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The Effects of Dependence and Trust on The Decision to Electronically Monitor Subordinates

by Bradley Alge
Center for Education and Research
Information Assurance and Security
Purdue University, West Lafayette, IN 47907-2086

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RUNNING HEAD: Electronic Monitoring Decision

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Bradley J. Alge
Krannert Graduate School of Management
1310 Krannert Building
Purdue University
West Lafayette, IN 47907-1310
Ph. 765-494-4483
Fax: 765-496-1778
E-mail: algeb@mgmt.purdue.edu

Gary A. Ballinger
Krannert Graduate School of Management
1310 Krannert Building
Purdue University
West Lafayette, IN 47907-1310
E-mail: Gary_Ballinger@mgmt.purdue.edu

Stephen G. Green
Krannert Graduate School of Management
1310 Krannert Building
Purdue University
West Lafayette, IN 47907-1310
E-mail: sggreen@purdue.edu

Gregory Till
Krannert Graduate School of Management
1310 Krannert Building
Purdue University
West Lafayette, IN 47907-1310
E-mail: gtill@mgmt.purdue.edu

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Abstract

Electronic monitoring of employees is both controversial and on the rise. Unfortunately, research examining electronic monitoring has focused predominantly on the reactions of monitored employees. Little is known about the processes that trigger managers' decisions to electronically monitor subordinates. Employing a distributed virtual team simulation, this study examined the effects of dependence and trust on managerial decisions to electronically monitor their subordinates. Results indicate that managers who are in higher dependence relationships with subordinates or have lower cognition-based trust in subordinates are more likely to engage in richer electronic monitoring of those subordinates. Moreover, although managers tend to increase the level of electronic monitoring over time, this tendency is stronger when cognition-based trust is low versus high. The implications of these results on electronic monitoring, trust, and cybernetic models of control in organizations are discussed.

KEYWORDS: Electronic Monitoring, Control, Trust

THE EFFECTS OF DEPENDENCE AND TRUST ON THE DECISION TO ELECTRONICALLY MONITOR SUBORINATES

Controlling employees by monitoring their activities is a fundamental managerial function (Barnard, 1938; Tenbrunsel & Messick, 1999). From micro-based reinforcement theory (e.g., Skinner, 1953), to macro-based agency theory (Jensen & Meckling, 1976), the monitoring and control of employees has enjoyed a longstanding tradition in the organizational sciences and has been a primary focus of researchers. Similarly, self-regulation theories, which focus on the monitoring of progress toward goals and making adjustments based on feedback, have become an important approach for understanding behavior in organizations (Bandura, 1991; Carver & Scheier, 1998; Klein, 1989; Latham & Locke, 1991). Thus, managers often oversee the goal setting process by setting standards and monitoring progress toward those standards.

One way that managers can monitor and control the actions or activities of their subordinates is through the use of electronic monitoring systems (Aiello, 1993; Ambrose & Alder, 2000). Recent surveys by the American Management Association (2001) indicate that electronic monitoring is on the rise with over 78% of all firms surveyed indicating they electronically monitor their employees to some extent; 62% of firms track Internet use; 54% of firms track e-mail. Botan (1996) estimates that over 40 million U.S. employees are subjected to electronic monitoring on the job. Electronic monitoring is unique from traditional physical supervision. Electronic monitoring can be done more easily in secret than more traditional approaches—Indeed, technologies are becoming increasingly more unobtrusive. Also, electronically collected data can be easily and permanently archived creating a detailed audit trail of one's activities, and through data manipulation and analysis, can enable managers to make quicker sense of the data.

Although electronic monitoring can serve legitimate business functions including the monitoring and control of progress toward organizational goals, the practice is also controversial. If poorly designed, electronic monitoring can have a negative effect on privacy and fairness (Alge, 2001; Ambrose & Alder, 2000; Kidwell & Bennett, 1994; Stanton, 2000). In addition, electronic monitoring can increase stress, inhibit social interaction, and create unrelenting demands on employees (Aiello, 1993; Aiello & Kolb, 1995; Smith, Carayon, Sanders, Lim, & LeGrande, 1992), leading some to label organizations utilizing such practices as "electronic sweatshops" (Lee, 1994). Thus, the decision to electronically monitor is complex.

