Centre de Referència en Economia Analítica

Barcelona Economics Working Paper Series

Working Paper nº 162

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Abstract: We study manager-employee interactions in experiments set in a corporate environment where payoffs depend on employees coordinating at high effort levels; the underlying game being played repeatedly by employees is a weak-link game. In the absence of managerial intervention subjects invariably slip into coordination failure. To overcome a history of coordination failure, managers have two instruments at their disposal, increasing employees' financial incentives to coordinate and communication with employees. We find that communication is a more effective tool than incentive changes for leading organizations out of performance traps. Examining the content of managers' communication, the most effective messages specifically request a high effort, point out the mutual benefits of high effort, and imply that employees are being paid well.

Keywords: Change, Incentives, Coordination, Communication, Experiments, Organizations

JEL Classification Codes: C92, D23, J31, L23, M52

Acknowledgements: The authors thank the NSF (SES-0214310), the Spanish *Ministerio de Educación y Cultura* (SEC2002-01352), the BBVA Foundation, and the Barcelona Economics Program of CREA for financial help, Kurt Anderson, David Rodríguez, and Amy Stone for excellent research assistance. We would like to thank Eric Bettinger, Colin Camerer, John Ham, Al Roth and seminar participants at Harvard, NYU, and Illinois for helpful comments.

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1. Introduction.

Coordination failure often causes organizations to get stuck in situations that are unsatisfactory for all involved. The question then is how to extricate people from such performance traps and bring about change for the better. Coordination has long been studied by behavioral game theorists,[1] but typically the only players in the game are the agents attempting to coordinate. In many settings, there are important external agents who have a stake in whether coordination is achieved. If a firm earns low profits because of coordination failure among its employees, the management and shareholders suffer as well. If a country fails to develop economically because of coordination failure among industries, the government has a serious problem. It follows that these external agents have strong incentives to take actions that will lead to improved coordination. In this paper we study the role of external agents with a stake in the outcome, specifically managers of underperforming corporations, in moving organizations from coordination failure to successful coordination.

Our work focuses on the effectiveness of two prominent management tools used to influence behavior in such situations, financial incentives and communication. We study experiments set in a corporate environment, called the "turnaround game," where managers' and employees' payoffs depend positively on employees coordinating at high effort levels – the underlying game being played by employees is a weak-link game. In an initial phase, where managerial intervention is absent, employees almost invariably slip into coordination failure. An additional subject is then introduced as a manager. This manager, faced with overcoming a history of coordination failure, can take action in two ways. First, he can change employees' incentives to coordinate by shifting some portion of the organization's surplus over to employees. From an economists' point of view this is an obvious tool to use. Second, he can communicate with employees. Although this may seem less natural to economists, studies in organizational behavior suggest that communication is one of the crucial variables that influence change.[2] Indeed, there is good reason to believe that communication will be particularly effective in organizations afflicted by coordination failure as this is primarily a problem of beliefs. The weak-link game being played by employees is fairly simple and presumably after a few periods most subjects realize that mutual gains would occur if all employees switched to higher effort levels. However, no one employee can affect a positive change unilaterally. To be willing to choose a higher effort level, an

[1] See Camerer (2003, ch. 7) for a recent summary of this literature.

[2] For examples see Ford and Ford (1995) and Kotter (1996).

employee must believe that others will also choose to increase their effort levels. In the face of a history of coordination failure such beliefs are understandably difficult to achieve. A manager's task therefore fundamentally consists of finding a way to affect employees' beliefs about other employees' actions. The effective use of communication is a way of influencing employees' beliefs in a positive way. The ability to do this can be seen as an essential feature of leadership, one of the components of vision, as discussed in Foss (2001).

Our experimental design systematically varies the avenues of communication available to managers and employees. In our baseline treatment, managers only control financial incentives and no communication is possible. We then allow for one-way communication – managers can send messages to employees – and two-way communication – managers can send messages to employees and vice versa. The content of communication between managers and employees was completely unstructured as subjects could send any messages they desired subject only to minor restrictions. We recorded all of the messages and quantified the content using a systematic coding scheme. Analyzing these codings allows us to compare the impact of various types of messages with the impact of changing financial incentives, identify the most successful type of messages, and generally characterize most effective managerial communication style.

Our results emphasize the importance of communication. As the available avenues of communication increase, both employees' effort and managers' profits increase. Communication is a more effective tool for increasing manager profits than financial incentives. The marginal profit from increasing incentives is actually slightly negative, as increased payments to employees more than consume the added revenue from increased effort by employees. In contrast, the most effective types of messages increase profits by over 30% on average. This is the central result of our paper – for managers attempting to overcome a history of coordination failure, it's what you say, not what you pay, that largely determines your success.

While managers try a wide variety of communication strategies, including complex multi-round plans, the most successful communication strategy is quite simple: Explicitly request that all employees choose a high effort level, emphasize the mutual benefits of coordinating at a high effort level, and assure the employees that they are being paid well (although it is not necessary to actually pay them well). In other words, managers succeed in this environment by acting as good coordination devices.

Successful communication from employees to managers takes a surprising form – the most valuable thing an employee can do is give advice to the manager on how he should

approach the other employees. Because employees benefit from having the manager successfully coordinate their effort levels, they have strong incentives to offer useful advice. Managers in the two-way communication treatment therefore enjoy the benefits of group decision making.[3]

Two secondary results of our analysis are worth noting. First, sessions for these experiments were conducted at two locations, Case Western Reserve in Cleveland and Universitat Autònoma de Barcelona in Barcelona. Barcelona managers perform significantly worse than Cleveland managers. This poor performance occurs primarily in sessions where managers can communicate with employees and reflects underlying differences in the types of messages sent by managers in the two locations. This result does not necessarily reflect cultural differences, as the two populations differ on a number of dimensions, but demonstrates how performance can vary between populations because of systematic differences in managerial communication strategies.

Second, we checked whether, controlling for differences in financial incentives, employees managed by a computer did worse than employees managed by another human absent any possibility of communication. We find no significant differences, giving us added confidence in the results of earlier studies where the manager is computer-controlled.

The work most closely related to that reported here is Capra, Tanaka, Camerer, Munyan, Sovero, Wang, and Noussair (2005).[4] Their experiment studies coordination failure in a growth model drawn from the development literature. They find that allowing communication among players leads (on average) to improved coordination. Our work differs from their simultaneous and independent contribution in many ways, three of which deserve mention. First, our work focuses on change. Our experimental design generates a history of coordination failure which a new manager and the employees then need to overcome. Second, our game includes an agent, the manager, who does not actually play the coordination game but has a direct stake in its outcome. In Capra *et al*, all communication is

[3] For summaries of the psychology literature on group decision making see Davis (1992) and Kerr, MacCoun, and Kramer (1996). For logic problems with a demonstrably correct solution, groups generally perform better than individuals although not as well as a group of individuals operating independently would do.

[4] Chaudhuri, Schotter, and Sopher (2004) also study experiments where an external agent has an interest in coordination. In their case, a participant in a previous minimum game can offer advice to a "successor" in the current minimum game. The ancestor receives a payoff identical to the successor's earnings in the current minimum game as well as their earnings from their previous play. Chaudhuri *et al* find that advice increases coordination if it is common knowledge and of sufficient quality. See also Cooper, DeJong, Forsythe, and Ross (1989 and 1992) and Weber, Camerer, Rottenstreich, and Knez (2001). These papers are less relevant to our work due to their use of either restricted message spaces or suggested scripts. For the effect of cheap talk in experiments in general see Crawford (1998).

between the agents playing the coordination game. We do not allow any communication between employees so as to focus on the interaction between managers and employees. Finally and most importantly, instead of concentrating solely on communication, we examine both incentives and communication with a focus on which tool is most effective for overcoming coordination failure. The rich communication strategies we observe are largely due to the interaction between incentives and communication as well as the inherent tension between managers and employees. We view the work of Capra *et al* as a complement to our own, driving home the point that communication can play an important role in overcoming coordination failure, but it does not address the interactions between managers and employees that drive our most interesting results.

Section 2 introduces the turnaround game. Section 3 describes our experimental design and summarizes the primary research questions arising from our design. Section 4 presents our procedures. Section 5 reports the results and Section 6 concludes.

2. The Corporate Turnaround Game

An experimental firm in the corporate turnaround game consists of four employees and a manager. The structure of the game played by these five subjects is governed by the following pair of basic design choices.

1) The firm's technology has a weak-link structure.

As described by Kremer (1993), for many organizations the individual (or unit) doing the worst job – the "weak link" – determines the overall productivity of an organization. Applied to the corporate turnaround game, this assumption implies that productivity (and profitability) depends on the *minimum* effort level chosen by the four employees. As a prototypical example, imagine a firm producing via an assembly line where the slowest worker determines the speed of the entire line.[5]

Starting from this observation, Knez and Camerer (1994) argue that the game played within many firms takes on the form of the "minimum game" introduced by Van Huyck, Battalio, and Beil (1990). Knez and Camerer refer to these games by the more evocative term "weak-link games," a terminology that we follow. These are a type of coordination game. Each player simultaneously chooses a strategy that can be thought of as an effort level. A player's payoff is a decreasing function of his own effort and an increasing function of the minimum effort chosen by the players in the group. Payoffs are set up so that it is worthwhile for a player to raise his effort level if *and only if* it will increase the minimum

[5] For examples from field settings, see Knez and Simester's (2002) study of Continental Airline's turnaround and Ichniowski, Shaw, and Prennushi's (1997) work on steel production.

effort for the group. Coordinating on any of the available effort levels is a Nash equilibrium for a weak-link game, but results from earlier experiments suggest that play often evolves towards the payoff dominated equilibrium where all players choose the lowest possible effort level.[6] In the corporate turnaround game, the subgame following the manager's choice of an incentive scheme will always be a weak-link game.

By studying a production technology with a weak-link structure, we focus on a worst-case scenario. Presumably many organizations face coordination problems in more forgiving settings where a change for the better is easily achieved. However, if we can understand how to overcome coordination failure in organizations with a weak-link structure, a tough environment, it should be even easier to accomplish in less difficult circumstances.

2) Both managers and employees get limited information feedback.

