Cooperation, Free-Riding, and the Signaling Value of Incentives: An Experiment in a Company*

Marvin Deversi†

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Abstract

Economists and management scholars have argued that the scope of incentives to increase cooperation in organizations is limited as their use signals the prevalence of free-riding among employees. This paper tests this hypothesis experimentally, using a sample of managers and employees ($N = 449$) from a large software company. In the experiment, I exogenously vary whether managers are informed about prevailing cooperation levels among employees before they can set incentives to promote cooperation. Comparing informed versus uninformed incentive choices, the data reveals strong positive effects of incentives that are unaffected by the hypothesized signaling effect. The absence of such effect seems related to the perception of managers' intentions, a mitigating factor that has not been explored in the literature so far.

Keywords: cooperation, incentives, signaling, crowding out, field experiment.

JEL-Classifications: C91, D01, D91, H26.

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†Department of Economics, LMU Munich, e-mail: marvin.deversi@econ.lmu.de

1 Introduction

Complementarities in production render cooperation among employees important for companies (e.g., Dirks and Ferrin, 2001; Gratton, 2009). At the same time, they cause free-rider problems due to a misalignment of individual profits and collective efficiency (e.g., Gittell, 2000; Fehr, 2018). Using monetary incentives is a prevalent strategy of companies to cope with such conflict, but their effectiveness is still at debate.[1] Recent research points out that incentives can induce unintended side effects that eventually impede their original purpose (Gneezy et al., 2011; Bowles and Polanía-Reyes, 2012).

One effect that is of particular relevance for the context of cooperation is that incentives convey information about typical behavior of others (e.g., Sliwka, 2007; Van der Weele, 2012; Bénabou and Tirole, 2011). A manager who introduces incentives to cooperate may signal that employees would act selfishly otherwise. As a result, employees may expect less cooperative behavior from their colleagues and, in line with evidence on conditional cooperation (Fischbacher et al., 2001), cooperate less themselves.[2] Evidence from the laboratory suggests that employees potentially understand the signaling value of incentives (e.g., Galbiati et al., 2013), but field evidence is largely missing.

Studying the signaling value of incentives within companies is however difficult. Incentives and information about cooperative behavior held by managers are endogenous, and whether such information is available to managers might be unknown to employees. This paper exploits a unique field environment that combines three very rare features that allow overcoming these issues. First, it allows for exogenous variation in information (about the cooperativeness of employees) held by managers when choosing incentives. Second, employees are well aware of the fact that cooperativeness measures exist. Third, employees also know whether such measures are (or are not) available to managers when setting incentives.

I collaborate with a large software company that relies heavily on cooperative behavior of their employees and seeks to provide incentives to encourage the latter. To study whether incentives work as signaling devices, I conduct an online experiment (or also called "artefactual field experiment" following the typology of Harrison and List (2004))

[1] Examples include the introduction of manager guidelines that outline cooperative behavior as a requirement for promotion and salary increases, or the provision of peer-to-peer recognition tools in which employees can confer monetary awards to cooperative colleagues. See Gratton (2009) and `www.blog.bonus.ly/a-look-at-googles-peer-to-peer-bonus-system` for a description of how Google and British Petroleum implement these tools.

[2] The term "conditional cooperation" describes that people cooperate if they believe that others cooperate as well. There exists ample evidence about the prevalence of conditional cooperators in various samples (e.g., Gächter, 2007; Kocher et al., 2008).

with managers and employees from the company. Employees find themselves in a social dilemma situation in which they have a dominant strategy to free-ride on the cooperative efforts of their colleagues. Managers benefit from high cooperation levels among employees and can counter free-riding by implementing a costly incentive that promotes cooperation. Prior to incentive choice, I exogenously vary whether managers are informed about prevailing cooperation levels among employees measured in a previous study (Deversi et al., 2020). At the same time, I notify employees that their manager has been informed before setting incentives. By comparing beliefs and behavior of employees under informed versus uninformed incentive choices, I am able to isolate whether the information provided to managers transmits to employees and hence affects the company's cooperative culture.

I find that incentives have strong positive effects on cooperation. They increase cooperation rates by 24%, and beliefs about cooperative behavior of those working under incentives by 44%. I do not observe differential increases between the information treatments, neither in beliefs nor in actual behavior. This indicates that employees do not take into account the information conveyed by the managers' incentive choices. Unlike employees, managers react to the information that is made available to them. In the treatment group, they update their beliefs and, in line with maximizing their profits, choose incentives to increase cooperation more frequently.

It appears that the absence of a signaling effect is driven by the employees' misperception of the managers' decision-making. Employees do not expect managers to choose incentives based on their monetary benefits. Instead, they consider managers more likely to choose incentives when managers expect higher levels of cooperation. Hence, employees appear to interpret managers' choices to "reward" cooperation through incentive provision. The usual assumption is that high incentives signal low cooperation (e.g., Sliwka, 2007; Van der Weele, 2012; Bénabou and Tirole, 2011). But, with the simple additional assumption that the manager also has prosocial preferences, high incentives might also signal high cooperation. I identify that the total effect is null, and some suggestive evidence in favor of the latter effect.

My findings relate to a large influential literature in economics and management science dealing with the interaction of incentives and social preferences (for a review, see Bowles and Polanía-Reyes, 2012). According to this literature, incentives can crowd out prosocial behavior because they provide information about the person who sets the incentive, such as selfish intentions (e.g., Fehr and Rockenbach, 2003; Fehr and List, 2004) or his or her knowledge about the task (e.g., Bénabou and Tirole, 2003; Bremzen et al., 2015; Deserranno, 2019). Another channel to which this literature has alluded to is the

signaling of principals' private information about social norms. In the experimental laboratory, Danilov and Sliwka (2017) investigate shirking behavior of agents that work on individual tasks under either fixed or variable pay contracts. They find an increase in agents' trustworthiness when the principal is informed about past effort provision and refrains from implementing a variable pay contract. Cardinaels and Yin (2015) show that the use of incentives to increase truthful behavior in a reporting task signals that other agents were likely to report dishonestly before. Both studies differ from my design by analyzing individual decisions rather than interactions of multiple agents.[3] Galbiati et al. (2013) use a two-agent minimum effort game and vary whether sanctions are endogenously set by an informed principal or exogenously set by the experimenter. They find that endogenous sanctions are more effective in enforcing high effort because they signal high effort provision in past rounds. My study makes a relevant contribution to this literature by providing a unique, naturally occurring test environment of signaling effects and their predicted adverse impact on cooperation. My results give rise to potential contextual factors that render signaling and crowding out effects more or less likely to occur - namely, prosocial preferences of the principal.

The remainder of this paper is structured as follows. I first introduce the experimental design by describing my field setting and the experimental game. Then, I present the results in Section 3. In Section 4, I discuss potential explanations for the absence of the hypothesized signaling effect in my setting. Section 5 concludes this paper.

2 Experimental Design

2.1 Field Setting

This study is conducted in partnership with a large software company. In most tasks within the company - reaching from software development, consulting, sales to service activities (e.g., human resource management) - cooperation is essential to maximize joint production output of work teams.[4]

The management of the company conducted a study to measure the prevailing levels of cooperation and to subsequently establish new policies that enhance cooperation. This study is described by Deversi et al. (2020). It entailed a one-shot, three-person pub-

[3]This implies that in both studies information about prevalent behaviors must affect agents' behavior via conformity preferences (Sliwka, 2007) or social esteem (Bénabou and Tirole, 2011) of agents, rather than trough reciprocity (Van der Weele, 2012) or effort complementarities (Friebel and Schnedler, 2011) as in my setting.

[4]For more detailed information on the company see Deversi et al. (2020).

lic goods experiment in which a total of 369 employees participated.[5] The data revealed high levels of cooperation (on average 79% of the endowment) and high expectations about others' cooperation behavior (on average 66% of the endowment) that were however significantly lower than actual cooperation rates. Further, about 82% of company employees were conditional cooperators which emphasizes the relevance of beliefs about others' behavior for cooperation in the company. Both results together indicate a significant room for signaling effects to adversely affect the cooperative culture of the company. If the management was to implement incentives without informing employees about the results of Deversi et al. (2020), employees might infer that measured cooperation levels were low. The experiment of the current study takes place after the previous study, but before managers and employees have been informed about the findings.