To date, the majority of research on electronic monitoring has focused on the reactions of those being monitored. For example, research has shown that on simple tasks, electronic monitoring can elevate the performance of those being monitored, but on more complex tasks can impede performance (Aiello & Svec, 1993). Other research has focused on fairness and privacy reactions, as well as stress created. In one of the few studies to focus on managers (i.e., the people performing the electronic monitoring), Kulik and Ambrose (1993) focused on how managers interpret data received from electronic monitoring systems. Their study showed that when combined with visual observation of subordinates, computer-monitored data (i.e., secretary typing speed in words per minute) had a significant effect on managers' ratings of subordinates' typing performance, but did not have an effect on managers' ratings of subordinates' overall performance or non-typing performance.

Research on electronic monitoring has been surprisingly silent on factors that lead a manager to employ electronic monitoring in the first place. The purpose of this study is to examine antecedent conditions that may lead a manager to electronically monitor subordinates. We draw on a control theory framework that focuses on resource dependence as stimulus to

implementing control processes (Green & Welsh, 1988). With this perspective, we examine how a manager's dependence on resources provided by subordinates and a manager's trust in subordinates influence the manager's decision to electronically monitor those subordinates.

Monitoring Richness

Our focus in the present study is on the decision to electronically monitor. However, given a variety of available technologies this decision involves more than simply a yes (I will electronically monitor) or no (I will not electronically monitor) decision. Managers must choose from a variety of technologies that promote different levels of monitoring. We use the term monitoring richness to refer to the extent to which a monitoring system (electronic or otherwise) enables the monitor (i.e., manager) to make sense of the behaviors of the monitoring target. This definition flows directly from media richness theories that describe communication media along a richness continuum, distinguished by their ability to convey meaning (Daft & Lengel, 1984; 1986).

Like face-to-face communication in media richness theories, physical monitoring offers the greatest degree of monitoring richness. Managers are able to see a variety of verbal and non-verbal cues concerning a target's behavior (e.g., facial expressions, tone of voice) that may not be detectable under leaner electronic monitoring systems. Even within electronic monitoring systems, the level of monitoring can vary in terms of richness. Some, relatively lean, electronic monitoring systems may provide summary statistics on the performance or behavior of a target. Other systems may be able to provide a richer, more intimate look at the actions or behaviors of the target. For example, some systems can provide a detailed audit trail of all web sites that an employee visits. Other systems go a step beyond, providing a real-time peek into the on-screen activities of employees, whether they are working down the hall or from a remote location.

Software packages with names like Peek-n-Spy and Big Brother/SurfControl support these richer types of electronic computer monitoring.

Although concepts similar to monitoring richness including intensity or degree of monitoring have been identified in prior theoretical work (e.g., Aiello,1993; Carayon, 1993), there has been no empirical research on how managers choose a level of monitoring richness. Drawing on control theory and resource dependence arguments, we attempt to understand the factors that influence how managers choose a level of monitoring richness when supervising employees electronically.

Control Theory and Resource Dependence

A useful framework for understanding the decision to electronically monitor is cybernetic control theory. Building on control theory and resource dependence, Green and Welsh (1988) developed a model that speaks directly to why control processes are initiated. According to their model, a manager's decision to initiate control depends on four factors: the dependency of the manager on others for critical resources, the extent to which the manager can trust others to adequately provide those resources (resource flow expectations), the cost of control, and cybernetic feasibility. In this study, we employ the first two of these factors, dependence and trust, in an experimental simulation to examine their influence on managers' decisions about the use of electronic monitoring, an emerging form of control in organizations today.