Specifically, we assume the firm manager observes the minimum effort selected (which is revealed by the firm's productivity), but cannot observe any individual employee's effort level. Likewise, employees observe their own effort and the minimum effort for the firm, but not the individual efforts of the other three employees. For the managers this implies that they lack the necessary information to tailor bonuses to the effort put forth by individuals and can only offer bonuses based on the minimum effort over all employees. In other words, limiting the information available to the firm manager restricts the tools available for overcoming coordination failure. Limiting employees' information gives managers a significantly more difficult task, as previous work demonstrates that overcoming coordination failure is substantially more difficult when employees cannot observe others' effort levels.[7]

Limiting the manager's information about employees' choices implies that he, consistent with the spirit of most principal-agent models, has difficulty monitoring them. There is no particular reason to believe that this assumption has either more or less external validity than assuming the manager individually monitors the employees, as both cases occur in reality. The benefit of limiting the manager's information is a considerable simplification of the environment as well as confronting the manager with a more challenging task.

We limit the employees' information feedback for three reasons. The first is that with full feedback there is asymmetric information between the manager and the employees. This

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[6] See Van Huyck *et al* (1990) and Knez and Camerer (1994 and 2000). Coordination failure is less likely in small groups – see preceding as well as Weber, Camerer and Knez (2004).

[7] See Brandts and Cooper (2004).

introduces extraneous issues that add unwanted complexity to our design. Second, we want to make the manager's task harder in overcoming coordination failure. As a general design feature we try to confront managers with a difficult but not impossible task.[8] Presumably lessons learned from such a harsh environment will be valuable in more forgiving settings as well. Finally, limiting the employees' information accentuates the importance of leadership by the manager. When employees can see the choices of other employees, leading by example often takes place.[9] One or more employees make a large increase in their effort levels presumably in the hope of leading laggards to match this effort, thereby overturning a history of coordination failure. This sort of internal leadership works reasonably well with full feedback, but can't work with limited feedback as laggards can't see the effort choices of putative leaders. Limited feedback therefore leaves managers as the primary source of potential leadership within the firm.

Turning to the specifics of the turnaround game, a round of the game starts with the manager setting a bonus rate (B) that determines how much additional pay each employee receives per unit increase in the minimum effort. Bonuses are based solely on the minimum effort, consistent with our assumption that the manager cannot observe individual efforts. We restrict the feasible bonus rates to the integers $B \in \{6,7,8,9,10,11,12,13,14,15\}$. Given the other parameter values used in our experiments, this is the set of (integer) bonus rates that neither make the choice of positive effort a dominated strategy nor allow the manager to lose money. The employees observe B and simultaneously select effort levels. Intuitively, employees spend forty hours per week on the job, and effort measures the number of these hours that they actually work hard rather than loafing. Employee i's effort, E_i, is restricted to be in ten hour increments: $E_i \in \{0,10,20,30,40\}$. The players' payoffs are then given by the following payoff functions:

$$\text{Manager payoff: } \pi_F = 100 + \left((60 - 4B) \times \min_{i \in \{1,2,3,4\}} (E_i) \right) \quad \text{(eq. 1)}$$

$$\text{Employee i payoff: } \pi_e^i = 200 - 5E_i + \left(B \times \min_{j \in \{1,2,3,4\}} (E_j) \right) \quad \text{(eq. 2)}$$

[8] On a related point, we use four employees rather than either a smaller or larger number to make it possible but not trivial to overcome a history of coordination failure. Based on the results of Van Huyck et al (1990), it would likely be a simple task to overcome coordination failure with only two employees (if it even occurred to begin with). Likewise, turning around a very large group would likely be so difficult that we would learn nothing from the exercise.

[9] See Brandts and Cooper (2005).

The manager's payoff depends on the minimum effort selected by his employees, consistent with our assumption that the firm's production technology has the weak-link property. As can be seen in Equations 1 and 2, the bonus transfers a portion of the firm's revenues to its employees. Managers are limited to a linear bonus scheme to simplify the game.

To develop the basic theoretical properties of the turnaround game, we first focus on the proper subgame where employees choose effort levels after the manager has chosen a bonus rate. For all available values of the bonus rate the resulting subgame is a weak-link game. Coordinating on any of the five available effort levels is a Nash equilibrium. Given this multiplicity of equilibria in the subgame, subgame perfection has little predictive power for the full game. In particular, any combination of bonus rate and minimum effort can be supported by a subgame perfect equilibrium.

To understand why overcoming coordination failure is so difficult in this environment, consider the game induced by a bonus value of B = 6 (see top panel of Table 1). Suppose that the employees have previously all chosen effort level 0. An employee who thinks about raising his effort from 0 to 10 faces a certain payoff reduction of 50 pesetas due to increased effort, while his maximum possible gain is only 10 pesetas beyond the 200 pesetas he gets without risk by choosing 0. For the proposed increase to have a positive expected profit, the employee must believe the probability of the three other employees *simultaneously* raising their efforts from 0 to 10 equals at least 5/6. Treating the other three employees as statistically independent, this translates into requiring a 94% chance of increased effort for each of the other three employees.[10] Given these grim incentives, overcoming coordination failure is quite unlikely with a low bonus rate.

(Insert Table 1 Here)

Now imagine that a new manager takes over the firm. Determined to shake the firm out of its underperforming ways, he raises the bonus rate to B = 14, the highest bonus rate at which the firm manager can earn a profit. This yields the payoff table shown in the bottom panel of Table 1. The incentives for employees to increase effort are strengthened by this change. Again suppose we start with all four employees choosing effort level 0. An employee increasing his effort from 0 to 10 still faces a certain loss of 50 pesetas, but the potential gain is now 90 pesetas. The break-even probability that the other employees will simultaneously increase their efforts is now 5/14. Assuming the other three employees are

[10] To derive this probability, solve for p such that $200 = 150*(1-p^3) + 210*p^3$.

independent, this translates into requiring a 71% chance that each employee raises his effort. These are better odds than we saw with B = 6, but still daunting. Although one can imagine employees now at least attempting to overcome coordination failure, there is clearly room for the manager to play a leadership role beyond increasing the bonus rate.

3. Experimental Design

To understand the experimental design, it is necessary to realize that our focus is *not* on comparative static results. It is quite possible that subjects with no previous experience will generally converge to a more efficient equilibrium in the turnaround game with B = 14 than in the game with B = 6. This, however, isn't our point. Instead, we want to know if and how managers will overcome a history of coordination failure. The experiments are therefore designed so that employees will usually fail to coordinate prior to the possibility of managerial interventions.

At the beginning of a session, subjects were randomly assigned to either the role of an employee or a manager. Subjects then played thirty rounds of the turnaround game in fixed groups ("firms") of five: one manager and four employees. For the first ten rounds of the experiment the manager was strictly an observer; managers could see the same round by round information feedback that they normally received, but could neither control the bonus rate nor communicate with employees. Managers were not paid for these rounds, although employees and managers were both shown the payoffs that the manager would have earned. The bonus rate was fixed at B = 6 for the first ten rounds, this being the lowest (integer) bonus rate that does not make choosing positive effort levels a dominated strategy. The goal was to get a high percentage of firms coordinated on the inefficient outcome with minimum effort equal to zero. This seemed likely given the results of previous experiments (Brandts and Cooper, 2004 and 2005).

For the remaining twenty rounds the manager actively managed his firm. The employees were informed when the manager took over control of the firm. In all treatments the manager was then responsible for choosing a bonus rate in each round and received payoffs as shown in Equation 1.

(Insert Table 2 Here)

Table 2 summarizes the treatments in our experimental design. The primary treatment variable in our sessions is what type of communication was possible between a firm's manager and employees. The three communication conditions we studied are:

- No Communication.

- One Way Communication. At the same time that firm managers selected a bonus rate they were given a text box that could be used to type a message to their employees. These messages were shown to the employees, along with the bonus rate, prior to the employees choosing effort levels. The messages were cheap talk as any commitments made in the communication stage were non-binding.
- Two Way Communication. Managers could send messages as above. Employees were given a similar text box to send a message to the manager at the same time as they chose an effort level. These messages were sent only to the manager, not to the other employees. As above, messages were cheap talk.

As a secondary treatment, we also report results from sessions where the firm manager was played by the computer with bonus levels determined exogenously for all rounds. This treatment is a control for whether using a subject as the manager as opposed to the computer affects employees' choices independent of financial incentives, an important methodological issue if the current study is to be compared with earlier work using a computer as the manager (e.g. Brandts and Cooper, 2004 and 2005). Employees in these sessions knew that the manager was always the computer rather than another subject. For these sessions the bonus rate equaled 6 for the first ten rounds and 10 for the remaining 20 rounds, similar to the average bonus level chosen in the sessions with human managers.

Our subjects were undergraduate students from Case Western Reserve University in Cleveland and from either Universitat Pompeu Fabra or the Universitat Autònoma in Barcelona.[11] While the use of two populations was not intended as a treatment per se, there are a number of differences in behavior between the two locations that will be described in the results section. Because of a related project using EMBAs as subjects, we needed to run most of the one-way communication sessions in Cleveland. We therefore made no attempt to balance the sessions between the two locations, instead relying on statistical analysis to control for location effects. We ran at least 5 experimental firms for each treatment in each location. We believe this is sufficient to statistically identify any location effects. We ran at least 20 experimental firms for each of the treatments with human managers.

Our experimental design is intended to address five specific research questions; in the results section we will present five corresponding regularities.

[11] Barcelona sessions with computer managers were run at UPF and all other Barcelona sessions were run at UAB. There is little difference between the student bodies at the two universities.

QUESTION 1: In the absence of communication and holding the bonus rate fixed, will minimum effort be significantly different with human managers than with computer managers?

From a purely economic point view, we might predict that, absent communication, the level of the bonus is the primary force driving employees' effort levels regardless of whether it is set by man or machine. However if play with human managers taps into emotions that aren't present with computer managers, then effort levels are likely to depend on whether the manager is a fellow subject.[12]

QUESTION 2: Will more avenues of communication lead to higher minimum effort holding financial incentives fixed? Specifically, will average minimum effort be greater with one way communication than with no communication (and human managers)? Will average minimum effort be greater with two way communication than with one way communication?

QUESTION 3: Ceteris paribus, will increased financial incentives (e.g. higher values of B) lead to higher minimum effort?

QUESTION 4: Which communication strategies will be most effective in increasing the minimum effort?

QUESTION 5: Will firm managers' choices of financial incentives be more important in determining their profits than their choice of communication strategies?

Questions 2 – 5 cut to the heart of the matter. Based on the literature studying change from organizational behavior, our prior was that more avenues of communication will effectively lead to better coordination.[13] Standard economists' intuition suggested that the answer to Question 3 would to be positive as well, although results from our earlier study with computer managers (Brandts and Cooper, 2005) suggest otherwise. We had no strong prior about the answers for Questions 4 and 5, as these truly explore terra incognita.

