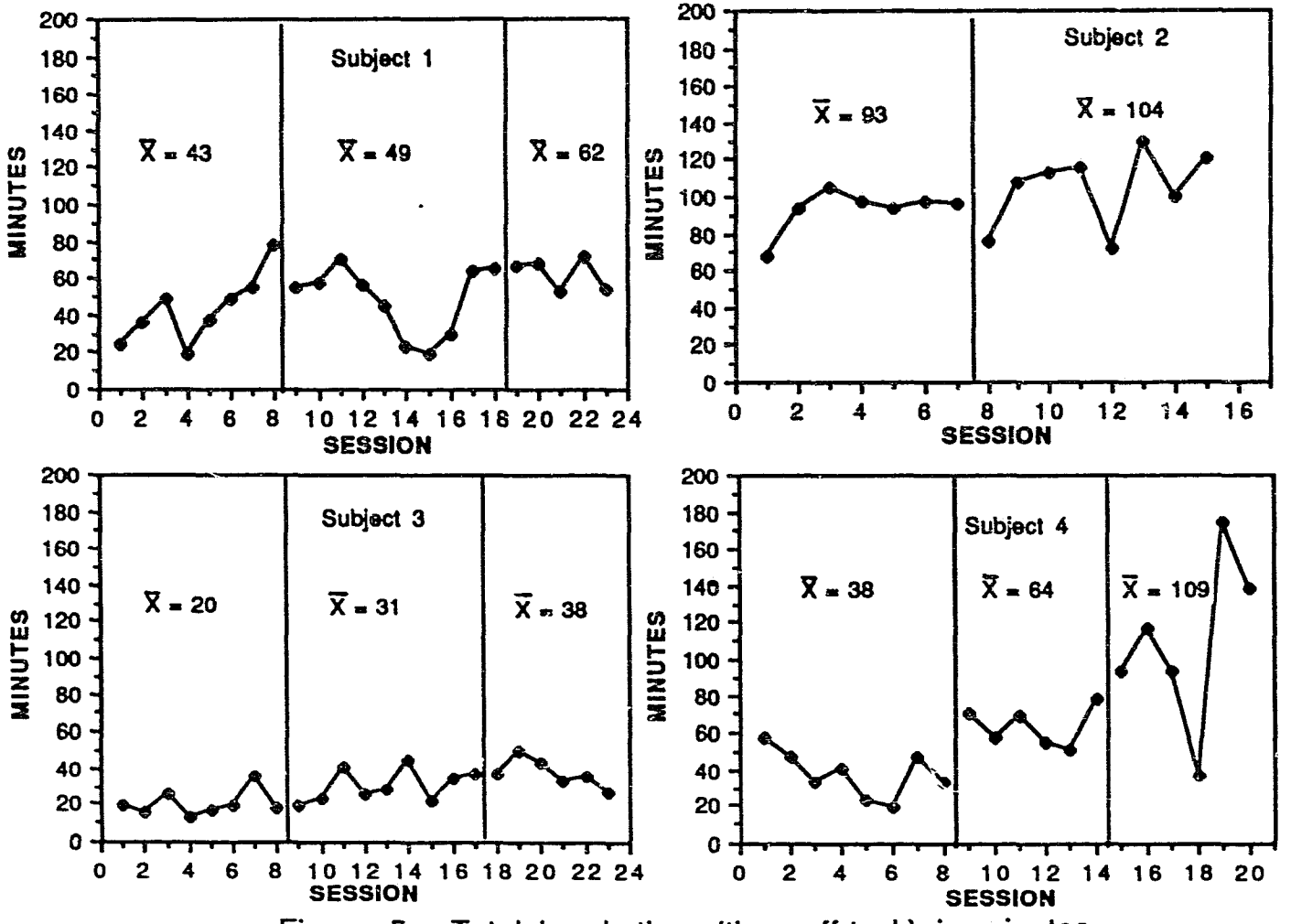


Figure 5. Total break time (time off-task) in minutes.