Dependence

According to the resource dependence perspective, organizations depend on sub-units to provide necessary resources (Pfeffer & Salancick, 1978). A dependence relationship exists when a higher order unit (i.e., organization or manager) needs valuable resources from a sub-unit (i.e., department or subordinate) in order to attain its goals, and those resources cannot be easily

substituted or obtained elsewhere. When faced with resource dependency, organizations (i.e., managers) may initiate control as one strategy to ensure that dependent resources are efficiently provided.

Surprisingly, there has been virtually no micro-based research examining the influence of dependence on managerial decisions to control subordinates. Following from theoretical arguments on resource dependence and control (Green & Welsh, 1988; Pfeffer & Salancick, 1978), we expect that managers will be more likely to engage in richer levels of electronic monitoring when they are more (rather than less) dependent on their subordinates for resources.

Hypothesis 1: Managers in high dependence relationships with subordinates will use richer levels of electronic monitoring than managers in low dependence relationships with subordinates.

Trust

Another key factor in whether managers decide to monitor subordinates is based on their belief in their subordinates' trustworthiness. At a general level, trust can be thought of as a willingness of one party to be vulnerable to another party in situations involving risk (Boone & Holmes, 1991; Das & Teng, 2001; Mayer, Davis, & Schoorman, 1995). Yet trust is also multi-dimensional (e.g, Lewicki & Bunker, 1996; McAallister, 1995). Here, our focus is on what McAallister (1995) refers to as cognition-based trust, or the belief in one's reliability and trustworthiness to provide necessary resources. Other discussions of trust that reflect this notion include knowledge-based trust (Lewicki & Bunker, 1996), competence-based trust (Barber, 1983; Das & Teng, 2001; Gabarro, 1978), and ability (Mayer et al., 1995). The concept of cognition-based trust is consistent with Green and Welsh's (1988) model of control that suggests

expectations about the acceptability of resources flows in a relationship is a primary factor influencing the initiation of control.

It follows that trust is strongly linked to decisions about monitoring and control (Gambetta, 1988; Gray & Garsten, 2001; Mayer et al., 1995; Reed, 2001). According to Luhmann, (1979, p. 112), trust and control serve as alternative mechanisms for resolving the problem of order and organization (see also Knights, Noble, Vurdubakis, & Willmott, 2001). That is, control is a way to increase the reliability and predictability of otherwise unreliable (untrustworthy) resource flows (Das & Teng, 2001, p. 258). It follows that when cognition-based trust is sufficiently low, those with appropriate levels of power are more likely to exert control.

Absent trust, monitoring is often seen as necessary to ensure cooperation (Ouchi, 1979). McAllister (1995) proposed that cognition-based trust would predict monitoring and control decisions. In the marketing literature, trust explained significant variance in the decision to exert control in a buyer-seller relationship (Andaleeb, 1995). In a survey of professional managers from an EMBA program, McAllister (1995) found cognition-based trust so highly correlated with an ad-hoc self-report measure of control-based monitoring that the two variables failed to show discriminant validity. By manipulating cognition-based trust and examining its effects on actual control decisions, we seek to provide a strong test of the proposed trust-control relationship in an electronic monitoring context.

Hypothesis 2: When cognition-based trust in a subordinate is low, managers will use richer levels of electronic monitoring than when cognition-based trust in a subordinate is high.

Although the above hypotheses predict that both dependence and trust will influence the control decision, Green and Welsh (1988) suggest that trust will be particularly relevant when

dependence is high and less relevant when dependence is low. In other words, a dependence relationship must exist for trust to matter. This suggests an interaction between dependence and trust such that the relationship between trust and the decision to electronically monitor will be stronger when dependence is high versus low.

Hypothesis 3: Dependence and cognition-based trust will interact to explain electronic monitoring decisions. Trust will be more strongly related to the richness of electronic monitoring when dependence is high than when dependence is low.