4. Procedures.

All sessions were run on a computerized network. Sessions with subjects as firm managers were run using a web application specifically developed for this purpose while the sessions with computer managers used a z-tree program. There are minor differences in how

[12] There exists a large literature on experimental labor markets demonstrating a positive relationship between wages and effort. This bilateral gift exchange is presumably due to reciprocity, as employees reward a higher wage with greater effort. For a survey of these results, see Fehr and Falk (2002). Note that the environment being studied in this literature is quite different from that studied here, as there is typically only one employee and effort is a strictly dominated strategy. The focus is on issues of trust and trustworthiness rather than coordination as is the case here.

[13] In experiments studying battle-of-the sexes coordination games, one-way communication has been found to be more effective at accomplishing good coordination than two-communication (Cooper *et al*, 1989). However, the asymmetry of equilibrium payoffs in that case implies a fundamentally different situation.

information is presented between the programs (e.g. the screens are laid out in a slightly different fashion).

Instructions were framed in neutral but naturalistic terms. Subjects received instructions and payoff quiz questions for both roles. Subjects were told that in the role of employees they must allocate 40 hours a week, in ten hour blocks, between Task A and Task B. Task A is equivalent to effort, but this term, due to its strong connotations, was never used when communicating with subjects through the instructions or otherwise. Subjects knew the number of rounds in the experiments and knew in advance when the bonus would be set by the computer and when it would be set by another subject acting as manager. Subjects were reminded of this information throughout the course of the experiment.

In the one and two-way communication treatments managers were given – at the same time that they were asked to choose a bonus level - a text box in which they could type a message. Subjects were given no instructions about the content of the messages except that they could not identify themselves or use offensive language. Although we did not monitor messages in real time, our ex post reading of them indicates that subjects universally abided by these restrictions. Subjects were given no time or length limit on entering messages. Indeed, some of the messages were quite long and took a lengthy time to type. Once the manager was finished, whatever message he wrote was sent to all the employees in the firm at the same time they saw his choice for the bonus rate.

In the two-way communication treatment employee communication came into play. At the same time that employees were asked to choose an effort level, they were given a text box in which they could type a message. Their instructions about messages were identical to those given to managers. Employees' messages were sent to their manager, appearing at the same time the manager saw the minimum effort chosen by their employees in the previous round. Employees could *not* send messages among themselves. The manager could not identify which employee was specifically responsible for a particular message as messages were randomly ordered and displayed without any identifying information.

Payoffs were converted from 'experimental pesetas' to dollars/euros at a 500:1 ratio. Average payoffs were $24.37 in Cleveland and 16.59€ in Barcelona. Much of this difference come from the need for a larger show-up fee in Cleveland ($10) to attract subjects than in Barcelona (5€). Given that the average exchange rate during the period experiments were being run was about $1.15/1€, the marginal cost of effort and the marginal benefit of increasing minimum effort was somewhat higher in Barcelona.

To limit the possibility of contamination across sessions, as part of subjects' post-experiment instructions we strongly encouraged subjects to not discuss the specifics of the experiment with others. In a post-experimental survey we asked subjects if any previous participant had discussed the details of the experiment with them. The lack of positive responses indicates that the vast majority of subjects complied with our request to not share their experiences. Data from the one firm where the manager had talked with an earlier participant about how to play the game has been excluded from our analysis.

Sessions for this experiment typically only lasted about ninety minutes, but there were a small number of firms that ran for a longer period of time. These relatively long sessions were caused by a combination of particularly verbose subjects and slow network connections. Due to other groups having reservations for the rooms where experiments were being run, these firms had to end play prior to the completion of all thirty rounds – an announcement was made at the beginning of the last round that the experiment would be ending prematurely. The statistical analysis in our results section includes controls for firms that ended play prior to the completion of thirty rounds.

For one session with one-way communication, containing four firms, the messages were accidentally not saved. The software worked correctly for this session, so all the data on subjects' choices that was saved has been included in our dataset, but obviously data from this session is not reflected in any content analysis of managers' messages.

5. Results

Before getting into the data, it is useful to reiterate our terminology. A "firm" refers to a fixed grouping of four employees and a manager. "Firm-level" data consists of a single observation per round per firm, the minimum effort chosen by the four employees of the firm. Throughout this paper, unless otherwise specified, we are using firm-level data.

A. Treatment Effects: For our treatments to be interesting, it is necessary that a history of coordination failure be established in the first ten rounds. The data clearly meets this pre-condition. The average minimum effort falls from 7.09 in round 1 to a paltry 2.37 in round 10. The minimum effort is zero in round 10 for 77 out of a total of 86 firms. When human managers took over in round 11, the need for a turnaround is almost always present.

Table 3 presents an overview of bonuses, minimum efforts, and payoffs for rounds 11 – 30 of the different treatments. This information provides a first impression of the answers to Questions 1 and 2. Note that the average bonus level is similar across treatments, suggesting that any treatment differences will not be due to differences in incentives.

(Insert Table 3)

The fact that the average minimum effort is higher for the computer manager treatment than the no communication treatment (11.8 vs. 4.2) suggests that the answer to Question 1 is positive. However, these averages are misleading as differences between these two treatments are largely driven by random differences in minimum efforts for round 10. This point can be seen clearly by comparing Figures 1 and 2. Figure 1 shows the evolution of average minimum effort for the four main treatments, using the data from all firms, while Figure 2 only includes those experimental firms for which coordination failure occurred in round 10 (e.g. minimum effort equals 0 in round 10). The latter are the most pertinent data, since those few groups that do not fall into coordination failure fail to satisfy the precondition for our study of turnaround. In Figure 1 we see that average minimum effort for the computer manager treatment is consistently greater than in the no communication treatment and is almost identical to average minimum effort in the one-way communication treatment. However, consider the data from round 10 (shown at the left of Figure 1). By chance, the average minimum effort in round 10 is higher for the computer manager treatment than for any other treatment while the average minimum effort in round 10 for the no communication treatment is the lowest of all four treatments. In Figure 2, where the playing field is leveled by only considering firms that start from a history of coordination failure, the difference between the computer manager and no communication treatments is far less dramatic.

(Insert Figures 1 and 2)

REGULARITY 1: Controlling for the average minimum effort in round 10, there is little difference between the average minimum efforts in rounds 11 – 30 for the computer manager and no communication treatments.

Returning to Table 3, a comparison of the summary data shown for the three treatments with human managers indicates that we can answer Question 2 affirmatively – additional avenues for communication lead to higher effort levels (holding bonus rates approximately constant). Consistent with the higher average minimum efforts, greater possibilities for communication lead to higher earnings for both managers and employees.

Comparing Figures 1 and 2, this conclusion holds even if our attention is limited to only those firms that start from a history of coordination failure. Looking at Figure 2, note how much larger the difference is between the one and two way communication treatments than between one way communication and no communication.

REGULARITY 2: Increased avenues of communication lead to higher minimum effort and higher payoffs for all parties holding financial incentives fixed.

To put the preceding discussion on a firmer statistical footing, Table 4 presents the results of regressions on firms' minimum efforts in rounds 11 – 30. To be precise, the

dependent variable is a firm's average minimum effort between round 11 and the firm's final round of play. Note that each firm appears as a single observation in the data set. There are 22 firms that had a minimum effort of 0 in all relevant rounds. To correct for the left censored data that results, we use a tobit specification. The results of these regressions need to be interpreted with care. While most of the critical variables, such as the treatment dummies, are clearly exogenous, others, such as the average bonus rate, are not. For the endogenous variables we are capturing correlations with the average minimum effort but causation should not be inferred from these correlations.

(Insert Table 4)

The base in these regressions is data from the computer manager treatment. Exogenous variables include a dummy for all the treatments in which the manager was a subject, a dummy for the two treatments with communication, and a dummy for the two-way communication treatment. The first of these three dummies captures the difference between the computer manager and no communication treatments, the second measures the difference between the no communication and one-way communication treatments, and the final dummy quantifies the difference between the one and two way communication treatments. A dummy for data gathered in Barcelona controls for location effects. To control for firms' differing initial conditions, both regressions include the minimum effort in round 10 as an exogenous variable. Model 2 adds three control variables to sharpen the results from Model 1. The average bonus level is a natural control for the pure effect of incentives, although this is the right hand side variable that is most clearly endogenous. We expect this endogeneity to bias the parameter estimate upwards, as managers tend to respond to high effort levels with higher bonus rates. We also include a specific control for the bonus rate in round 11. As can be seen in Figure 3, the bonus rate rises more rapidly in the computer manager treatment than in any of the treatments with human managers. If employees are more sensitive to the initial changes in the bonus rate than changes in later rounds, then the higher effort levels in the computer manager treatment may be due in part to differences in the bonus rate for round 11. The bonus rate in round 11 is exogenous as it is determined before any of the relevant effort decisions are made. The variable "number of rounds completed" was included to account for the fact that five firms did not complete the 30 rounds. Arguably, this variable is endogenous as it relates the communication styles of managers and employees.

(Insert Figure 3)

The results for Models 1 and 2 are similar. Consistent with Figure 2, there is no significant difference between the computer manager sessions and the no communication

sessions once differences in round 10 minimum efforts are controlled for. This result confirms Regularity 1. The parameter estimates for both the communication and two-way communication dummies are positive and significant in both Model 1 and Model 2. The effect of adding two-way communication is particularly strong judging by either the magnitude of the estimates or their statistical significance. Regularity 2 is also confirmed by the tobit analysis.

Models 1 and 2 also allow us to draw some initial conclusions about the impact of incentives. The average bonus is not significant, a surprising result given the upwards bias we expect in this estimate. In contrast, the bonus rate for round 11 has a significant positive effect on average minimum efforts. Apparently first impressions matter.[14] Inclusion of the bonus rate for round 11 is responsible for the reduced parameter estimate for "Human managers" in Model 2.

An unexpected feature of our data is that minimum efforts are systematically lower in Barcelona. Examining Table 3 we see a difference for all treatments, although the location effect is much stronger in treatments with communication. The regression results are consistent with these observations. For both Models 1 and 2 on Table 4, the Barcelona dummy is negative and statistically significant. In additional tobit regressions beyond those reported on Table 4, we have interacted the Barcelona dummy with dummies for whether or not communication was present. The Barcelona effect is negative in both cases, but is much larger with communication and only is statistically significant in this case.[15] This result would make one suspect that the location effect must be tied to differences between the two populations in communication strategies. Our content analysis of the messages will confirm this conjecture.

B. The Content of Messages: At this point we know that communication and successful coordination go together. We also know that the poor performance of firms in Barcelona is linked to communication. This brings us to the heart of the matter: what kinds of statements

[14] This sensitivity is restricted to the very first period with a manager. If we include the bonus rate for round 12 in an analogous regression, for example, it has no statistically significant effect.