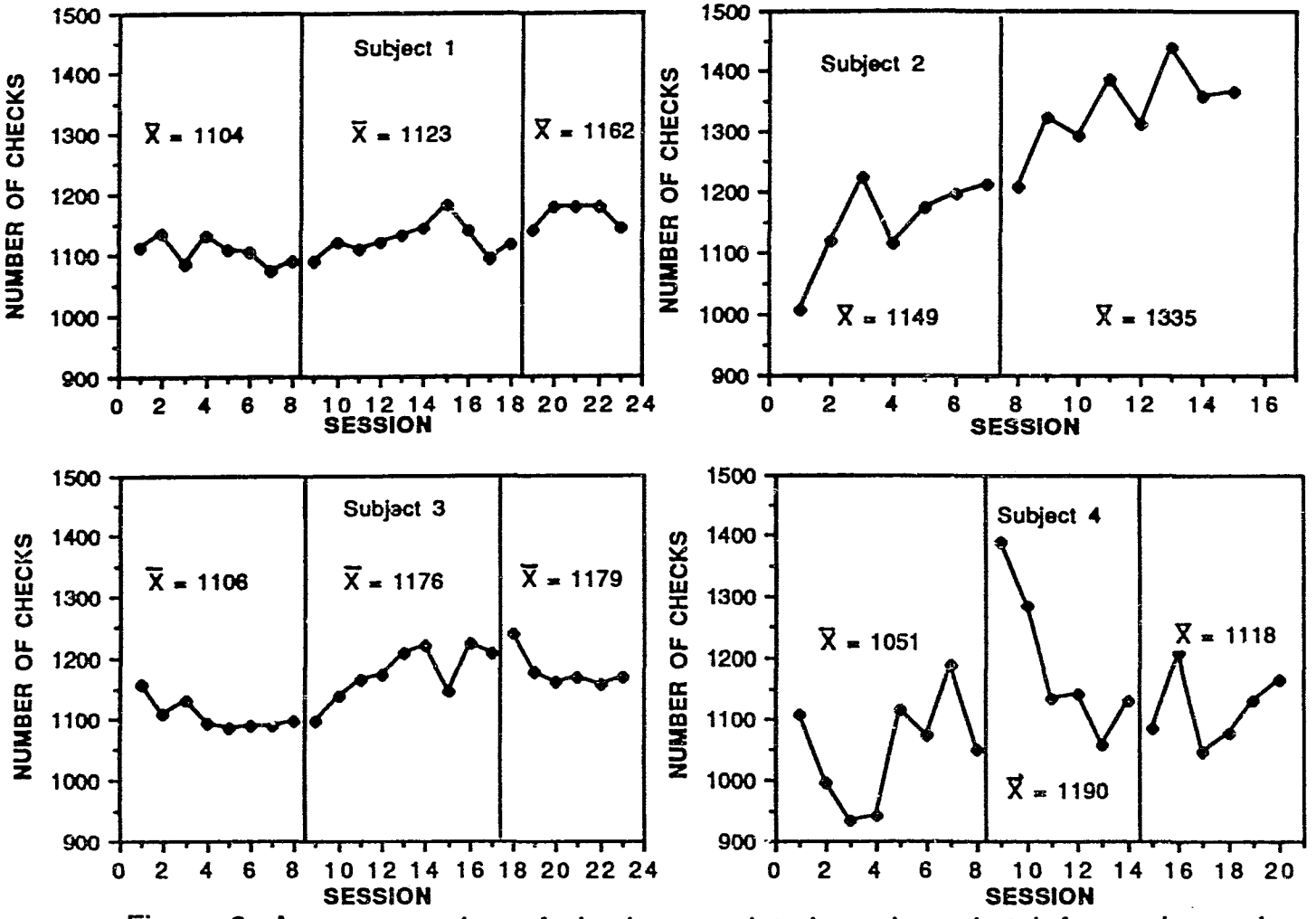


Figure 6. Average number of checks completed per hour (rate) for each session.

Table 1

Correlation Coefficients: Number of Checks and Time Off Task, and Number of Checks and Rate of Responding

	Subject 1	Subject 2	Subject 3	Subject 4
Number of Checks and Time Off Task	-.908	.226	-.025	-.718
Number of Checks and Rate of Responding	.468	.852	.722	.433