2.2 Experimental Game

In the experiment, three randomly grouped employees ($n = 3$) play a public goods game. Each employee receives an initial endowment of 10 Tokens (worth € 10) to be allocated between a private account and a common account. The amount contributed to the common account is an integer that satisfies $0 \leq c_i \leq 10$. The sum of contributions to the common account is multiplied by 1.5 and then divided equally among the three group members. Therefore, each individual group member receives a share of $\gamma = 0.5$ of the total sum of contributions.

In addition, I match one manager to each group of employees. They earn a fixed amount of 15 Tokens (worth € 15) and a share of $\gamma = 0.5$ from the sum of contributions. They cannot contribute. Before employees act, managers decide whether to implement a monetary incentive to make employees cooperate (termed *Additional Payment* in the instructions). If the incentive is chosen, the employee with the highest contribution in the common account receives an additional payment of three tokens.[6] The tie-breaking rule is specified such that the three tokens are evenly distributed among the partic- ipants that contributed the highest amount. Setting the incentive to cooperate ($a = 1$) costs 5 Tokens.

[5]The authors use a linear public goods game - also known as voluntary contribution mechanism. The incentives of the game capture a tension between individual payoff mazimization and collective efficiency maximization. In the game each player has a dominat strategy to free-ride on others' contributions to a public good, deviations from this strategy are usually interpreted as cooperative behavior or as a social preference more generally (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002).

[6]I focus on this particular incentive because it is a policy that the management discussed to implement after conducting the analyses in Deversi et al. (2020). The idea was to introduce a tournament incentive that rewards the employee with the highest number of received peer-to-peer recognition awards that can be sent in the companies intranet. Similar relative rewards for cooperation have been analyzed by Irlenbusch and Ruchala (2008).

The payoff functions of employee i and manager m can be described as follows.

$$\pi_i = 10 - c_i + \gamma \sum_{j=1}^{n} c_j + a \times \begin{cases} 3 & \text{if } c_i > c_h, c_k \; \forall \; i,h,k \\ \frac{3}{\sum(h)} & \text{if } c_i = c_h > c_k \; \forall \; i,h,k \\ 0 & \text{if } c_i < c_h, c_k \; \forall \; i,h,k \end{cases} \tag{1}$$

$$\pi_m = 15 + \gamma \sum_{j=1}^{n} c_j - a \times 5. \tag{2}$$

where h and k refer to the other group members.

If the incentive is not implemented ($a = 0$), the standard social dilemma equilibrium arises as $1/n < \gamma < 1$, i.e., it is welfare-efficient if each member contributed his or her whole endowment but individually optimal to contribute $c_i = 0$. If the incentive is implemented ($a = 1$), the dominant strategy depends on the expectation about others' contributions. For expected average contributions $E(\bar{c}_{-i}) \in [0, 5)$, it is payoff-maximizing to contribute $k = \min\{n \in \mathcal{N} | n > E(c_{-i})\}$, i.e., the minimal integer higher than $E(c_{-i})$. For $E(\bar{c}_{-i}) = 5$, the employee is indifferent between free-riding or contributing 5. For $E(\bar{c}_{-i}) > 5$, the social dilemma equilibrium emerges again. Overall, the incentive increases the expected payoff from contributing into the common account without affecting the action space of players.

From the managers' perspective, implementing the incentive can only be payoff maximizing if the expected sum of contributions without the incentive is lower than 20 Tokens (i.e., 6.67 Tokens per employee). In order for the cost of the incentive to pay off, each group member must increase contributions in response to the incentive by at least 3.33 Tokens.[7]

For both choices of the manager (i.e., using the strategy method), I elicit three decisions from the employees. First, I elicit their contribution in the common account (*unconditional contribution*). Second, I ask for their contributions if the other group members contributed on average 0/1/2/.../10 (*conditional contributions*). For one randomly selected subject in the group the conditional contributions are payoff-relevant, whereas for the two remaining subjects the unconditional contribution is. This ensures that both unconditional and conditional contribution decisions are incentive-compatible. Third, I elicit their belief

[7] To see this, I compare the manager's payoffs $\pi_m(a = 1) - \pi_m(a = 0) = \gamma E[\sum c_j(a = 1) - \sum c_j(a = 0)] - 5 \geq 0$. Re-formulation yields $E[\sum c_j(a = 1)] - E[\sum c_j(a = 0)] \geq 10$, hence, $\frac{10}{3}$ per group member. In addition, as $\max E[\sum c_j(a = 1)] = 30$, this yields an upper bound for the expected sum of contributions without the incentive, i.e., $E[\sum c_j(a = 0)] = 20$.

about the average unconditional contribution of the other two players (*belief*). Following Gächter and Renner (2010), employees receive €5 if they hit the correct average, and €0 otherwise.

Finally, I ask two further questions that capture employees' beliefs about managers' incentive choice and their beliefs about managers' expectation about contribution behavior of employees. Both questions are incentivized by providing €1.5 for a correct response. A full list of elicited variables, including additional survey variables, can be found in Appendix A.

2.3 Treatments and Hypotheses

The critical feature of my experiment is the information structure. Generally, there exists uncertainty about employees' behavior in the game. I provide information on average unconditional contributions measured by Deversi et al. (2020) to managers in INFO, but not in NO INFO. Prior to incentive choice, they receive the following information.

> "*Tip for you as a manager: 369 employees have already made their decision to allocate the 10 tokens between the private account and the common account. There was no additional payment for these decisions in place. On average, 2.10 Tokens were paid into the private account and 7.90 Tokens into the common account.*"

On the employee side, the instructions in INFO entailed the following statement.[8]

> "*What does the manager know before making a decision? The manager received information about the average contribution decision of 369 other employees. These employees have already decided on the allocation of the 10 tokens between the private account and the common account. There was no additional payment for these decisions in place.*"

Table 1 summarizes the design. It enables me to observe beliefs and cooperation of employees under different information sets of the managers while holding incentive choices constant. To derive testable predictions, I assume that both players update their beliefs in a Bayesian fashion and that managers are individual payoff-maximizers whereas employees are either individual payoff-maximizers as well or conditionally cooperative. Conditional cooperators contribute to the common account if they believe that others contribute as well.

[8]For employees in INFO, the treatment information was referred to three times: once in the main instruction text, once on a summary screen with the most important aspects in bullet points, and another time in the comprehension tasks section where I asked a question on whether the manager has been informed.

		Within Subject	
		NO INCENTIVE	INCENTIVE
Between	NO INFO	205 employees & 23 managers	
Subject	INFO	196 employees & 24 managers	

Table 1: Treatment Overview

Under these assumptions, managers should update their prior beliefs according to the average contribution rate provided to them in the information condition. They should respond to this belief update by choosing the incentive less frequently as measured contribution rates are higher than the critical threshold for choosing the incentives (7.90 Tokens $>$ 6.67 Tokens).

Hypothesis 1: *On average, managers update their beliefs according to the information provided and select the costly incentive less frequently in* INFO *than in* NO INFO.[9]

The incentive should steer selfish employees away from free-riding. This should render employees' beliefs in others' cooperativeness more optimistic and further enhance contributions of conditional cooperators.

Hypothesis 2: *On average, employees' beliefs about others' contributions and actual contributions are higher in* INCENTIVE/NO INFO *than in* NO INCENTIVE/NO INFO.

Consider employees' responses in NO INCENTIVE/INFO versus NO INCENTIVE/NO INFO. Here, a manager decided not to intervene and the public goods game is played without the incentive to cooperate. In the INFO treatment such choice reflects that contribution levels observed by the manager have been sufficiently high, as otherwise it would have been worth to incur the cost to implement the incentive. Conversely, INCENTIVE/NO INFO versus INCENTIVE/INFO should reflect the information that contribution levels observed by the manager have been sufficiently low, such that it was worth it to incur the cost to implement the incentive.[10] These belief updates should affect contribution

[9]There also is a equilibrium effect at work such that managers anticipate signaling effects from their incentive choices and hence choose the incentive even less frequently.

[10]The manager's actual decision threshold might be lower, depending on managers' beliefs and reciprocity preferences of employees (see Van der Weele, 2012), the upward containment is however unaffected by these other aspects. Hence, I expect employees to infer the positioning of the observed contribution levels relative to the upper threshold from managers decisions which implies that the empirical distribution of beliefs should shift.

behavior to the extent that employees are conditionally cooperative.