[15] The simplest of these models modifies Model 1 from Table 4 by interacting the Barcelona dummy with dummies for communication (pooling the one way and two way communication treatments) or the lack thereof (pooling the no communication and computer manager treatments). The parameter estimate for the interaction with communication is -12.80 with a standard error of 3.80, yielding statistical significance at the 1% level. For the other interaction term, the parameter estimate is -1.06 with standard error of 4.02, far from statistical significance. The location effect is only significant in firms where some sort of communication is possible. More complex models yield the same conclusion.

are linked to high effort levels and how does the impact of these statements compare with that of financial incentives?

To answer these questions, some way of quantifying the content of message is necessary. We therefore have developed and implemented a systematic scheme for coding the content of messages. The goal was to systematically quantify any communication that might be relevant to play of the game. We tried as much as possible to avoid pre-judging which sorts of messages would be important and which would not. Our methods are largely identical to those employed by Cooper and Kagel (2004). We began by randomly selecting ten firms to serve as a test sample, five from the one-way communication treatment and five from the two-way communication treatment. Both co-authors as well as two research assistants independently developed their own coding schemes for the test sample. In a series of meetings we reconciled these individual efforts into a single coding scheme. Three research assistants then independently coded all messages sent by managers or employees. One bilingual RA (native language English) coded all messages. An American RA coded all Cleveland messages and a Spanish RA coded all Barcelona messages. No effort was made to force agreement among coders – the goal was to have two independent readings of each message so that any coding errors were uncorrelated. At no point in the process of developing or implementing the coding scheme was any RA informed about any hypotheses the co-authors had about the messages. The RAs were repeatedly and explicitly told that their job was to capture what had been said rather than why it was said or what effect it had. Coding was binary – a message was coded as a 1 if was deemed to contain the relevant category of content and zero otherwise. We had no requirement on the number of codings for a message – a coder could check as many or few categories as he or she deemed appropriate. A number of the categories have sub-categories. For example, Category 1 for managers is "Ask for Effort." Under this are three sub-categories, "Polite," "Rude," and "Specific effort level." A coder was free to check as many or few sub-categories as they desired when a category was checked off.[16]

Our analysis of the codings uses averages across coders otherwise noted. In averaging across coders, we are implicitly assuming that errors are independent across coders so that averaging reduces the total error. Cross-coder correlations for major categories were generally around .6, slightly better than in the results reported in Cooper and Kagel (2004).

(Insert Tables 5 and 6)

[16] A sub-category could not be coded without coding the corresponding category. We didn't instruct the coders to not check mutually exclusive sub-categories like "Polite" and "Rude," although they never did so.

Table 5 summarizes the codings of managers' messages and Table 6 provides analogous information for employees' messages.[17] To provide ourselves with a manageable problem we concentrate on the effects of the most frequent codes - those that appear in at least 7.5% of all available observations.[18] We generally do not include sub-categories even though several clear this threshold to avoid problems with co-linearity in the regressions.

For a number of the common categories, the brief descriptions in Tables 5 and 6 don't adequately characterize the nature of the messages. We therefore begin by better describing some key categories along with examples. Starting with the managers, category 1 codes any request that employees choose a higher effort level. For example, "Please spend more hours on Activity A [effort]. Please." The frequent requests for a specific effort level were also coded under sub-category 1c.

Category 4 codes messages that point out the benefits of choosing higher effort levels for the employees – frequently this involved explicit discussion of the possibility for mutual gains by managers and employees (sub-category 4c). The following quote is a typical example: "We would all make more money if you, as employees, devoted your time to activity A [effort]."

Categories 5 and 6 are similar but not identical. Messages coded under category 5 involved the manager offering an implicit short term contract. A common form of these implicit contracts was the promise of an increased bonus rate in the next round if the employees delivered the some requested minimum effort in the current round (coded as sub-category 5a). As an example, "I'll set the bonus high next time if we all do 40 this time." Category 6 was reserved for longer term plans, often lacking the explicit quid pro quo of the implicit contracts coded under category 5. Many times these plans involved employees choosing a high effort in all rounds while the manager alternated between setting a high bonus rate and a low bonus rate. The following is a simple example of this sort of plan: "I think the best way for everyone to get a lot of money is to all go 40 hours every time and alternate between a 7 and 14 every other time." As in the preceding quote, alternating plans were often presented, either explicitly or implicitly, as a way to even out payoffs between the employees and manager. While this could have been accomplished just as well by picking an

[17] Coding frequencies for the one-way treatment do not include the four firms for which the messages were accidentally lost.

[18] All of the analysis reported here has also been done with a cut-off of 5% for inclusion. This has little impact on our conclusions as the added categories have little effect on behavior.

intermediate bonus rate, there seems to be a preference for alternating, perhaps because it makes the gift exchange clearer.

Category 10 was coded when the manager emphasized the bonus, usually by explicitly stating what the bonus rate was. It is difficult to understand the importance of this category without seeing the messages in context. When a manager specifically refers to the bonus rate it is almost always to make some point other than what the bonus is. For example, consider the following message which was coded under category 10: "Thanks. I appreciate it. Now I'll raise it to 11." The employees have just raised their minimum effort from 20 to 30. The manager is responding by raising the bonus rate from 10 to 11. The implication is clear – the manager is rewarding the employees for their increased effort. As is almost always the case for messages coded under category 10, it is implied that a bonus rate of 11 is good pay. Looking at the broader sweep of this particular manager's messages, it is also clear that he is signaling that an increase to a minimum effort of 40 will bring a further increase in the bonus rate. Indeed, he eventually succeeded in getting his employees to coordinate at effort level 40 in exchange for a bonus rate of 12. This is a good example of the implicit references to reciprocity that appears in many messages coded under category 10.

Turning to the employee categories, category 2 is coded when the employees indicate agreement to a plan, usually one coded under category 6 for the managers. For example, an employee responds "Sounds good to me. [Y]ou earn more, we earn more and everyone's happy" following a (lengthy) proposal by the manager that the bonus rate alternate between 8 and 15 while the all employees choose effort level 40 in all rounds.

Category 4 was coded for messages where an employee offered advice to a manager. Sometimes this advice is clearly self-serving as in the following quote: "[L]ets keep the min bonus at 8.... 6 is the just the LOWEST... you dont want your employees thinking theyre are the lowest, do you?!" In other cases the advice is genuinely intended to help the manager move the group to a higher minimum effort. For example, consider the following message from an employee that was coded under category 4, "Give us more concrete information: ie. If u all do 30, ill put a bonus of 11 the next round, then if u all do 40, till put a bonus of 12 and then if u keep it constant I will continue to raise the bonus." The manager receiving the preceding message had been making vague promises of a higher bonus in exchange for more work (coded under category 5), a tactic that wasn't working as the minimum effort was 0 in the round this message was sent. The manager in the next round somewhat followed this advice, sending, "30 or higher and i will raise it to 10 and so on." This didn't work immediately, as the minimum effort stayed at zero, but in later rounds the manager repeated

similar messages and was able to eventually reach perfect coordination at effort level 40. Sometimes the advice offered to managers is quite simple, like the following plea by an employee faced with an unsuccessful manager who was doing nothing but setting bonus rates: "Send us some messages....."[19]

Before analyzing the effects of the frequently coded categories, it is worth noting some of the categories that *don't* appear frequently. Manager categories 12 – 14 and employee categories 10 – 12 code for explicit references to fairness, trust, and reciprocity.[20] To our surprise, none of these categories are coded with any frequency. This doesn't imply that fairness, trust, and reciprocity don't matter in this setting. As noted previously in our discussion of category 10 (emphasizing the bonus rate) managers frequently refer implicitly to these concepts. It may simply be that notions like trust and reciprocity are so deeply ingrained in our subjects that they don't feel the need to explicitly lay them out.

Several of the categories code for confusion about the instructions or misunderstanding the rules (manager categories 16, 17, and 21; employee categories 13 and 15). All of these categories are rare, giving us some confidence that the subjects understood the experimental instructions.

A first basic question to answer about the frequently coded categories is when (and where) they were used. Table 7 shows how the likelihoods of coding the most frequently used messages relate to a number of variables. Specifically, we report averages over observations where *either* coder checked off the relevant category. As a point of comparison, the first two rows of the table provide these same statistics for all observations with communication and for all observations from the two-way communication treatment. We also report the results of statistical tests for whether the frequency of a category was significantly different in Cleveland (US) than in Barcelona (Spain) and, where relevant, significantly different with two-way communication.[21] It should be clear that the likelihood of the various categories isn't random. As a trivial example, positive comments are generally associated with a high lagged minimum effort while negative comments usually follow a

[19] In the round this message was sent, the manager select a bonus rate of 11 but still received a minimum effort of 0. Subsequently the manager did start sending messages and was able to achieve higher minimum efforts although never reaching perfect coordination at effort level 40.

[20] We did not require that a message explicitly include one of these three words to be coded, but instead looked for clear references to these concepts.

[21] Statistical significance is derived from ordered probit regressions over all observations where the coding in question could possibly have been observed. The regressions control for lagged minimum effort, change in lagged minimum effort, minimum effort in Round 10, current bonus (employee codes only), lagged bonus, and late rounds (rounds 21 - 30). Standard errors are corrected for clustering

round with low minimum effort. Another notable case is manager category 6, laying out long term plans, which is normally associated with groups that have already achieved a relatively high minimum effort.

(Insert Table 7)

Table 7 shows significant differences in the types of communication used by managers in Cleveland and in Barcelona consistent with our conjecture that poorer performance in Barcelona was linked to differences in communication style. The most noticeable difference when the dialogues are read is the greater negativity of Barcelonan managers, as captured by the greater frequency of codings for category 2 (negative responses) and the lower frequency of codings for category 3 (positive responses). However, as will become clear below, the less frequent coding for category 10 in Barcelona (emphasizing the bonus rate) may be the most important difference.

Managers generally send more messages in the two-way communication treatment, partially in response to messages from their employees. Of particular importance will be the more frequent usages of Category 1 (particularly 1c, requests for a specific effort level) and Category 10.