Time

The passage of time is a significant, but often overlooked, aspect of cybernetic-based models of control and manager-subordinate relationships. In cybernetic control theory, standards are set and monitored over repeated performance episodes. Adjustments are made in response to feedback about performance and the process continues over time seeking equilibrium. This suggests that control decisions may change over time as managers receive information about performance and the flow of needed resources from employees. If the flow of resources is not consistently reliable, the motivation to increase control is likely to rise if the manager has a significant dependence on employees. Absent any dependence, perhaps due to alternative sources of the needed resources, the motivation to control may not be evident and is less likely to increase over time.

Hypothesis 4: Over time, managers will increase the level of electronic monitoring richness to a greater extent when dependence on the team members is high versus low.

Similarly, the development of trust expectations between a manager and a subordinate take time to develop (Bauer & Green, 1996; Graen & Uhl-Bien, 1995). Repeated episodes of

performance often underlay judgments about the trustworthiness or reliability of an employee. Thus, managers may not control an initially poor performing subordinate. But, if the subordinate is repeatedly unreliable in providing needed resources, i.e., untrustworthy, the initiation of ever-richer electronic monitoring levels is expected to occur.

Hypothesis 5: Over time, managers will increase the level of electronic monitoring richness to a greater extent when cognition-based trust is low versus high.

Methods

Sample and Design

Ninety undergraduate students were recruited from an upper-division class at a large Midwestern university and offered course credit for their participation in a "simulation exercise" assessing their skills at "virtual team management." The students were offered a monetary incentive of $5 for participating. The mean subject age was 20.8 years and 62% of the subjects were male.

To test our hypotheses, we created a virtual team manager simulation involving a 2 (dependence: high versus low) x 2 (trust: high versus low) x 3 (trials) mixed factorial design. Dependence conditions were manipulated between subjects, while the trust condition was manipulated within subjects.

Procedures

Each subject reported to a room with a conference table and a PC workstation, where one confederate was waiting. Within a few minutes, a second confederate entered and all parties were introduced. The experimenter then explained that they were participating in a study testing their virtual team management skills. The subject was informed that s/he had been randomly selected to be the "virtual team leader" for the exercise. The confederates were told that they had been

randomly selected to be team members. Immediately after this, the experimenter told the subject to wait while he took the confederates to other rooms in the same building for the exercise. Once away from the subject, confederates were paid for their time and excused.

Subjects were told that they were guaranteed a minimum of $5 for participating in the simulation. Their performance, however, would be judged by "independent management experts" who would rank their efforts against other classmates participating in the same exercise. If their team scored above the 40th percentile each team member would be awarded an extra $5, and teams scoring above the 60th percentile would receive an additional $10 per team member.

For the simulation task, the subject was seated at the workstation and was responsible for preparing summary charts of monthly stock prices from companies in a selected industry. Data for one company was supplied to the subject in a printout; this was to be entered directly into the spreadsheet. Subjects were told that the other "team members" were to research two competitors of the subject's firm and send the stock prices for the month to the subject via electronic mail. The subjects were informed that their team members would get the stock price data that they were sending by conducting research on the internet. After all of the data had been received and put into the spreadsheet, the subject was asked to answer four questions comparing the stock prices for the three companies. These tasks were to be completed over a five-minute period for each trial. Subjects were informed that there were to be five trials with the first trial being a practice trial. The subject also was informed that after each trial they would have the chance to review the performance of their team members and send them comments to guide their performance on subsequent trials. After answering questions for the subject, the experimenter began the practice trial. At the beginning of the trial the experimenter would leave the room and

go to an office with a workstation where he would monitor and control the performance information the subject received during the trial.

After the practice trial, the experimenter returned and gave the subject a "Team Member Performance Review" to complete. For each team member, the subject had to respond to evaluate the performance of each team member. Subjects were also given an opportunity to provide written comments that would be provided to each Team Member before the start of the next trial. After the subject completed the performance evaluations, the experimenter introduced a set of electronic monitoring options. The subject was informed that before beginning the next trial they had the option of electronically monitoring the performance of their team members. In addition to a no monitoring option, three electronic monitoring options were offered: 1) At the end of the trial, the subject could get a chart comparing their team members' performance during the trial to performance norms (divided into productive, neutral and unproductive web as compared to a bogus "norm"). 2) At the end of the trial, the subject could get a detailed list of the actual web sites visited by the team members during the trial. 3) During the trial, the subject could view each team members' Internet use "live" through use of a special software program that allowed for streaming video access of the team members on-screen activity.