Hypothesis 3: *On average, employees' beliefs are more optimistic in* NO INCENTIVE/INFO *compared to* NO INCENTIVE/NO INFO *and more pessimistic in* INCENTIVE/INFO *compared to* INCENTIVE/NO INFO*.*

Hypothesis 4: *On average, employees' contributions are higher in* NO INCENTIVE/INFO *compared to* NO INCENTIVE/NO INFO *and lower in* INCENTIVE/INFO *compared to* INCENTIVE/NO INFO *if they are conditionally cooperative.*

2.4 Procedures

This study is part of a larger research agenda taking place in the company such that the experimental procedures that I used are identical to those described in Deversi et al. (2020). Participants were randomly selected from a large population of employees eligible to participate in experiments that were taking place at the same time.

I conducted the experiment in spring 2019 using the software Qualtrics.[11] Potential participants were invited via e-mail and participated through a personalized link. Participation took place in a two-week time period. Payout calculations and matching of managers and employees were administered ex post. While there was no feedback during the experiment, participants received payoff information afterwards via a website created solely for this purpose. I asked participants to perform all experimental tasks individually and groups were randomly allocated to avoid coalition formation. A double-blind data procedure ensured the anonymity of all managers and employees. Approval of the ethics committee at the University of Munich has been granted in January 2019 and my analyses have been pre-registered at the AEA RCT registry (AEARCTR-0003931).

2.5 Sample Characteristics

I invited 1,500 managers and employees to participate in the experiment. A total of 48 managers and 401 employees participated which corresponds to a participation rate of 30%. Table 2 shows the sample characteristics.[12] Participating managers and employees are highly educated (only less than 14% have no post-secondary education). There are 19 female managers (40%) and 132 female employees (33%). Managers are on average 44

[11] The instructions can be found in Appendix B.

[12] The balance table is provided in Appendix C.

	Managers		Employees	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*
Female	0.40	0.50	0.33	0.47
Age	43.96	10.05	36.15	8.35
Seniority	11.73	6.97	5.08	3.89
Education				
Highschool	0.06	0.25	0.10	0.30
Bachelor	0.04	0.21	0.14	0.35
Master	0.63	0.49	0.60	0.49
Ph.D.	0.21	0.41	0.12	0.32
Other	0.06	0.25	0.04	0.19
Performance Pay				
Company			0.70	0.46
Individual			0.30	0.46
Observations	47		401	

Table 2: Participants' Characteristics

years old and work in the company for almost 12 years. Employees are on average 36 years old and work in the company for around 5 years. Furthermore, 70% of employees work under a company performance pay scheme in which bonuses depend on the company's asset market performance. The other 30% work under an individual performance scheme in which they receive bonuses based on individual target achievement. Many managers, especially those high in the hierarchy, have special contracts that can not be assigned to either of these schemes.

3 Results

3.1 Managers

A general prerequisite for a signaling effect is that managers react to the information treatment. Figure 1 shows the cumulative distribution function of the deviation between the managers' expectation and the average contribution level provided in INFO. It becomes clear that managers hold heterogeneous beliefs in NO INFO that differ substantially from the provided average, and that managers in the information condition adjust their priors accordingly. Almost 80% of managers in INFO deviate not more than one Token from the provided average value, whereas 20% hold such beliefs in NO INFO. Hence, a Mann-Whitney U Test (MWU) rejects that beliefs in both conditions are from the same underlying distribution ($p = 0.001$). This belief update should induce less selection of the incentive for profit-maximizing managers. And indeed, I observe that managers select the costly incentive less frequently in INFO than in NO INFO (71% versus 91%). However,

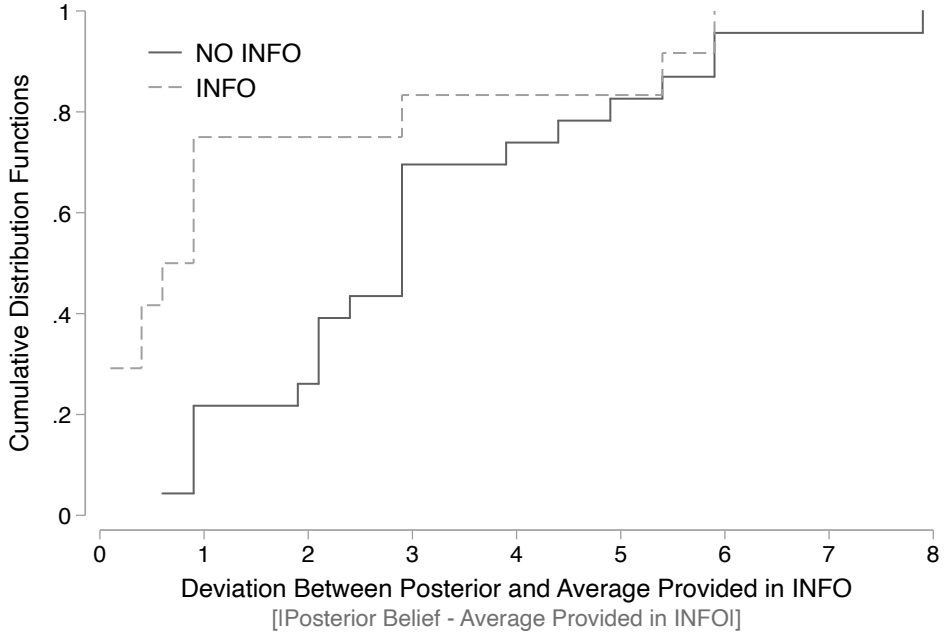


Figure 1: Treatment Effects on Managers' Posterior Beliefs

Notes: The graph shows the cumulative distribution functions of the absolute difference between managers' posterior beliefs about employees' contributions without the incentive in place and the measured contribution rate in Deversi et al. (2020) by treatment.

as I observe only 47 managers' decisions, this difference is only marginally statistically significant (MWU, $p = 0.078$; or one-sided Fisher Exact test, $p = 0.078$).

Result 1: *Managers' beliefs are significantly closer to the measured contribution rates in* INFO *than in* NO INFO*, and managers select the incentive less often in* INFO *than in* NO INFO*.*

3.2 Employees

As described in my hypotheses, beliefs about others' contributions are a crucial indicator for the mechanisms driving potential effects in the incentive and information conditions. Figure 2 presents the respective treatment comparisons. Beliefs about others' unconditional contributions are higher when the manager selected the incentive as compared to when it was not selected (7.5 Tokens versus 5.2 Tokens; Wilcoxon Signed-rank Tests (WSR), $p< 0.001$). This difference is also statistically significant when tested in both treatments separately (WSR, both $p< 0.001$). Yet, the information treatment has no impact on beliefs, neither under NO INCENTIVE (MWU, $p= 0.906$) nor under INCENTIVE (MWU, $p= 0.236$). The individual within-subject difference in beliefs between the two incen-

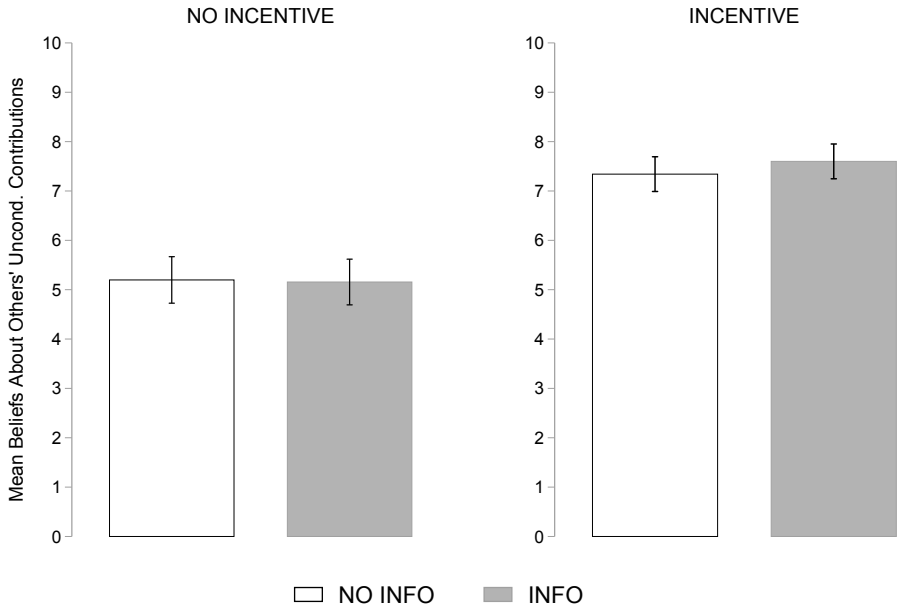


Figure 2: Treatment Effects on Employees' Beliefs

Notes: Bars show the average belief of employees about the unconditional contribution decision of the other group members. The 95% confidence intervals are based on a standard normal distribution.

tive states is also not statistically significant from each other between INFO and NO INFO (MWU, p= 0.314). This indicates that employees' beliefs were unresponsive to the information treatment.[13] If anything, we observe a small tendency in the opposite direction of the predicted effect.