Just because a category of message is used frequently doesn't necessarily mean it accomplishes much. Table 8 begins our examination of what types of messages are most effective for raising managers' profits. Data is drawn from the 39 firms in the communication treatments with minimum effort of 0 in round 10. These are the firms in greatest need of a turnaround. The data is broken down by whether firms achieved earnings above our below the median for this group.[22] We report statistics for all twenty rounds with human managers as well as for just the first five rounds (rounds 11 – 15) when most of the change in employees' choices occurs. For the four resulting cells we report the average bonus rate and the frequency of the most common message categories. We also calculate "all coded comments" which is the sum of the average frequencies for all of the categories. Sub-categories are not included in this statistic to avoid double counting. "All coded comments" provides a measure for how much a manager is communicating.[23]

(Insert Table 8)

[22] The median firm is grouped with the firms below the median. For categories that could only be coded with two-way communication, we use the median earnings for the 20 firms in the two-way communication treatment that had minimum effort of 0 in round 10.

[23] In many ways this is a more accurate measure than word counts as it does not give credit for irrelevant communications or for being unusually verbose.

To begin our examination of Table 8, note that for rounds 11 – 15 the average bonus rates are quite similar for firms above and below the median earnings. Whatever leads some firms to eventually be more profitable than others, it doesn't appear to be differences in incentives. In contrast, there are fairly obvious differences in what messages are being sent. Ignoring the content of messages, managers who earn more than the median earnings send twice as many coded messages as their less successful peers. Greater than median earners are 53% more likely to be coded for category 1, 81% more likely to be coded for category 4, more than three times as likely to be coded for category 5, more than twice as likely to be coded for category 6, and more than 26 times more likely to be coded for category 10! Most of these differences persist if we consider the longer sweep of rounds 11 – 30.

Based on the results reported in Table 8 it is tempting to conclude, for example, that emphasizing the bonus (category 10) is an important determinant of success. However, we have to be quite cautious in interpreting these results as causality hasn't been established. Consider category 2, the use of negative responses. Over rounds 11 – 30, unsuccessful managers are 66% more likely to be coded for category 2. Does this imply that negativity by managers leads to low profits? Not really – it instead indicates that managers who are doing badly are more likely to say negative things. In this particular case the true causality can be easily seen by looking at the statistics for rounds 11 – 15 where successful managers are 82% *more* likely to make a negative comment. However it is generally not so simple to pin down causality especially when many categories are being coded simultaneously. We therefore turn to a more formal statistical analysis to determine the impact of the messages on minimum efforts and, ultimately, manager profits.

Table 9 reports the results of five ordered probit regressions. The basic data set is all observations from rounds 11 – 30, although some of the regressions only use a subset of this dataset. The dependent variable is a firm's minimum effort for the round being observed – it is the categorical nature of minimum effort that leads to our use of an ordered probit model. Since firms appear multiple times in the data set, the standard errors are corrected for clustering at the firm level (see Liang and Zeger, 1986). The critical issue here is to determine whether a category is associated with higher (lower) minimum effort because it directly causes higher (lower) minimum effort or because it is associated with higher (lower) lagged minimum effort which in turn causes the high (low) current minimum effort. To identify causality our regressions include lagged dependent variables – the lagged minimum

effort and the twice-lagged minimum effort.[24] Unlike usual, the use of lagged dependent variables does not require us to drop any data since the first data being included is from round 11, not round 1. We do not report the parameter estimates for the lagged dependent variables in Table 9 to save space, but they are always positive and statistically significant at the 1% level. A version of Table 9 including all of the dependent variables is available at www.weatherhead.cwru.edu/djcooper. As additional controls, the regressions also include treatment dummies, structured as in Table 4, a Barcelona dummy, the minimum effort in round 10, and a dummy for rounds 21 – 30. We do not report the parameter estimates for any of these basic controls to conserve space, but it is worth noting that the estimates for the treatment variables, the Barcelona dummy, and the minimum effort in round 10 tend to be relatively small and often fail to be statistically significant. This shouldn't be taken as evidence on treatment effects or location effects, but instead reflects the presence of lagged dependent variables in the regressions. The dummy for rounds 21 – 30 is always negative and almost always statistically significant. Given that the regressions capture *changes* in minimum effort levels, these negative estimates reflect the ossification of employees' choices over the final ten rounds.

(Insert Table 9)

The critical variables for the regressions on Table 9 measure what the managers and employees said in their messages. For manager messages, we include the average coding (e.g. across the two coders) in the current round for all categories above the 7.5% frequency threshold. These variables were set equal to zero for all observations where coding wasn't possible and were demeaned for all observations where coding was possible.[25] For the employee codes, the variables are based on the average lagged employee codes as the current round's employee messages haven't yet had an opportunity to affect the behavior of other subjects. As above, these variables are demeaned.[26]

Three additional variables control for the impact of incentives on minimum effort levels. The current bonus rate and the change in the current bonus rate (current bonus rate

[24] In round t, the lagged minimum effort is the minimum effort from round t – 1 and the twice-lagged minimum effort is the minimum effort from round t – 2. We have explored a variety of alternative specifications for the lagged dependent variables (e.g. longer lags or using dummies for each effort level) and found little impact on the qualitative results.

[25] Observations from the four firms in the one-way communication treatment for which messages weren't saved are included in the set of observations for which coding isn't possible. As an alternative approach to handling these observations we have dropped them from the dataset. This has little impact on the results.

[26] Round 11 data are included in the set of observations for which coding isn't possible. For the one regression that didn't include managers' categories we deleted data from Round 11.

minus lagged bonus rate) are included as separate variables. These two variables capture different ways in which incentives might matter. If the bonus rate only affects employee choices by changing the game they play among themselves, then we would expect only the current bonus rate to be significant. However, if changing the bonus rate serves as an important mechanism for rewarding employees and encouraging positive reciprocity, then the change in the bonus rate should also have a positive and significant parameter estimate. We also include the bonus rate in round 11 as a variable. Given the results of our earlier tobit analysis, it seems likely that the first bonus rate set by a member will have a persistent effect. This variable was interacted with a dummy for rounds 13 – 30 and demeaned to avoid any interference with the estimates for "Current Bonus" and "Change in Bonus."

Model 1 includes controls only for managers' messages and Model 2 only considers employees' messages. Model 3 includes all categories for both managers and employees that clear the 7.5% frequency hurdle. Model 3 is the central regression in our discussion of message content.

Before turning the message categories, we first consider the impact of incentives. While the current bonus rate in isolation does not have a significant impact on minimum effort levels, changes in the bonus rate do have a significant positive effect. This suggests that the importance of the bonus rate does not grow from its direct effect on incentives as much as its utility as a mechanism for sending messages. The preceding is consistent with the conclusion of Brandts and Cooper (2005) that changes in the bonus rate (in sessions with computer managers and full information feedback) are important more as a coordination device than for the direct effect on incentives. As in the tobit analysis, we see that the bonus rate for round 11 has a long term positive effect, albeit of marginal statistical significance, on minimum effort levels.[27]

REGULARITY 3: Although the level of the bonus rate has little effect on the minimum effort, changes in the bonus rate lead to increases in the minimum effort. The bonus rate set in round 11 has a persistent impact on minimum efforts.

Turning to the managers' categories, we see that categories 1 (asking for effort), 4 (discussing the monetary benefits of higher effort), and 10 (emphasizing the bonus) have strong positive effects on minimum effort levels. It is worth noting that these effects get even stronger if we replace category 1 with category 1c (requesting a specific effort level) and category 4 with category 4c (stressing mutual benefits). Oddly, category 6 has a small but (marginally) statistically significant negative effect on minimum effort levels. Category 18

[27] Considering the effect of the round 12 bonus in an analogous regression, we fail to find any persistent impact.

has a large negative impact but the estimate is imprecise, leading to modest statistical significance. Neither category 2 (negative responses) nor category 3 (positive responses) have statistically significant effects. By extension, we do not believe that the greater negativity of Barcelonan managers is primarily responsible for their relatively poor performance. Category 5 also fails to be statistically significant. Although managers often use implicit contracts as a strategy for raising minimum effort, they apparently do little good. Among the employee categories, only category 4 (giving manager advice) achieves statistical significance. Comparing Models 2 and 3, the strength of this effect is greatly lessened when the manager categories are added. Given that employees' advice to managers often includes suggestions about what messages should be sent, this weakening is to be expected.[28]

In alternative versions of Models 1 and 3, not reported on Table 9, we added dummies for the first time a category was coded. With one exception, these dummies are not statistically significant and the parameter estimates are small. Most types of messages have the no greater impact the first time they are used than in later usages. The exception is manager category 4. The parameter estimate for the first time it is coded is statistically significant at the 5% level while the parameter estimate for its average coding becomes much smaller and ceases to be statistically significant. Unlike other types of messages, category 4 (discussing the benefits of higher effort) mainly has an effect the first time it is said. Presumably employees get the point and don't need to be told a second time.

The usefulness of some categories that have a positive effect is fairly obvious. Employees face a difficult coordination problem, and a good manager can help by acting as a coordination device. Requesting a specific effort level and pointing out that everybody gains from increased minimum effort makes an increase in effort far less risky for an employee as he has good reason to expect that others will also increase their effort levels. Thus, manager categories 1 and 4 have a strong impact on minimum effort levels. The positive impact of employee category 4 is also straightforward – given that employees have a stake in the manager's success, they can often help by offering good advice.

The impact of other categories is more mysterious. In particular, why should emphasizing the bonus rate (category 10) have such a strong positive impact? After all, the bonus rate is already prominently displayed for employees. In this case it is important to understand what is being implied, as discussed previously. Almost always a message coded

[28] Suppose the effect of advice is largely through getting managers to send messages that would not otherwise be sent. When manager categories are included in the regression, the effect of advice will largely be absorbed by these variables.

under category 10 is meant to imply that a "good" bonus rate has been chosen. This is often tied implicitly to positive reciprocity – implying the bonus is a reward for high effort is common. Thus, category 10 likely prompts higher effort by making employees believe there are large rewards for increasing effort, both in the current round and in future rounds, and by making them feel better about their relationship with the manager.

It also seems strange that laying out a long run plan (category 6) has a negative impact. Understanding this result becomes easier after considering Model 4. This regression has all the same variables as Model 3, but the dataset only includes observations for which the lagged minimum effort is zero, i.e. cases where the firm is experiencing coordination failure.[29] Category 6 now has a positive and significant parameter estimate! Combining this with our detailed reading of the messages, it becomes clearer why category 6 has the effect that it does. When a firm is going badly, long term plans are usually a method of building a good working relationship between the manager and employees. Often the manager suggests a series of increases in the bonus rate in exchange for a gradual increase in effort levels. On the other hand, when the firm is already doing well (in terms of high minimum effort), long term plans usually involve the manager trying to get a larger share of the surplus. Not surprisingly, this generally doesn't go over well with the employees.