Each monitoring option had a cost associated with it that was based on the richness of information provided. This cost was fifty cents for option 1 (performance charts), seventy-five cents for option 2 (detailed list of web sites) to one dollar per trial for option 3 ("live" view of the team member's on-screen work activity). This nominal charge was assessed to ensure that there was some cost for monitoring, as there is in real organizations. The cost was kept low, however, so subjects would still consider monitoring as a viable option. The cost for the richest condition ($1.00) was identical to the cost of obtaining alternate resources in the low dependence

condition. The $1.00 cost was chosen for the richest option because even if they chose this option at every trial, they would still have an opportunity to make money over the course of the simulation.

After the subject was given the opportunity to choose a monitoring option for each Team Member, the experimenter checked the sheets for completeness and told the subject that he was leaving to "deliver the performance reviews to the Team Members." After excusing himself for several minutes, the experimenter returned and started the next trial. These same procedures were used for each trial that was conducted.

All subjects completed a practice trial and two "full" trials. After completing the performance appraisals for the completed 2nd trial and selecting monitoring options for the 3rd trial, subjects were asked to complete a "virtual team manager self-assessment" while the experimenter left the room to deliver the performance reviews to the Team Members. This instrument contained manipulation checks for the dependence manipulation. After the form was completed, the experimenter returned and told the subject that the one-hour period allotted for the experiment had run out and there would be no more trials. Subjects then were debriefed and excused.

Manipulations

Cognition-based trust. Since lack of reliability and dependability in delivering resources, such as information, has been shown to have strong effects on cognitions about the trustworthiness of other parties (Das & Teng, 2001: 258), high and low cognition-based trust conditions were created by manipulating the adequacy of the information flows provided by the two "team members." During each trial, the experimenter, acting for Team Member #1, e-mailed stock price data within 1.5 minutes to the subject. Those data included summary

calculations in a format that allowed the subject to simply cut and paste the data into their spreadsheet, thereby saving the subject time and effort. Thus, team member #1 provided useful and timely data so that the subject could easily add the data to the spreadsheet and make the necessary comparisons (high trust). In contrast, the experimenter acting for team member #2 did not provide such useful and timely information. The stock price data e-mailed from Team Member #2 came without summary calculations in a format that was cumbersome to use. The information also was in a different software format that did not permit easy transfer to the spreadsheet. Finally, the information sent by team member #2 arrived after four minutes had passed, leaving little time in the trial for the subject to use those data (low trust).

Dependence. Since dependence is reduced by providing individuals with alternative sources of resources in a relationship (Emerson, 1962; Green & Welsh, 1988), dependence was manipulated in this study by varying the availability of information from sources other than the team members. Subjects in the low dependence condition were given two envelopes labeled "Team Member #1" and "Team Member #2" and were informed: "If at any time during a work period you feel your team is not performing adequately, you have the option of gathering data from sources other than your team member. For each report you must complete, the data you need also are available in the sealed envelopes. There are two sealed envelopes containing information that should come from Team Member #1 or Team Member #2. If you go to this source, rather than relying on a team member for this critical information, you will be charged one dollar for each envelope that you open. This dollar will be deducted from any earnings that you receive."

Subjects were reminded that they could open any number of envelopes during any given trial. The charge ($1.00 per envelope) for obtaining resources was identical to the charge for the

richest monitoring option. This nominal charge was assessed to ensure that there was some cost for obtaining information from alternative sources, as there is in real organizations. The cost was kept low, however, so subjects would consider these alternative sources of information as a possible option if team members were not considered trustworthy sources of information. Even if subjects used these alternative sources of information at each trial, they could still make money over the course of the experiment. Thus, subjects in the low dependence condition were provided an alternative source of the needed information.