To show a more complete representation of the belief data, Figure 3 plots the cumulative distribution functions of the individual belief differences between INCENTIVE and NO INCENTIVE. If incentive choices work as signaling devices, the difference in beliefs should be lower in INFO compared to NO INFO. However, I do not find an indication for this effect. Both distributions appear very similar to each other and do not clearly diverge (Kolmogorov-Smirnov Test, $p = 0.402$).

The estimation results in column (1) of Table 1 confirm the non-parametric analyses. Here, I regress beliefs on treatment dummies. The OLS regression pools all decisions in the strategy method and uses clusters on the subject level. While the incentive signifi-

[13]This null result seems not to be driven by low statistical power. In my *ex ante* power analysis, I calculated a required sample size of 368. Considering the final sample size of 402, my experiments appear slightly overpowered and still show a null result. In the *ex post* power calculation, given my sample size and the measured standard deviations in the belief difference between the incentive states, I would be able to detect an effect size of 30% of a standard deviation which is smaller than detected effect sizes in, for example, Galbiati et al. (2013) or Cardinaels and Yin (2015).

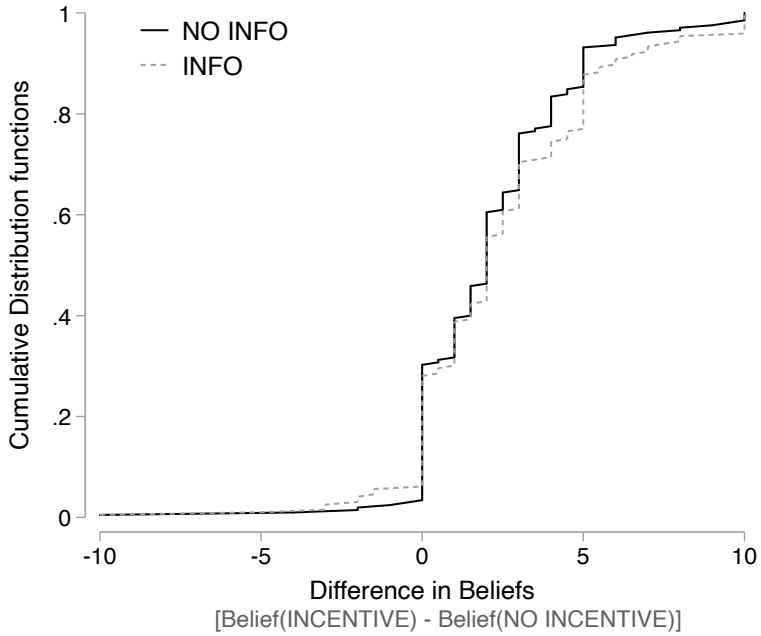


Figure 3: Treatment Effects on Employees' Beliefs About Incentive Effects

Notes: The graph shows the cumulative distribution functions of the difference between employees' beliefs about others' contributions with the incentive in place and versus without the incentive in place by treatment.

cantly increases beliefs by 44% (2.1 Tokens) on average, the interaction of the information treatment and the incentive choice as well as the information dummy alone have only small positive and insignificant effects.

The null result of signaling effects on beliefs renders potential effects on behavior in the public goods game unlikely. Still, as beliefs were elicited after public good contributions, it might be the case that order effects biased belief updating but not potential effects on behavior. As presented in column (2) of Table 1, I observe however comparable effects on unconditional contributions. The incentive decision induces an increase in unconditional contributions by 23% (1.5 Tokens), but there is no statistically significant effect of the information treatment or the treatment interaction. Furthermore, the estimated models in columns (4) to (6) show that the null effect of the treatment interaction is robust to controlling for a wide range of employee characteristics including *gender*, *age*, *seniority*, *incentive scheme*, *career level*, and *job function*.

Result 2: *Employees' beliefs about others' contributions and actual contributions are significantly higher in* INCENTIVE *than in* NO INCENTIVE.

	(1) Belief	(2) Uncond. Contribution	(4) Belief	(5) Uncond. Contribution
I(INCENTIVE)	2.144***	1.346***	2.172***	1.376***
	(0.174)	(0.216)	(0.179)	(0.219)
I(INFO)	-0.0419	-0.226	-0.0442	-0.168
	(0.335)	(0.363)	(0.339)	(0.364)
I(INCENTIVE×INFO)	0.300	0.391	0.294	0.329
	(0.274)	(0.319)	(0.283)	(0.326)
Constant	5.198***	6.744***	4.912***	6.552***
	(0.239)	(0.248)	(0.494)	(0.528)
Controls	No	No	Yes	Yes
Observations	802	802	784	784
R^2	0.131	0.055	0.156	0.092
Model	OLS	OLS	OLS	OLS

Table 3: Regression Estimations of Treatment Effects

Notes: For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. The control variables include *gender*, *seniority*, *incentive scheme*, *career level*, and *job function*. 18 employees are not included in the regressions using the additional controls as some of these have not been available for those participants. Standard errors are clustered on the subject level and are shown in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Result 3: *Employees' beliefs are not statistically different between* NO INCENTIVE/INFO *and* NO INCENTIVE/NO INFO. *They are also not statistically different between* INCENTIVE/INFO *and* INCENTIVE/NO INFO.

Result 4: *Employees' contributions are not statistically different between* NO INCENTIVE/INFO *and* NO INCENTIVE/NO INFO. *They are also not statistically different between* INCENTIVE/INFO *and* INCENTIVE/NO INFO.

3.3 Treatment Heterogeneity

Following Danilov and Sliwka (2017), one may expect that employees that work at the company for only a short period of time should update their beliefs more strongly because they have a less precise prior. In columns (1) and (2) of Table 4, I show OLS regressions for employees whose seniority is above and below the median seniority level, respectively. For less senior employees, the interaction effect of the incentive choice and the information treatment is positive and marginally significant. I.e., these employees exhibit a small tendency to infer relatively high cooperation rates from managers setting the incentive.

	(1) Belief	(2) Belief	(3) Uncond. Contribution	(4) Uncond. Contribution
I(INCENTIVE)	2.329***	2.000***	1.369***	1.393***
	(0.235)	(0.279)	(0.278)	(0.331)
I(INFO)	-0.778	0.453	-0.176	-0.303
	(0.498)	(0.472)	(0.433)	(0.667)
I(INCENTIVE) × I(INFO)	0.712*	-0.014	0.692*	-0.468
	(0.382)	(0.419)	(0.412)	(0.504)
Constant	6.187***	6.305***	6.523***	6.497***
	(1.245)	(1.177)	(0.573)	(1.084)
Subgroup	Low Sen.	High Sen.	Cmp. Pay	Ind. Pay
Controls	Yes	Yes	Yes	Yes
Observations	384	400	552	232
R^2	0.206	0.169	0.120	0.111
Model	OLS	OLS	OLS	OLS

Table 4: Treatment Effects on Beliefs and Contributions by Subgroups

Notes: For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. The control variables include *gender*, *seniority*, *incentive scheme*, *career level*, and *job function*. 18 employees are not included in the regressions using the additional controls as some of these have not been available for those participants. Standard errors are clustered on the subject level and are shown in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

For more senior employees, the interaction is very close to zero and insignificant.

With respect to cooperation behavior, one may expect hat employees with strong reciprocity preferences react more strongly to a belief update. Using data from the previous study, I observe that employees working under individual performance pay are less likely to be conditional cooperators than employees under company performance pay (MWU, $p = 0.028$). As shown in columns (3) and (4) of Table 4, I observe that for employees in the individual performance pay scheme the coefficient of the treatment interaction is negative whereas for employees in the company performance pay scheme the coefficient is positive and also marginally significant.

As I will show in the next section, the observation that signaling effects have a small tendency to work in the opposite direction of my prediction is related with the employees' perception about how managers make incentive choices.