The negative effect of manager category 18 came as a surprise to us, as we thought that "soliciting feedback" from employees would be a valuable component of building a positive relationship. Looking at the messages coded out under category 18, many could be better labeled as "requests for advice."[30] It isn't surprising that struggling managers fail to generate much immediate improvement from their employees.

Returning to Model 4, we see that it matters not just what messages are sent by a manager but also when they are sent. We've already noted that the sign of the estimate for manager category 6 switches when the sample is restricted to observations with lagged minimum effort equal to zero. In conjunction with this, the parameter estimate for employee category 2 (agreeing to manager's plan) goes from being small and insignificant to being large, positive, and significant at the 1% level. The parameter estimate for manager category 2 (negative responses) is now negative and significant at the 1% level, while manager category 4 and employee category 4 cease to be statistically significant. Manager categories

[29] Lagged minimum effort is dropped as an independent variable for obvious reasons.

[30] e.g. "What could I do to make you work more hours on activity A?"

1 and 10 still receive positive and statistically significant estimates, reflecting their status as the most reliable paths to higher effort.[31]

Thus far we have only looked at the immediate effect of the various types of message. Model 5 checks whether these effects are persistent – the dependent variable is the lead minimum effort rather than the current minimum effort. In other words, for an observation in round t the dependent variable is the minimum effort in round t + 1. All the variables are otherwise identical to those in Model 3. Data from the final period is dropped since there isn't a lead minimum effort. The results of Model 5 reinforce some of our previous conclusions. Not only do changes in the bonus rate and manager categories 1, 4, and 10 have an immediate impact on minimum efforts, they also have a persistent impact. These persistent effects likely reflect both direct and indirect effects, as managers' actions help to build an ongoing relationship between the manager and the employees. Interestingly, category 5 now has a positive and statistically significant estimate. This seems unlikely to be a direct effect, as the implicit contracts coded under category 5 are generally short-run in nature. Instead it likely reflects the beginning of a positive relationship between a manager and his employees. No employee category appears to have a persistent effect on minimum effort – the parameter estimate for employee category 4 is tiny and flips sign from Model 3.

Calculating marginal effects on minimum effort for Models 3 and 5, even some of the variables that have a persistent effect lose much of their impact.[32] For example, the effect of a bonus rate increase on the lead minimum effort is 28.4% of its effect on the current minimum effort.[33] This declining impact likely explains why the bonus rate is significant here but not for the tobit analysis reported on Table 4. In a less extreme case, the impact of category 1 on the lead effort is only 48.9% of its effect on the current effort level. In contrast, other variables actually have a greater effect on the lead minimum effort. Notably, the

[31] It is important to interpret the results with some care as an ordered probit is a non-linear model. Even though the parameter estimates for Categories 1 and 10 are larger in Model 4 than Model 3, the marginal effect on minimum effort is actually smaller for both parameters.

[32] The marginal effects are based on discrete changes. For the bonus rate, the calculation is based on the difference between the mean bonus rate minus ½ and the mean plus ½. To capture the full effect of a change in the bonus rate, we have re-run Model 3 with "Current Bonus" and "Lagged Bonus" as independent variables rather than "Current Bonus" and "Change in Bonus." For the various communication categories, the calculation is based on the change from a coding of 0 to a coding of 1. All variables other than the one being changed are held fixed at their average levels. Calculations of marginal profits, shown in Table 10, use the average bonus rate for the dataset.

[33] In discussing Model 3, we noted that changes in the bonus rate matter more than the level of the bonus rate. Given the inclusion of the lagged minimum effort, it can be argued that this result is due to most of the effect of the bonus rate level being captured already in the lagged dependent variable. However, this argument relies on a change in the bonus rate having a persistent effect. The results of Model 5 indicate otherwise.

marginal effects of categories 4, 5, and 10 on the lead minimum effort are respectively 142.7%, 330.6%, and 128.8% of their marginal effects on the current minimum effort.

REGULARITY 4: The effectiveness of messages depends both on what is said and when it is said. Manager messages that request greater effort (category 1) and emphasize the bonus rate (category 10) consistently have a positive persistent impact on minimum effort. Emphasizing the benefits of increased effort (category 4), proposing a long term plan (category 6), and employee messages that offer advice to the manager (category 4) also lead to increased minimum effort under certain circumstances.

The regressions reported in Table 9 measure the impact of incentives and various categories of messages on minimum efforts, but do not directly address the question of how manager profits are affected. We have therefore calculated marginal effects on manager profits for Models 3 and 4 from Table 9. (See f.n. 32 for details of how marginal effects are calculated.) The results are displayed in Table 10. The top panel shows the results for all data and the bottom panel limits the sample to those observations with lagged minimum effort of zero, the cases where the manager faces an immediate past of coordination failure. To give the reader some sense of the accuracy for these estimated marginal effects, we also recapitulate the statistical significance of the variables as reported in Table 9.

(Insert Table 10)

In either panel of Table 10, increasing the bonus rate has a minimal effect on profits. Indeed, the marginal effect across all observations is negative! The increase in minimum effort caused by a bonus rate hike does not cover the additional bonuses that the manager must pay to employees. Even when the firm faces an immediate past of coordination failure, the best case scenario for changes in the bonus rate being helpful (as the marginal effect cannot be negative), the impact on profits is quite small, amounting to 5.6% of average profits.[34] In contrast, many of the message categories have large positive impacts. Across all observations, categories 1, 4 and 10 increase profits by 33.0%, 18.9%, and 33.5% respectively. Restricting attention to observations following a minimum effort of 0, categories 1, 6, and 10 increase profits by 28.0%, 36.3%, and 24.9% respectively. Even in the best case for incentive payments, the marginal impact of the most effective comments is roughly 5 – 7 times greater than the marginal impact of a bonus rate increase. The bottom line is quite clear – it's what you say, not what you pay!

[34] It is tempting here to argue that a bigger impact on profits can be generated by increasing the size of the bonus rate hike – a one unit increase at the mean is being considered here. This argument is flawed due to the non-linear relationship between bonus rates and profits. For example, consider the largest possible bonus rate increase from B = 6 to B = 15. Even in the case where lagged minimum effort equals zero, this cannot possibly lead to an increase in manager profits.

REGULARITY 5: The manager's communication strategy has a larger impact on his profits than his choice of a bonus rate.

The marginal effects reported on Table 10 only reflect the current round; e.g. the round in which the bonus rate increase or message takes place. These figures do not capture any long term effects on manager profits. To the extent that some of the messages have a persistent impact, the true effect on profits is larger than the numbers reported here.

6. Conclusions

A novel feature of our experiments is the presence of an external agent, the manager, who has a stake in the coordination game being played among employees. Our goal is to study how such an agent might best help overcome a history of coordination failure. The overarching conclusion from our analysis is that communication between managers and employees can play a critical role in escaping coordination failure. More specifically, the effective use of communication helps our experimental firms to increase minimum effort, with two-way communication between human managers and employees being superior to one-way communication from managers to employees. Effective communication is more valuable for increasing managerial profits than manipulating the employees' bonus rate. There was no obvious reason to anticipate the latter result. Facing coordination failure, it is in everybody's interest for the firm to improve coordination. We would therefore expect that any coordination device would serve this purpose. In addition, simple economic intuition suggests that financial incentives should have strong drawing power. Although bonus rate increases have an overall positive effect – see also the results on incentive changes by computer managers reported in Brandts and Cooper (2005) – they simply don't work as well as sending the right messages.

Not all messages between management and employees have the same beneficial effect. The most effective managerial strategy seems to be rather simple and, ex post, natural. Managers should request a specific effort level and emphasize the mutual benefits of high effort. The goal is to act as a good coordination device. It is useful to point out how well employees are being paid, although it is not important to actually pay employees especially well. For employees the most effective messages give advice to the manager, providing the firm with benefits of more than one person thinking about his problems.

It may come as a surprise to many economists that effective communication is much more important than the choice of bonus rates. Our interpretation of this result centers on how cognition enters into the achievement of coordination. Some means of achieving coordination may be naturally more salient than others. This kind of interplay is currently

terra incognito, but may be of considerable importance for understanding social and economic life. In our context, the attribution of an intention to coordinate through a change of the bonus rate is based on a rather indirect channel. In addition, changes in the bonus rate raise issues of distribution which bring a separate question into the picture and, hence, may increase the complexity of the situation. Through the use of communication managers can directly point to the need for coordination. The exercise of cognitive leadership works better when leaders use cues which followers can grasp more easily.

Although superficially the results of our experiments indicate that incentives don't much matter, there actually exists a subtle interaction between incentives and communication. While changing the bonus rate accomplishes little for a manager, many of the most effective messages appeal to the financial interests of employees. For example, pointing out the mutual benefits of coordination is effective because employees care about coordinating *and thereby earning higher payoffs*. The key to success for a manager isn't making it more lucrative for employees to coordinate; rather it lies in convincing employees that it is in their financial interest to attempt to coordinate by raising their effort levels. Incentives do matter even in this setting, just not on the margin that economists are used to thinking about.

Our results have general implications for those interested in overcoming coordination failure. The specific managerial strategy that works best here will not necessarily work in all environments, but it seems clear that one role of a good manager is to act as a good coordinating device. By indicating clearly what is expected of employees[35] and pointing out the benefits of coordinating, a good manager makes it easier for employees to overcome their strategic uncertainty and successfully coordinate. More generally, a successful manager cannot afford to rely on increased financial incentives to generate improvement. Good communication also has an important role to play. This point is driven home by comparing the Cleveland and Barcelona firms, as superior performance in Cleveland is largely driven by differences in the communication strategies used by managers in the two locations.

As a final comment, we must note that our results are generated from a specific environment where coordination plays a central role. We don't argue that changing financial incentives will never be an effective managerial tool or that incentive design is always less important than communication. There exist ample examples of environments in which

[35] The value of clarity can also be seen in the results of Capra et al (2005), who find that "specific proposals" are a particular effective form of communication for increasing coordination.

incentives play a central role.[36] An important topic for future research is determining which settings, such as those that involve coordination, are particularly amenable to the use of communication and which are more sensitive to the choice of incentives.

[36] For an elegant example from the experimental literature on coordination games, see Battalio, Samuelson, and Van Huyck (2001).