Subjects in the high dependence condition were provided no alternative source of information and were told that: "If at any time during a work period you feel the team is not performing adequately, make notes and you will be able to provide feedback to your team members at the end of the work period. I must remind you, however, that the data you need to complete your report can only be provided by your team members via the Internet."

Measures

Manipulation checks. The manipulation of trust was assessed through the use of a cognition-based trust measure (included in the performance evaluations) completed by the subject for each of the Team Members. The four-item scale (α = .83) was adapted from McAllister (1995); a sample item is "I can rely on this team member not to make my job more difficult by careless work." The manipulation of perceived dependence on team members was measured using a three-item scale (α=. 71); a sample item is "I do not have to rely on my team members to get the information I need" (reverse scored).

Monitoring richness. The monitoring richness dependent variable was measured through the monitoring choices completed by the subject before each trial. The monitoring level for each team member for each trial was coded in increasing values to reflect the level of monitoring that

the subject requested. Monitoring levels were coded: "0" for no monitoring, "1" for the performance-norm information, "2" for the detailed list of web sites, and "3" for the live streaming video of the team members onscreen activities. Thus, monitoring richness outcomes varied from very low richness (no monitoring) to very high richness (live streaming video).

Results

A repeated measures multivariate analysis of variance (MANOVA) with both between Ss (dependence) and within-Ss (trust ratings and trials) was used to test the significance of the trust manipulation. MANOVA results revealed significant effects for trial, multivariate F (2,88) = 7.11, p = .001, trust, multivariate F (1,89) = 177.35, p < .001, and the trial by trust interaction, multivariate F (2,88) = 36.91, p < .001. Inspection of the means revealed that low trust team members were rated significantly lower in trust than the high trust team members. Moreover, this difference became greater over time, confirming the efficacy of the trust manipulation. Subjects in the high dependence condition also rated themselves as significantly more dependent on their team members (M = 5.67) than did subjects in the low dependency condition (M = 4.85; t (88) = 3.13, p < .01). These results confirm the efficacy of the dependence manipulation.

Hypotheses were tested using a generalized estimating equations (GEE) approach introduced by Zeger and Liang (1986). The method is appropriate with designs such as this one where the dependent variable is a repeated measure and is categorical or binary (Horton & Lipsitz, 1999). GEE's fit a naïve, standard regression model to the data, take the residuals from this regression and use them to estimate parameters that quantify the correlations between observations in the same individual, and then refit the regression model using a series of iterations until the estimates stabilize (Burton, Gurrin & Sly, 1998). The user may specify the

form of the correlation between observations within subject, but the model is robust to errors in the specification of the correlation matrix (Sheu, 2000; Zeger & Liang, 1986).

Using SAS PROC GENMOD (i.e., generalized linear models), we specified a multinomial distribution for the dependent variable. The regression model tested took the form of repeated measures across three trials, regressing monitoring level on trust as a within-subject independent variable and dependence as a between-subject independent variable and the possible interactions of the independent variables. The model specified was: Monitor Level = β_1Trust + β_2Dependence + β_3Trial + β_4Trust*Dependence + β_5 Dependence*Trial + β_6 Trust*Trial + β_7 Trust*Dependence*Trial. Formal inferences for each main effect and interaction under the GEE approach are based upon the Wald test (Burton, Gurrin & Sly, 1998; Horton & Lipsitz, 1999). Estimated regression coefficients are divided by their robust standard error and the result is a normalized standardized deviate (Z-score).

Hypothesis 1 proposed that subjects would select richer levels of monitoring when dependence was high as opposed to low. Results indicate a significant positive relationship was between dependence and monitoring richness level ($\beta = 0.82$, SE = 0.41; Z = 1.99, $p < .05$) indicating that higher levels of dependence resulted in richer monitoring levels by the supervisor. These findings support Hypothesis 1.

Hypotheses 2 proposed that subjects would select richer levels of monitoring when cognition-based trust was low as opposed to high. A significant negative relationship was found between trust and monitoring richness level ($\beta = -2.27$, se = 0.56; Z = -4.05, $p < .001$) indicating that lower trust resulted in higher monitoring levels as predicted, supporting Hypotheses 2.