Result 5: *Less senior employees and employees that work under the company performance pay scheme exhibit a small tendency to infer relatively high cooperation rates from managers setting the incentive.*

4 Discussion

Why is there no signaling effect of incentive choices? To begin with, a basic requirement for a causal treatment effect is that participants paid attention to treatment specific information and understood the incentive structure of the game. In this regard, it is affirmative that participants in INFO took longer to complete the experiment than employees in NO INFO (MWU, $p = 0.005$). Next to reading the additional instructions, this might also entail some time in which employees were thinking about the implications of the managers being informed when setting incentives. Comprehension questions at the beginning of the experiment and a telephone hotline through which participants could ask questions during the experiment aimed at preventing misunderstandings.

Several potential explanations for the null evolve from the complexity of the reasoning process required from employees to infer signals from managers' choices. It should first be noted that the strategic sophistication of participants in my sample is arguably high. Compared to standard student subject pools, employees have a high average education level including many employees with a PhD. As math skills are often found to be positively related to strategic sophistication (e.g., Czermak et al., 2016), I asked participants how well they feel described by the statement "I am good at maths" in the post-experimental survey. I find that the median response on a scale from 0 ("does not describe me at all") to 10 ("describes me perfectly") is relatively high at 7. I also show in Appendix D that my main regression results are robust to accounting for this variable. Moreover, it has been argued that using the strategy method to represent managers' choices "[...] may signal to agents that the experimenter wants them to infer information from contract choices" (Cardinaels and Yin, 2015, p. 1012); such a reflection effect essentially limits the strategic sophistication required from participants and makes my null result even stronger.

Even under the premise of high strategic sophistication, it might still be the case that stakes involved for employees were too low, i.e., participants did not spent the cognitive efforts required to process the conveyed information. However, Deversi et al. (2020) find indications that employees from the company cared about similar-sized stakes in a public goods game. In their experiment, a substantial share of participants reacted to variations in the marginal per capita return of contributions in the common account. Also, in a surprise donation option at the end of their experiment most participants decided to keep the final payoff for themselves rather than donating it to a charity.

I now turn to considering employees preferences and their beliefs about managers' decision-making as a potential source of the null. First, it could be that employees are not

conditionally cooperative such that they do not value the potential signals about others' behavior. Following Fischbacher and Gächter (2010), I estimate an individual reciprocity parameter for each employee using the conditional contributions in NO INCENTIVE/NO INFO.[14] I find that the average value of the parameter is 0.7 and that there exists a substantial fraction of perfectly conditional cooperators among employees (48%) who should care a lot about information about others' contributions.

Second, employees might expect managers to be indifferent between selecting the incentive or not such that managers' choices are random and do not signal. Contrary to this concern, I observe that on average employees expect managers to select the incentive with a likelihood of around 63% which is significantly different from 50% (WSR, $p < 0.001$) and almost identical between treatments (63.3% in INFO and 63.4% in NO INFO; MWU, $p = 0.976$).

Third, it would be detrimental to the signaling effect if employees misinterpret the managers' purpose of providing the incentive. There is some evidence in line with this argument. Some employees (21%) expect their managers to expect zero or even negative incentive effects on contributions. Hence, in Table 5, I re-estimate the main OLS regressions from Table 3 excluding these employees. Interestingly, I observe that the positive interaction effects for beliefs and unconditional contributions increase compared to the full sample estimates. The signaling effect on beliefs is even statistically significant at the 5% level. Employees infer high contribution levels from informed managers that select the incentive which leads to a crowding-in effect on contributions that is marginally significant.

What reasoning do employees expect from managers that can explain these observations? In Figure 4a, I correlate the expected likelihood of the managers setting the incentive with employees' beliefs about the manager's expectation of the unconditional contribution levels.[15] If employees perceive the managers as individual profit-maximizers who tradeoff the expected incentive effect against its costs, one would observe a positive relationship between both variables. However, I observe that employees perceive them as independent (slope parameter in NO INFO of -0.01, t-Test, $p = 0.993$). The relationship turns slightly positive in INFO but remains insignificant (interaction effect of 0.91, t-Test, $p = 0.450$). Employees appear to not take into account that setting the costly incentive fulfills a selfish purpose. In Van der Weele (2012) or Bénabou and Tirole (2011),

[14] If the parameter is 1, there is a linear relationship between an employee's contributions and the average contributions of the other two employees in the contribution schedule. The parameter is 0 if the employee's and the others' contributions are independent from each other.

[15] There are no significant differences in these second-order beliefs between INFO and NO INFO (MWU, $p = 0.400$) corroborating the null result further.

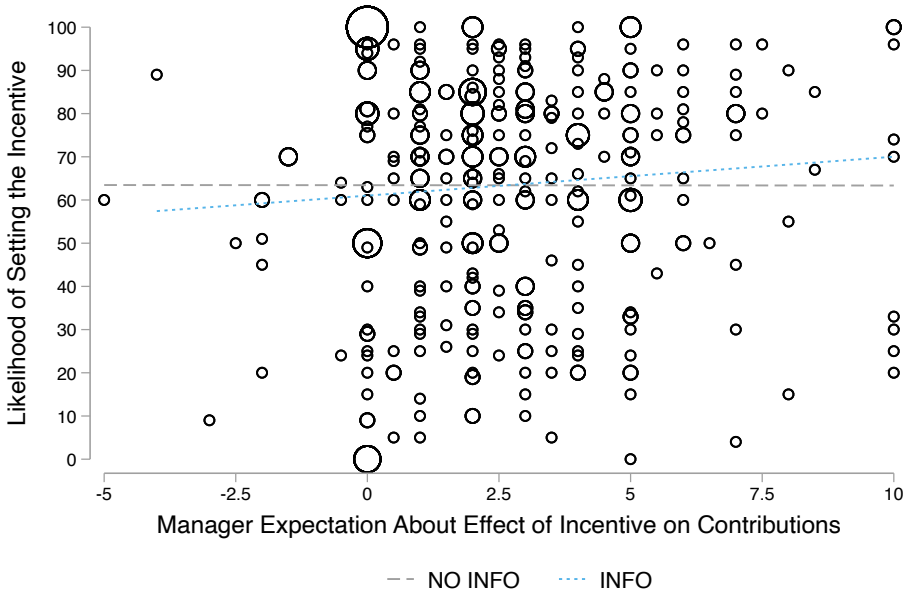
	(1) Belief	(2) Uncond. Contribution
I(INCENTIVE)	2.642***	1.580***
	(0.180)	(0.238)
I(INFO)	-0.291	-0.319
	(0.340)	(0.403)
I(INCENTIVE) × I(INFO)	0.563**	0.668*
	(0.280)	(0.355)
Constant	4.559***	6.379***
	(0.251)	(0.277)
Excluded	Misperceivers	Misperceivers
Controls	No	No
Observations	640	640
R^2	0.220	0.085
Model	OLS	OLS

Table 5: Second Order Beliefs and Treatment Effects on Beliefs and Cooperation

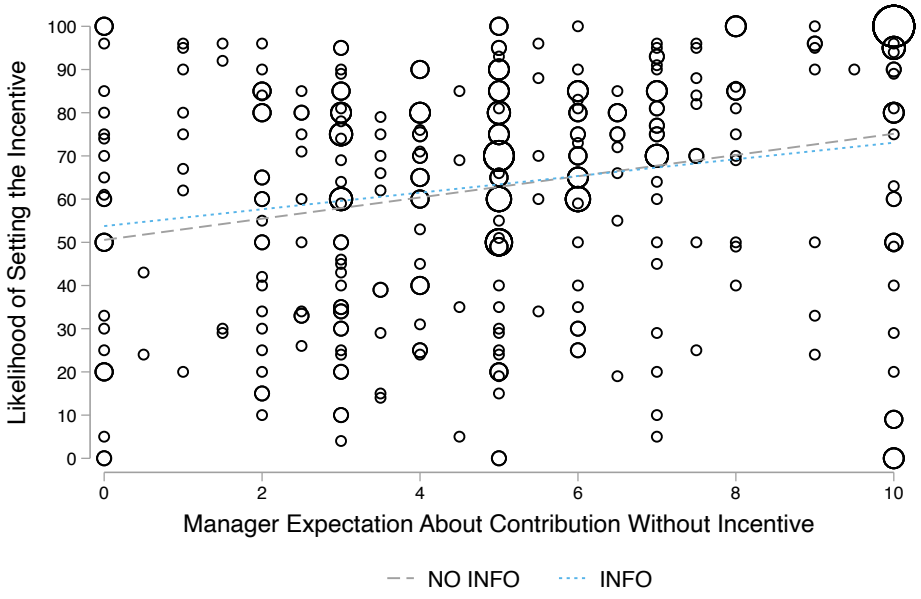
Notes: For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. 81 employees are not included in the regressions as they do not expect that their managers expect higher cooperation from setting the incentive (i.e., they misperceive the purpose of the incentive) . Standard errors are clustered on the subject level and are shown in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

for example, it is a necessary requirement for a signaling effect that the agents presume their managers to choose an incentive if it helps them to increase personal profits. Otherwise, the employees can not infer from incentive provision that contribution levels were low. The lack of evidence confirming this presumption can hence explain the overall null result. However, it does not explain the observed crowding-in tendencies in the data.