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Table 1

Employee i's Payoff Table, B = 6

		Minimum Effort by Other Employees				
		0	**10**	**20**	**30**	**40**
Effort By Employee i	**0**	200	200	200	200	200
	10	150	210	210	210	210
	20	100	160	220	220	220
	30	50	110	170	230	230
	40	0	60	120	180	240

Employee i's Payoff Table, B = 14

		Minimum Effort by Other Employees				
		0	**10**	**20**	**30**	**40**
Effort By Employee i	**0**	200	200	200	200	200
	10	150	290	290	290	290
	20	100	240	380	380	380
	30	50	190	330	470	470
	40	0	140	280	420	560

Table 2
Features of Treatments

Treatment Name	Computer Manager	No Communication	One-way Communication	Two-way Communication
Manager Type Rounds 1 - 10	Computer	Computer	Computer	Computer
Manager Type Rounds 11 - 30	Computer	Human	Human	Human
Communication	None	None	Managers to employees	Managers to employees and vice versa
Bonus Rate Rounds 1 – 10	6	6	6	6
Bonus Rate Rounds 11 – 30	10	Set by Manager in Each Round	Set by Manager in Each Round	Set by Manager in Each Round
Cleveland Firms	5	10	20	6
Barcelona Firms	5	18	7	15

Table 3
Summary of Results, Averages Over Rounds 11 – 30

		Location		
Treatment	Statistic	Cleveland	Spain	Pooled
Computer Manager	# Firms	5	5	10
	Bonus	10	10	10
	Minimum Effort	12.1	11.4	11.8
	Manager Profit	342	328	335
	Employee Payoff	249	242	245
No Communication	# Firms	10	18	28
	Bonus	9.0	9.4	9.3
	Minimum Effort	5.1	3.5	4.2
	Manager Profit	214	161	183
	Employee Payoff	198	195	197
One Way Communication	# Firms	20	7	27
	Bonus	9.3	9.1	9.3
	Minimum Effort	15.4	4.9	12.7
	Manager Profit	431	216	376
	Employee Payoff	246	190	231
Two Way Communication	# Firms	6	15	21
	Bonus	10.1	9.8	9.9
	Minimum Effort	28.0	16.9	20.1
	Manager Profit	613	379	446
	Employee Payoff	326	270	238

Table 4
Tobit Regressions, Firm Averages Over Rounds 11 – 30
Dependent Variable: Average Minimum Effort
86 Observations, 22 Left Censored

Variable	Model 1	Model 2
Constant	9.27**	-7.05
	(4.26)	(18.00)
Human managers	-4.91	-0.57
	(4.63)	(4.91)
Communication	6.15*	6.61*
	(3.54)	(3.47)
Two Way Communication	13.69***	12.40***
	(3.72)	(3.62)
Barcelona	-7.35**	-7.43***
	(2.84)	(2.74)
Minimum Effort, Round 10	0.66***	0.73***
	(0.17)	(0.17)
Average Bonus		0.78
		(0.91)
Bonus, Round 11		1.86**
		(0.93)
Number of Rounds Completed		-0.52
		(0.69)
Log Likelihood	-265.26	-262.31

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

Table 5
Summary of Manager Codings

Category	Description	Frequency of Coding		
		One Way Communication	Two Way Communication	All Communication
1	Ask for Effort (code appropriate sub-categories as well)	0.271	0.443	0.352
1A	Polite	0.067	0.044	0.056
1B	Rude	0.014	0.006	0.010
1C	Specific effort level	0.141	0.357	0.243
2	Negative response (code appropriate sub-categories as well)	0.080	0.115	0.097
2A	Encouraging	0.014	0.023	0.018
2B	Hostile	0.022	0.018	0.020
2C	"Singling" our an employee	0.010	0.046	0.027
3	Positive response (praise, thanks, appreciation, etc)	0.124	0.134	0.129
4	Discuss monetary benefits of high effort (code appropriate sub-categories as well)	0.113	0.111	0.112
4A	Benefits for manager	0.018	0.001	0.010
4B	Benefits for employees	0.040	0.023	0.032
4C	Mutual Benefits	0.059	0.086	0.072
5	Implicit Contracts (code appropriate sub-categories as well)	0.058	0.110	0.082
5A	More effort today leads to higher bonus tomorrow	0.038	0.076	0.056
5B	Lower effort today leads to lower bonus tomorrow	0.005	0.008	0.007
5C	High bonus today, request higher effort in response	0.017	0.022	0.019
6	Laying out a plan (code appropriate sub-categories as well)	0.033	0.172	0.099
6A	Alternating plan	0.011	0.084	0.045
6B	Ratcheting up effort	0.003	0.033	0.017
7	Surprising employees (code appropriate sub-categories as well)	0.008	0.018	0.013
7A	Choosing higher bonus than specified by plan	0.005	0.015	0.010
7B	Choosing lower bonus than specified by plan	0.000	0.002	0.001
8	Encouragement (should not specifically refer to effort)	0.063	0.087	0.074
9	Use of humor	0.012	0.040	0.025
10	Emphasizing the bonus (includes explicitly stating what the bonus will be)	0.075	0.269	0.167
11	Comments about time (code appropriate sub-categories as well)	0.009	0.033	0.020
11A	Need to hurry to get finished	0.001	0.027	0.013
11B	Will be able to leave sooner if cooperate	0.002	0.004	0.003
12	Explicit reference to fairness	0.004	0.007	0.006
13	Explicit references to trust	0.009	0.010	0.009
14	Explicit references to reciprocity	0.004	0.004	0.004
15	Attempts by managers to appear sympathetic	0.012	0.034	0.022
16	Expressing confusion about the rules	0.000	0.008	0.004
17	Clarifying the rules	0.007	0.011	0.009
18	Soliciting feedback from employees (2-way)	0.007	0.077	0.040
19	Giving feedback to employees (2-way, involves responding to messages from employees)	0.000	0.094	0.045
20	Establishing common knowledge (2-way, passing on a message from one employee to other	0.000	0.031	0.015
21	Misunderstanding rules	0.000	0.002	0.001

Table 6
Summary of Employee Codings

Category	Description	Frequency of Coding per Employee
1	Generic response to manager's comments (code appropriate sub-categories as well)	0.207
1A	Positive	0.119
1B	Negative (code appropriate sub-categories as well)	0.053
1C	Asking for clarification	0.008
2	Agreeing to manager's plan	0.105
3	Disagreeing with manager's plan	0.025
4	Giving manager advice	0.087
5	Discuss monetary benefits of high effort (code appropriate sub-categories as well)	0.017
5A	Benefits for manager	0.002
5B	Benefits for employees	0.000
5C	Mutual Benefits	0.014
6	Implicit contracts (code appropriate sub-categories as well)	0.008
6A	Higher bonus today ? more effort tomorrow	0.007
6B	More effort today, request higher bonus tomorrow	0.001
7	Requesting a higher bonus	0.053
8	Attempting to start a dialogue/soliciting feedback from the manager	0.031
9	Negotiating with the manager	0.025
10	Explicit reference to fairness	0.008
11	Explicit references to trust	0.003
12	Explicit references to reciprocity	0.003
13	Rules (code appropriate sub-categories as well)	0.012
13A	Expressing confusion about the rules	0.005
13B	Requesting clarification of the rules	0.003
13C	Clarifying the rules	0.005
14	Comments about time (code appropriate sub-categories as well)	0.017
14A	Need to hurry to get finished	0.015
14B	Will be able to leave sooner if cooperate	0.001
15	Misunderstanding rules	0.005

Table 7
When Are Frequently Coded Comments Likely to Be Made?

Category	Average Lagged Minimum	Current Bonus	Spain	Significance US vs. Spain	Two Way Communication	Significance One vs. Two Way
All Observations	14.91	9.52	0.50	---	0.47	---
All Two Way Observations	18.64	9.91	0.73	---	---	---
Manager Category 1	15.55	9.45	0.54		0.59	*
Manager Category 1c	19.25	9.64	0.61		0.69	**
Manager Category 2	6.92	9.33	0.71		0.58	
Manager Category 3	24.50	10.51	0.38	**	0.55	
Manager Category 4	11.76	9.56	0.61		0.50	
Manager Category 5	14.90	9.83	0.55		0.67	***
Manager Category 6	26.67	10.58	0.56		0.84	***
Manager Category 10	22.52	10.25	0.43	**	0.72	***
Manager Category 18	23.47	10.63	0.55		---	---
Manager Category 19	21.87	9.93	0.79	**	---	---
Employee Category 1	19.51	9.83	0.76	**	---	---
Employee Category 1a	20.65	10.38	0.80	***	---	---
Employee Category 2	20.60	10.13	0.70		---	---
Employee Category 4	16.83	9.58	0.72		---	---

*** Significant Effect on Likelihood of Coding, 1% Level
** Significant Effect on Likelihood of Coding, 5% Level
* Significant Effect on Likelihood of Coding, 10% Level

Table 8
Determinants of Managerial Success
Minimum Effort in Round 10 = 0

Variable	At or Below Median Earnings		Above Median Earnings	
	Rounds 11 - 15	Rounds 11 - 30	Rounds 11 - 15	Rounds 11 - 30
Bonus	8.72	9.24	8.92	10.16
All Categories	.940	.911	1.879	1.836
Category 1	.305	.280	.532	.465
Category 1c	.085	.124	.342	.385
Category 2	.055	.126	.100	.076
Category 3	.085	.095	.121	.166
Category 4	.125	.089	.226	.138
Category 5	.070	.060	.216	.106
Category 6	.035	.034	.079	.171
Category 10	.010	.048	.263	.289
Category 18	.050	.029	.078	.095
Category 19	.167	.104	.057	.088

Table 9
Ordered Probit Regressions

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Data Included	All Data Round 11 - 30	All Data Round 12 - 30	All Data Round 11 - 30	Lagged Min. Effort = 0	All Data Round 11 - 29
Number of Observations	1684	1598	1684	854	1598
Dependent Variable	Minimum Effort	Minimum Effort	Minimum Effort	Minimum Effort	Lead Min. Effort
Current Bonus	.037 (.025)	.042* (.024)	.035 (.024)	-.048 (.032)	-.011 (.026)
Change in Bonus	.109*** (.030)	.093*** (.028)	.109*** (.029)	.253*** (.034)	.046*** (.022)
Bonus, Round 11 (Rounds 13 – 30)	.073* (.039)	.051 (.037)	.076* (.039)	.026 (.082)	.051 (.040)
Manager Category 1	.623*** (.147)		.614*** (.144)	.809** (.320)	.253* (.138)
Manager Category 2	-.153 (.240)		-.114 (.227)	-1.194*** (.370)	-.080 (.243)
Manager Category 3	.146 (.142)		.163 (.142)	-.723 (.480)	.019 (.204)
Manager Category 4	.379** (.172)		.348** (.162)	.131 (.255)	.409** (.162)
Manager Category 5	.145 (.169)		.139 (.183)	.098 (.267)	.372** (.168)
Manager Category 6	-.266 (.174)		-.308* (.167)	.819* (.492)	-.435** (.197)
Manager Category 10	.629*** (.194)		.611*** (.200)	.643** (.295)	.645*** (.194)
Manager Category 18	-.983* (.581)		-1.033* (.590)	-.530 (.590)	-.070 (.492)
Manager Category 19	-.609 (.476)		-.699 (.474)	-1.232 (1.196)	-.398 (.417)
Lagged Employee Category 1a		.488 (.761)	.891 (.736)	-1.192 (2.168)	.726 (.894)
Lagged Employee Category 2		.098 (.626)	-.332 (.677)	4.847*** (1.702)	.173 (.702)
Lagged Employee Category 4		1.397*** (.510)	.980* (.520)	-.071 (.995)	-.130 (.430)
Log-likelihood	-1235.91	-1202.50	-1231.70	-328.72	1362.07

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

Note: Beyond estimates reported in this table, the regressions included controls for lagged minimum effort, twice lagged minimum effort, human, communication, two-way Communication, minimum effort in round 10, Barcelona, and a dummy for rounds 21 – 30. A table reporting the full results is available from the authors on request.