Hypothesis 3 proposed that trust would be more strongly related to the richness of electronic monitoring when dependence was high than when dependence was low. We tested this prediction against the null hypothesis by constructing a contrast test (H0 = HiTrust* HiDepend = HiTrust*LoDepend = LoTrust*LoDepend = LoTrust*HiDepend = 0) as recommended by Horton and Lipsitz (1999). When testing for effects against the null hypotheses, Horton and Lipsitz (p. 164) recommend constructing a Wald test statistic: $T = \widetilde{\beta}'(\text{var}(\widetilde{\beta}))^{-1}\widetilde{\beta}$ where $\widetilde{\beta}$ is a p x 1 vector containing the parameter estimates for the effect to be tested. SAS PROC GENMOD in Release 8.2 allows the user to specify contrasts that are similar to Type III Sum of Squares tests derived in PROC GLM for the testing of effects. The test statistic for the contrast test on Hypothesis 3 ($\chi_1^2 = 0.25$, $\underline{p} = .65$) revealed that there is no support for Hypothesis 3.

Hypothesis 4 predicted that, over time, managers would increase the level of electronic monitoring richness to a greater extent when dependence on the team members was high versus low. We tested this prediction against the null hypothesis (Depend*Trial1 = Depend*Trial2 = Depend*Trial3 = 0) by again constructing a contrast test. The test statistic ($\chi_2^2 = 0.49$, $\underline{p} = .78$) revealed no support for Hypothesis 4.

The same procedure was used to test Hypothesis 5, which proposed that, over time, managers would increase the level of electronic monitoring richness to a greater extent when trust was low versus high. The trust by trial interaction was significant ($\chi_2^2 = 27.33$, $\underline{p} < .0001$). As can be seen in Figure 1, differences in monitoring richness became more pronounced over time with managers choosing to monitor low trust subordinates at richer levels than high trust subordinates.

Discussion

This study examined factors that influence a manager's decision to initiate control by means of electronic monitoring of subordinate behavior. Using a methodologically advanced procedure for modeling repeated categorical responses over time (i.e., generalized linear modeling with generalized estimating equations), the results of this study confirm aspects of Green and Welsh's (1988) model of control. Our results establish the importance of both dependence and cognition-based trust in the control process. In a virtual team context, managers were more willing to electronically monitor subordinates at richer levels of electronic monitoring when a) they depended on subordinates for critical information (high dependence relationship) and b) when the resources provided by their subordinates was inadequate (low cognition-based trust). The initiation of control was also time-dependent with respect to trust, but not dependence. Over time, managers increased monitoring richness levels to a greater extent for low trust subordinates than for high trust subordinates.

Contrary to expectations, trust and dependence did not interact. This could be attributable to a relatively weaker manipulation of dependence. Although perceived levels of dependence were significantly different between high and low dependence subjects, the mean of perceived dependence in the low dependence condition was above the midpoint (4.85). This suggests that even in the low dependence condition, subjects felt somewhat dependent on their team members, though not as dependent as subjects in the high dependence condition. We may have observed an interaction if we could have created even greater variance in dependence (i.e. by creating a condition where subjects perceived dependence to be lower than in the present study). In fact, an examination of the mean monitoring richness levels for combinations of dependence and trust over time reveals a fantail pattern largely consistent with Green and Welsh's predictions (See Figure 1).

However, an alternative explanation is possible. Green and Welsh (1988) suggest a sequence of events in which there must exist high dependence before control will be initiated. One implication from the present research is that although dependence had a main effect on monitoring initiation as expected, contrary to Green and Welsh (1988), even low levels of dependence or the perception of dependence may be sufficient for control to be initiated. Cognition-based trust, or adequacy of resource flows, was the strongest predictor of initiation of electronic monitoring, irrespective of dependence levels. Thus, it appears that although dependence is a sufficient condition to trigger control behaviors, managers may engage in monitoring and control in situations of low trust regardless of dependence. Future research is needed to contrast very high levels of dependence and trust with very low levels of dependence and trust to test these possibilities.