To analyze this, we need to understand how the presumption of employees about managers' choices actually looks like. In Figure 4b, I correlate employees' beliefs about the likelihood of setting the incentive with their beliefs about the managers' expectation of the unconditional contribution level without the incentive in place. While one would expect a downward sloping relationship in line with payoff maximization, I find the opposite. A standard deviation increase in the belief about the managers' expectation increases the belief about the likelihood of incentive selection by 2.5%-points (t-Test of regression coefficient, $p < 0.001$). It appears that employees expect that managers reciprocally provide rewards for high expected levels of cooperation. Employees do not see their managers as selfish profit maximizers. This could be related to past experiences with managers or a general prosocial relationship between management and employees in the company. As



(a) Managers' Incentive Choice and Expected Incentive Effect



(b) Managers' Incentive Choice and Expected Contributions

Figure 4: Employees' Beliefs About Managers' Decision-Making

employees think that managers provide incentives based on high expectations about cooperation rates, incentive provision signals high contribution levels and can explain the belief update observed in Table 5.

5 Conclusion

The literature suggests that incentives designed to promote cooperation in organizations may signal that selfish behavior is prevalent. As a consequence, they only have limited or even counterproductive effects. Contrary to this hypothesis, I find that setting an incentive to cooperate significantly increases cooperation among employees of a large software company. This increase is not affected by signals about others' behavior.

Further analyses suggest that the absence of a signaling effect in my setting is related to employees' perception of their managers' decision-making. They believe that managers do not exploit their private information about others' behavior in an opportunistic manner, but provide incentives if they expect high levels of cooperation. This might explain why I observe a small tendency in the data that employees infer high cooperation levels from incentives set by informed managers.

To the best of my knowledge, my study is the first to analyze whether contract choices signal social norms in a relevant field environment. According to Levitt and List (2007), it is often not possible to generalize findings from the experimental laboratory to the field because contexts differ. Actors in the field bring internalized social norms or past experiences and strategies into the game and herewith change outcomes. In my partner company and probably other organizations alike, reputation appears to be an important context factor of the functioning of incentives. A more nuanced understanding of this and other contextual factors, for example, the transparency about superior information on the side of the principal or the legitimacy of principals' decision making (Schnedler and Vadovic, 2011), is required. Another question for future research that arises from my setting is whether companies can prevent signaling effects of incentives by actively investing in the general relationship between managers and employees. This might include establishing pro-social intentions in managers such that their decision making "serves the employees", or to create a perception among employees that the management pursues benevolent management strategies.

Finally, it must be noted that in most field experiments there exists a tradeoff between using more artificial designs to discover causal effect mechanisms underlying the data and more natural designs that allow for bigger picture analyses (Deversi et al., 2020).

This paper focused on teasing out the signaling of others' behavior via incentive choices. Companies that design incentives to promote cooperation should also take other forms of incentive effects, like framing effects or the signaling of other information hold by the management (Bowles and Polanía-Reyes, 2012), into account.

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Appendix

A Variable Overview

Variable	Scale	Description	Details
age	ratio	Age of employee	
gender	nominal	Gender of employee	
seniority	ratio	Seniority of employee (in years)	
job function	nominal	Twelve functional areas (departments) which consists of clusters of several job families based on generic job content	Communications, Development, Education and Training, Finance, Administration, Human Resources, Information Technology, Marketing, Sales, Consulting, Not assigned
career	ordinal	Nine career level of employee (describes contribution based upon business results, accountability, complexity, experience and communication)	Not specified for reasons of discretion
pay scheme	nominal	Employees pay scheme	Either company performance pay or individual performance pay

Table A.1: Variables Collected from Company Records

Variable	Scale	Description	Details
Employees			
contribute	ratio	Unconditional contributions with and without the incentive in place	
x-contribute	ratio	Contribution conditional on x contributed by other team members with and without the incentive in place	
belief contribute	ratio	Belief about average contribution of the other team members with and without the incentive in place	
manager choice	ratio	Belief about share of managers that select the incentive	
manager belief	ratio	Belief about managers' expectation about unconditional contributions of employees	
Managers			
incentive choice	binary	Decision about whether to set the incentive	
belief contribute	ratio	Belief about average contribution of employees with and without the incentive in place	
2nd order belief	ratio	Belief about employees' beliefs about contributions of others with and without the incentive in place	

Table A.2: Variables Collected from the Experiment

Variable	Scale	Description	Details
altruism	ordinal	Social preference measure indicating the participants tendency for altruistic behavior	
neg. reciprocity	ordinal	Social preference measure indicating the participants tendency for negative reciprocity	
pos. reciprocity	ordinal	Social preference measure indicating the participants tendency for positive reciprocity	
math	ordinal	Measure of perceived math skills	
competitive attitude	ordinal	The participants individual competitive attitude	
nationality	nominal	The participant's nationality	
education	nominal	The participant's education level	
children	binary	Indicating whether the participant has children or not	
friends	ratio	The participants number of friends	

Table A.3: Variables Collected from the Survey

B Instructions

Information that are only presented in INFO are highlighted in *italics*.

B.1 Managers

As a manager, you are connected to a group of three employees which consists of anonymous participants in this study. The participants are randomly selected [Company] employees without management responsibility. The combination into groups of 3 occurs randomly. Your and your group's payouts depend on your and the group members' decisions. In addition, your decisions determine the payouts of up to six additional groups.

Decision-making situation of the group members

Each member of the group must decide on the use of 10 tokens each. You and the other group members can put the 10 tokens into a private account, or you can deposit them in whole or in part into a common account. Any tokens that you do not deposit into the common account are automatically added to your private account.

Income of the group members

The total income of a group member is the sum of income from his/her private account and his/her income from the common account:

- Income from the private account: He/she earns exactly one euro for each token he/she puts in his/her private account. For example, if he/she put 4 tokens into the private account, he/she will earn exactly €4 from the private account. No one but he/she receives income from his/her private account.
- Income from the common account: For each token that is added to the common account, each group member will receive €0.5. I.e., the other two group members also each receive €0.5 for each token contribute. Conversely, the contributing group member also earns money from the contributions of the other two group members to the common account.

Your income

You as a manager will receive €15 for your participation. In addition to this €15, you also receives €0.50 for each token that your group members contribute to the shared account. You do not earn from the deposits of your group members into the private accounts.

Your Decision

Before your group members make the contribution decisions, you decide whether or not to pay the group member with the highest contribution to the common account an additional payment of €3 to his / her private account. In the event of a tie, the €3 will be divided among all group members with the same contribution to the common account. If you opt for this additional payment scheme, this will cost you €5. If you decide against this, you will not incur any costs and no additional payments will be made to the group members.

What do the group members know about your decision?

Before making any decisions, all group members will be informed that you, the manager, decide on the additional payment of €3. Your group members also know that the additional payment is costly for you and that you earn from the deposits into the community account.

Tip for you as a manager

369 employees have already made their decision to allocate the 10 tokens between the private account and the common account. There was no additional payment for these decisions in place. On average, 2.10 Tokens were paid into the private account and 7.90 Tokens into the common account.

Summary

- All group members decide how many of the 10 tokens they deposit into their private account and how many of the 10 tokens they deposit into the common account.
- Each group member earns one euro for the tokens in the respective private account and €0.50 for each contributed token in the common account.
- You as a manager earn €0.50 for each token contributed in the common account. You cannot contribute tokens to the community account.
- The manager knows the average contribution of 369 other [Company] employees to the common account. There was no additional payment in place for these decisions.
- As a manager, you have to decide whether to pay the group member with the highest contribution to the common account an additional payment of €3 to their private. The additional payment will cost you €5.