Table 10
Marginal Impact on Manager Profits

All Data
1684 observations, Average current profit = 314.63

Category	Description	Significant Effect on Min. Effort	Marginal Effect on Profit
N/A	Bonus	***	-21.53
1	Ask for Effort	***	103.68
2	Negative response		-18.69
3	Positive response (praise, thanks, appreciation, etc)		27.36
4	Discuss monetary benefits of high effort	**	59.44
5	Implicit Contracts		23.34
6	Laying out a plan	*	-49.45
10	Emphasizing the bonus (includes explicitly stating the bonus)	***	105.50
18	Soliciting feedback from employees (2-way only)	*	-146.70
19	Giving feedback to employees (2-way only)		-106.13

Lagged Minimum Effort = 0
854 observations, Average current profit = 140.14

Category	Description	Significant Effect on Min. Effort	Marginal Effect on Profit
N/A	Bonus	***	7.87
1	Ask for Effort	**	39.22
2	Negative response	***	-25.07
3	Positive response (praise, thanks, appreciation, etc)		-18.25
4	Discuss monetary benefits of high effort		5.48
5	Implicit Contracts		4.06
6	Laying out a plan	*	50.88
10	Emphasizing the bonus (includes explicitly stating the bonus)	**	34.92
18	Soliciting feedback from employees (2-way only)		-14.85
19	Giving feedback to employees (2-way only)		-18.21

*** Significant Effect on Minimum Effort, 1% Level
** Significant Effect on Minimum Effort, 5% Level
* Significant Effect on Minimum Effort, 10% Level

Figure 1
Comparison of Minimum Effort Across Treatments
All Firms

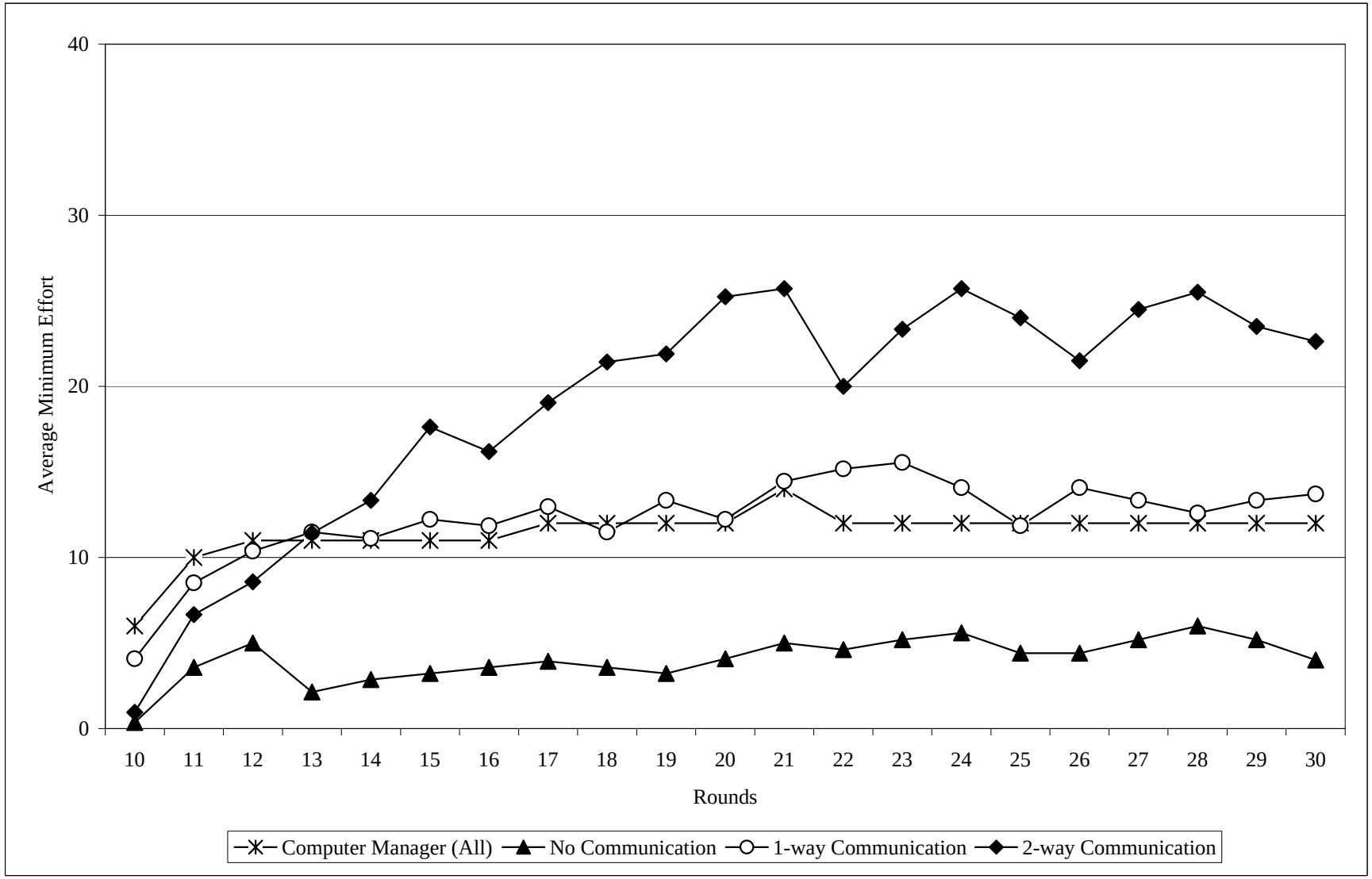

Figure 2
Comparison of Minimum Effort Across Treatments
Firms with Coordination Failure (Minimum Effort = 0 in Round 10)

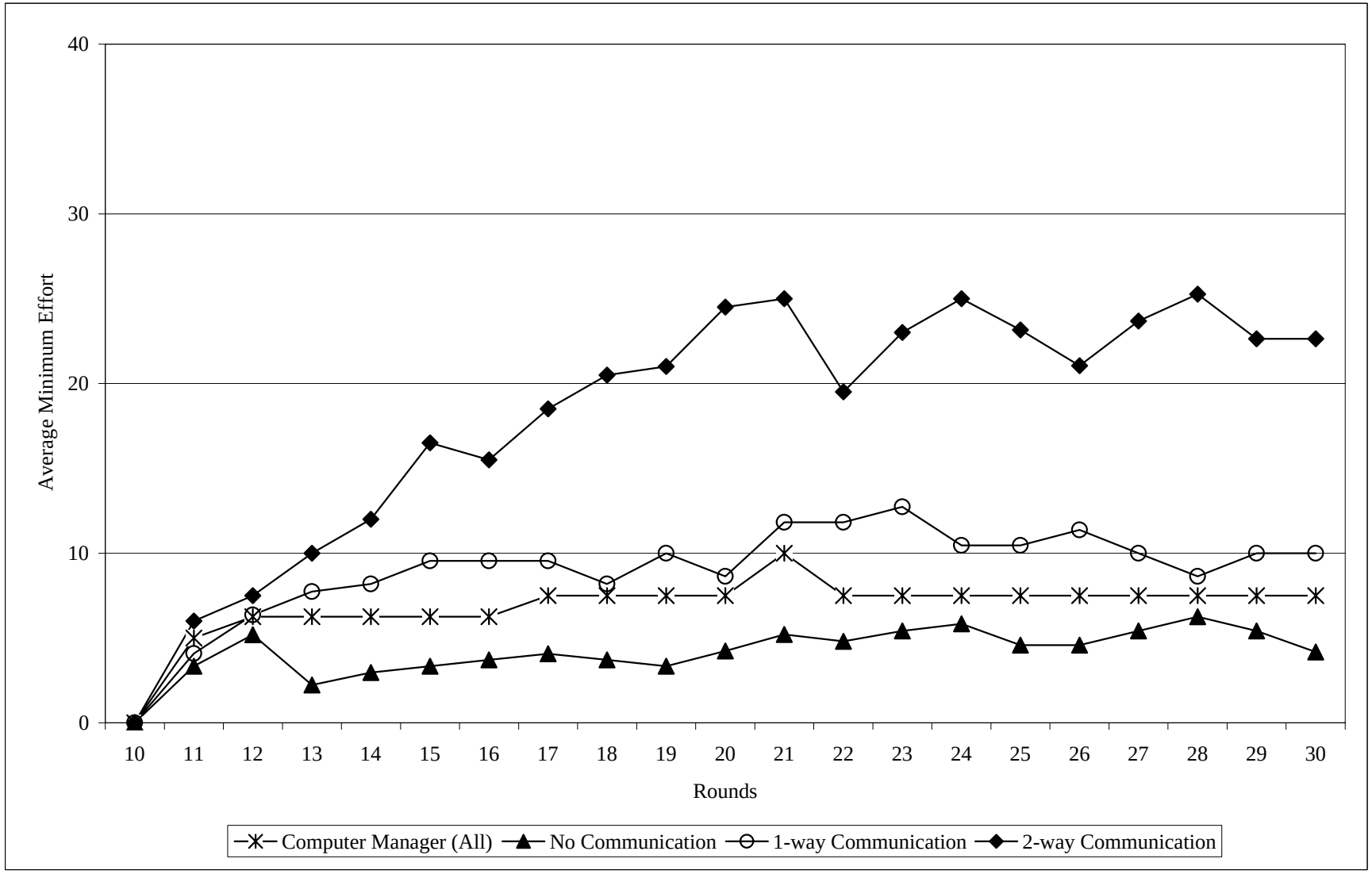

Figure 3
Comparison of Bonuses Across Treatments, All Firms