Trust appears to be particularly important in virtual environments (Handy, 1995; Jarvenpaa & Leidner, 1999). When social presence and physical cues are low, factors such as trust take on greater significance (Knights et al., 2001). Indeed, the strong findings with respect to trust clearly suggest trust concepts are important in virtual environments. Although conventional wisdom suggests it takes considerable time for trust to develop, subjects were able to distinguish between high and low trustees quickly. This distinction grew stronger over time and thus paralleled differences in monitoring decisions. This supports recent conceptualizations of virtual trust or swift trust (Meyerson, Weick, & Kramer, 1996). According to the swift trust perspective, teams that lack an extended history or anticipate little future interaction can still develop and differentiate trustworthiness of subordinates relatively quickly. Cognition-based trust can develop relatively quickly when information is provided about one's trustworthiness. In the present study, this came in the form of performance events or opportunities. In real world

settings this information might be quickly obtained from a knowledge management system. For example, knowledge repositories might contain information on individuals' past accomplishments and experiences. Knowledge management systems may also provide links to co-workers who have worked with particular individuals, allowing for quick reliability checks.

Our results are limited by the fact that this was a 1-hr lab study involving students with limited history or prospect of future interaction, and as such may not generalize to real organizations. However, our purpose in this study was to test the plausibility of the Green and Welsh (1988) model in an electronic monitoring context. That is, we attempted to create a situation where Green and Welsh's predictions could be observed. Indeed, we were successful in manipulating both dependence and cognition-based trust. We tried to ensure as much realism in our simulation as possible. Managers had to communicate and receive information from subordinates; task assignments had a deadline; and rewards received were variable and dependent on managers' abilities to complete the assigned team tasks. The fact the managers in our simulation did not have an extended history or potential future with their subordinates is not dissimilar from recent conceptualizations of trust in similar real world virtual environments (Meyerson et al., 1996). Having established that both dependence and cognition-based trust predict electronic monitoring decisions in a controlled lab setting, future research needs to cross-validate these findings in real organizations.

What's clear from our findings is that both dependence and trust are important antecedents to the control decision as Green and Welsh (1988) proposed. What's less clear is whether the chain of events suggested by Green and Welsh is valid. Future research is needed to test the sequence of relationships suggested by Green and Welsh over longer periods of dependence. Also needed, is research that looks at the dynamics of performance, feedback and

control. In the present study, we controlled subordinate reactions to monitoring. In naturalistic settings subordinates are likely to make adjustments to controls. Thus, research is needed to explore this dynamic process. Finally, future research is needed to understand how the different levels of monitoring richness impact the attitudes not only of those monitored, but the managers who selected them. For example, do managers experience guilt from engaging in richer electronic monitoring (e.g. tracking individuals' web sites)?

As society becomes increasingly virtual, and lower level employees are being depended upon to make decisions and provide critical resources, managers are confronted with a control paradox—how to give up control while maintaining it (Spreitzer & Mishra, 1999). At the same time, technological advances are providing managers with tools to electronically monitor and control employees. Although research has enhanced our understanding of how electronic monitoring affects employees, we know little about why managers engage in this practice. Thus, the present research shifts the focus from understanding electronic monitoring's effects (e.g., privacy and fairness) to understanding its causes (e.g., dependence and trust).

The present study, in addition to confirming aspects of control in general, contributes to our understanding of electronic monitoring as a specific form of control. Given that people may be particularly averse to electronic monitoring and control (e.g., Alge, 2001; Ambrose & Alder, 2000; Botan, 1996; Stanton, 2000; Zuboff, 1988), it is important to understand the conditions that might be conducive to its initiation. This study provides a first step toward understanding why managers engage in electronic monitoring and control of subordinates.

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Figure 1: Mean monitoring richness levels for combinations of dependence and trust over time