- *In decision-making situations without additional payment, 396 [Company] employees paid an average of 2.10 tokens in the private account and 7.90 tokens in the common account.*

B.1.1 Comprehension Questions

Please answer the following questions to ensure that you have understood the instructions for Part I of the experiment. If you are unsure, you can return to the instructions by clicking on "Back".

Assume that none of the group members pay a contribution into the group account.

- What is the total income (private account + common account) of a group member in tokens?
- What is your income from the group's common account in euros?

Assume that all three group members each pay a contribution of 10 tokens into the group account.

- What is the total income (private account + common account) of a group member in tokens?
- What is your income from the group's common account in euros?

Assume that in a group, member A pays 0 tokens to the shared account, member B 5 tokens, and member C 10 tokens. Which member receives the additional payment of 3 tokens if the manager has selected this scheme? Member A / Member B / or Member C

B.1.2 Incentive Choice and Belief Elicitations

Please choose whether you want to pay the member with the highest contribution to the common account the additional payment of 3 €to his / her private account. This additional payment will cost you €5. Yes. The additional payment is used. / No. The additional payment is not used.

In addition to your earnings from your private and common account, you will receive a further payout for estimating the average contribution of the other two members of your group to your common account. Your payout will depend on how accurately you estimate the actual average contribution of your two group members. If you are exactly right, you will receive an additional €2.5 for each correct answer. If your estimate differs

by 0.5 or more tokens from the actual average contribution, you will receive €0. Please enter a number from 0 to 10 (each number is allowed in steps of 0.5).

- What do you think is the average contribution of your group members' tokens to the common account with additional payment?
- What do you think is the average contribution of your group members' tokens to the common account without additional payment?
- What is the average expectation of the group members about the contribution of the other group members to the common account with additional payment?
- What is the average expectation of the group members about the contribution of the other group members to the common account with additional payment?

B.2 Employees

You are a member of a group of three, consisting of anonymous participants in this study. All participants are randomly selected employees of [Company]. The combination into groups of 3 occurs randomly. Your group will be connected to a manager. The manager is a randomly selected [Company] manager, i.e. a [Company] employee with management responsibility.The payouts for you, and the other group members and your manager in this section depend on your decisions, and the decisions of the other members of your group, and the manager's decision.

Decision-making situation

Each member of the group must decide on the use of 10 tokens each. You and the other group members can put the 10 tokens into a private account, or you can deposit them in whole or in part into a common account. Any tokens that you do not deposit into the common account are automatically added to your private account.

Total income

Your total income is the sum of your income from your private account and your income from the common account:

- Income from the private account: You earn exactly one euro for each token you put in your private account. For example, if you put 4 tokens into your private account, you will earn exactly €4 from your private account. No one but you receives income from your private account.

- Income from the common account: For each token that is added to the common account, you will receive €0.5. The other two group members also each receive €0.5 for each token you contribute. Conversely, you also earn money from the contributions of the other two group members to the common account. For example, if the sum of all three group members' contributions to the common account results in 30 tokens, then you and the other two group members each receive 30 x 0.5 = €15 from the common account. If the three group members pay a total of 10 tokens into the common account, you and the other two group members receive 10 x 0.5 = €5 each from the common account.

Income of you manager

Your manager will receive €15 for his / her participation. In addition to this €15, he / she also receives €0.50 for each token that you and your group members contribute to the shared account. The manager does not earn from your deposits and the deposits of your group members into the private accounts.

Decision of your manager

Before you and your group members make the contribution decisions, your manager decides whether or not to pay the group member with the highest contribution to the common account an additional payment of €3 to his / her private account. In the event of a tie, the €3 will be divided among all group members with the same contribution to the common account. If your manager decides on the additional payment, this costs the manager €5. If he / she decides against this, the manager incurs no costs and no additional payments are made to the group members.

What does the manager know when making a decision?

The manager received information about the average contribution decision of 369 other employees. These employees have already decided on the allocation of the 10 tokens between the private account and the common account. There was no additional payment for these decisions in place.
The manager *also* knows your decision-making situation. So he / she knows how much you earn, what your decision looks like and he / she also knows that you know about his / her decision. The manager doesn't know how much you and your group members are contributing when taking his/her decision on the additional payment.

Your entries

As described above, you can use 10 tokens to fund your private account and the common

account. Each group member has to make two types of contribution decisions, which we will refer to below as the contribution and the contribution table. You can find a detailed description of your entries on the entry screens. When you make your decisions, you do not yet know whether the manager has selected the additional payment or not. That is why you make every decision for both scenarios - once with and once without additional payment. Since both scenarios can be relevant to your payout, you should think carefully about your decisions in both scenarios.

Summary

- All group members decide how many of the 10 tokens they deposit into your private account and how many of the 10 tokens they deposit into the common account.
- Each group member earns one euro for the tokens in the respective private account and €0.50 for each contributed token in the common account.
- The manager also earns €0.50 for each token contributed in the common account. He / she cannot contribute tokens to the community account.
- *The manager knows the average contribution of 369 other [Company] employees to the common account. There was no additional payment in place for these decisions.*
- Before you take your decisions, your manager must decide whether he / she pays the group member with the highest contribution to the common account an additional payment of €3 to the private account or whether he / she does not pay any additional payment. The additional payment costs the manager €5.
- You do not yet know how your manager decides and make your apportionment decision in the event that he / she pays the additional payment and in the event that he / she does not pay any.

B.2.1 Comprehension Questions

Please answer the following questions to ensure that you have understood the instructions of the experiment. If you are unsure, you can return to the instructions by clicking on "Back". When talking about your total income, please think of the sum of the income from the private account and the common account without the possible additional payment.

1. Assume that none of the group members (even you yourself) pay a contribution into the group account.
    - How high is your total income?
    - How high is the respective total income of the other two group members?
2. Assume that all three group members (also you yourself) each pay a contribution of 10 tokens into the group account.
    - How high is your total income?
    - How high is the respective total income of the other two group members?
3. Assume that you deposit 0 tokens into the common account and that the other two members of your group deposit 10 tokens each.
    - How high is your total income?
    - How high is the respective total income of the other two group members?
4. Assume that you pay 10 tokens into the common account and the other two members of your group each pay 0 tokens.
    - How high is your total income?
    - How high is the respective total income of the other two group members?

Assume that in a group, member A pays 0 tokens to the shared account, member B 5 tokens, and member C 10 tokens. Which member receives the additional payment of 3 tokens if the manager has selected this scheme? Member A / Member B / Member C

Is the additional payment scheme costly for the manager? Yes. The manager incurs costs of €5. / No. The manager incurs no costs.

Is your manager informed about other [Company] employees' contributions before making a decision on the additional payment? Yes. / No.

B.2.2 Contribution Decisions

When choosing the contribution to the common account, you determine how many of the 10 tokens you want to deposit into the common account. The deposit to your private

account is automatically the difference between 10 tokens and your contribution to the common account.

Please enter the amount you would like to pay into the common account (any whole-number value between and including 0 and 10 is possible), if ...

- ... the manager has not selected the additional payment
- ... the manager has selected the additional payment

Now you will be asked to fill in a contribution table. In the contribution table, you should specify how many tokens you want to pay into the common account for each possible (rounded) average contribution of the other two group members to the common account. So, depending on how much the others contribute on average, you must define your own contribution decision. For each average contribution of the other two group members, please indicate the amount you would like to pay into the common account (any whole-number value between and including 0 and 10 is possible; of course, you can also enter the same amount several times):

What is your contribution to the common account if the manager has not selected the additional payment and ...

- ... the other two group members deposit an average of 0 tokens.
- ... the other two group members deposit an average of 1 tokens.
- ... the other two group members deposit an average of 2 tokens.
- ... the other two group members deposit an average of 3 tokens.
- ... the other two group members deposit an average of 4 tokens.
- ... the other two group members deposit an average of 5 tokens.
- ... the other two group members deposit an average of 6 tokens.
- ... the other two group members deposit an average of 7 tokens.
- ... the other two group members deposit an average of 8 tokens.
- ... the other two group members deposit an average of 9 tokens.
- ... the other two group members deposit an average of 10 tokens.

What is your contribution to the common account if the manager has selected the additional payment and ...

- ... the other two group members deposit an average of 0 tokens.
- ... the other two group members deposit an average of 1 tokens.
- ... the other two group members deposit an average of 2 tokens.
- ... the other two group members deposit an average of 3 tokens.
- ... the other two group members deposit an average of 4 tokens.
- ... the other two group members deposit an average of 5 tokens.
- ... the other two group members deposit an average of 6 tokens.
- ... the other two group members deposit an average of 7 tokens.
- ... the other two group members deposit an average of 8 tokens.
- ... the other two group members deposit an average of 9 tokens.
- ... the other two group members deposit an average of 10 tokens.

Help option: The numbers in the left column are the possible (rounded) average contributions of the other two group members to the common account. You now have to specify how many tokens you want to deposit into the common account for each slider, provided that the others contribute the specified amount on average. You have to make an entry in each field. For example, you are to specify how much you contribute to the common account if the other group members deposit an average of 0 tokens into the common account; how many tokens you contribute if the others contribute an average of 1 token or 2 tokens or 3 tokens, and so on. You can enter any whole-number contribution from 0 tokens to 10 tokens in each field and, of course, the same amount several times.

B.2.3 Incentive Compatibility

Payout relevance of your decisions
After all study participants have made their decisions, one member is randomly selected in each group of 3. For the randomly selected member, only the contribution table filled in by him/her is relevant for decision making and payout. For the other two group members who have not been selected, only the contribution is relevant for decision-making

and payout. The average of the two contributions (rounded to the next whole number) then determines the relevant conditional contribution from the third member's contribution table. Of course, you do not yet know which of your contribution decisions will be randomly selected. You must therefore carefully consider both types of contribution decisions, as both can become relevant to you.

The following graphic (Figure A.1) is intended to visualize the decision-making situation. For the randomly selected person on the right, the conditional contribution from the contribution table is relevant. For the other two group members, the contribution is relevant for payout.

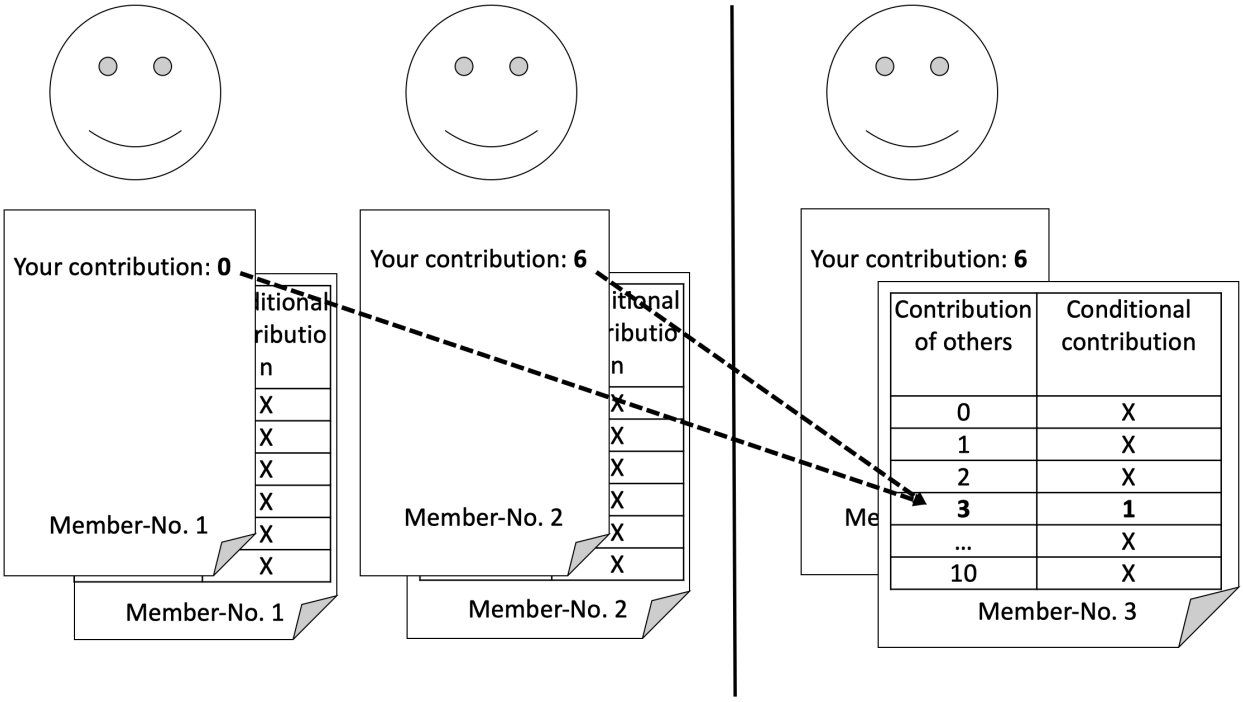

Figure A.1: Incentive Compatibility

B.2.4 Belief Elicitation

In addition to your earnings from your private and common account, you will receive a further payout for estimating the average contribution of the other two members of your group to your common account. Your payout will depend on how accurately you estimate the actual average contribution of your two group members. If you are exactly right, you will receive an additional €5. If your estimate differs by 0.5 or more tokens from the actual average contribution, you will receive €0. Please enter a number from 0 to 10 (each

number is allowed in steps of 0.5).

What do you think is the average amount of tokens your two group members contribute to the common account?

- If the manager has selected the additional payment: ...
- If the manager has not selected the additional payment: ...

What percentage of managers chooses the additional payment scheme? Please enter a number from 0% to 100% in steps of 5% points. If you are exactly right, you will receive €1.50. If your estimate is 5 percentage points or more away from the actual average value, you will receive €0.

Please enter a number from 0 to 10 for each of the next question (any number in steps of 0.5 is allowed). If you are exactly right, you will receive €1.00 each. If your estimate is 0.5 points or more away from the actual average value, you will receive €0.

What is the average expectation of the managers about the contribution of the group members to the common account if ...

- ... the manager has not selected the additional payment
- ... the manager has selected the additional payment

C Balance Tables

	INFO	NO INFO	P-Value
Age	44.83 (10.85)	43.13 (9.39)	0.678
Female	0.30 (0.47)	0.50 (0.51)	0.143
Seniority	12.31 (7.59)	11.17 (6.42)	0.523
Career Level			
Low	0.04 (0.20)	0.04 (0.21)	1.000
Medium	0.88 (0.28)	0.87 (0.34)	1.000
High	0.08 (0.28)	0.09 (0.29)	1.000
N	23	24	

Table A.4: Balance Table Managers

Notes: P-values rely on two-sample Mann-Whitney-U tests for continuous variables or on Fisher Exact tests for categorical variables. Career levels subsume several categories in each presented category. Job functions are not shown in the table because there exists too many categories, but there are no significant differences between treatment observable. Many managers have special bonus contracts such that I do not show the variable *Individual Performance Pay* here.

	INFO	NO INFO	P-Value
Age	36.70 (8.65)	35.57 (8.00)	0.252
Female	0.30 (0.46)	0.36 (0.48)	0.168
Seniority	4.97 (4.14)	5.19 (3.62)	0.243
Career Level			
Low	0.12 (0.33)	0.14 (0.35)	0.537
Medium	0.85 (0.36)	0.84 (0.37)	0.848
High	0.03 (0.17)	0.02 (0.12)	0.345
Indv. Perf. Pay	0.28 (0.45)	0.31 (0.47)	0.441
N	201	196	

Table A.5: Balance Table Employees

Notes: P-values rely on two-sample Mann-Whitney-U tests for continuous variables or on χ^2 -tests for categorical variables. Career levels subsume several categories in each presented category. Job functions are not shown in the table because there exists too many categories, but there are no significant differences between treatment observable.

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	(1) Belief	(2) Belief
I(INCENTIVE)	2.106***	2.188***
	(0.242)	(0.252)
I(INFO)	-0.406	0.242
	(0.434)	(0.506)
I(INCENTIVE)× I(INFO)	0.304	0.288
	(0.394)	(0.384)
Constant	4.954***	5.474***
	(0.314)	(0.366)
Observations	406	396
R^2	0.137	0.134

Table A.6: Treatment Effects on Beliefs by Self-Evaluation of Math Skills

Notes: For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. Standard errors are clustered on the subject level and are shown in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.