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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 from a large company. We exogenously vary whether managers are informed about prevailing cooperation levels among employees before they can set incentives to promote cooperation. In addition, employees matched to informed managers learn that the manager could base their incentive choice on cooperation levels. We find no evidence for the hypothesized signaling effect. Having an informed manager set the incentive does not change employees' beliefs about the cooperativeness of others. Incentives hence have strong positive effects on cooperative beliefs, irrespective of information. The absence of the signaling effect seems related to the perception of managers' intentions, a mitigating but understudied factor.

JEL-Codes: C910, D830, D910, D010.

Keywords: cooperation, incentives, signalling, crowding out, experiment.

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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., Fehr 2018; Gittell 2000). Implementing monetary incentives is a prevalent strategy of companies to cope with such conflict, but their effectiveness is still debated.[1] Recent research points out that incentives can induce unintended side effects that eventually impede their original purpose (Alfitian et al. 2021; Ashraf et al. 2020; Bowles and Polanía-Reyes 2012; Gneezy et al. 2011; Wagner et al. 2020).

One effect that is of particular relevance in the context of cooperation is that incentives convey information about typical behavior of others (e.g., Benabou and Tirole 2011; Sliwka 2007; Van der Weele 2012). 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 students 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 both endogenous, and whether such information is available to managers might be unknown to employees. This study combines a unique field setting with a controlled decision environment to overcome these issues. Our artefactual field experiment (Harrison and List 2004) creates exogenous variation in information (about the cooperativeness of employees) held by managers when choosing incentives. The measure of cooperativeness has been administered prior to our experiment in the sample population, but in a different sample, such that employees are unaware of its existence. This allows us to randomly inform employees that a measure of cooperativeness exists and that it was available to the managers when setting incentives.

[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).

We collaborate with a large company that relies heavily on the cooperative behavior of its employees and seeks to provide incentives to encourage cooperation. To study whether incentives work as signaling devices, we conduct an experiment with managers ($n = 47$) and employees ($n = 401$) from the company. Employees face a social dilemma situation in which the dominant strategy is to free-ride on the cooperative efforts of their colleagues. Managers benefit from high cooperation levels among employees and can implement a costly incentive to promote cooperation. Before they decide about the incentive, we 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, we notify those employees who will be matched with an informed manager that their manager has received information about cooperation levels before deciding whether to set the incentive.[3] This constitutes our INFO treatment that varies between employees and between managers. We use the strategy method to elicit employees' beliefs and behavior in case the manager has set the incentive, and in case the manager has not set the incentive. The presence or absence of the incentives hence varies within employees.

This design allows us to study beliefs and cooperation in three scenarios. First, we isolate the signaling effect of setting the incentive by comparing employees with information (about their informed managers) to those without information. Based on theoretical models by Sliwka (2007) and Van der Weele (2012), information could interact negatively with incentives, i.e., if informed managers introduce incentives, employees are expected to be less optimistic about others' cooperation. Second, we identify the signaling effect when incentives are not set. Employees with information should now be more optimistic than uninformed ones because they can interpret the absent incentive as a signal of high cooperation rates that requires no further action.[4] The last scenario we study is the incentive effect when managers (and employees) are not informed.

Starting with the last scenario, we find that incentives have strong positive effects on cooperation in NOINFO. In this case, incentives increase beliefs about cooperative behavior by 44% and cooperation rates by 24%. In contrast to our hypotheses, this increase in cooperative beliefs and behavior is the same in INFO and NOINFO, i.e., there is no evidence for negative signaling effects of incentives or positive signaling of absent incentives. This indicates that employees do not take into account the potential information conveyed by the managers' incentive choices. In addition to these main effects, we ex-

[3]Note that employees are informed about the fact that managers learned about cooperation rates but not what the cooperation rates are. We present details and explain this design choice in Section 2.3.

[4]See Danilov and Sliwka (2017) for an empirical demonstration of this positive signaling effect in a laboratory principal-agent setting.

amine treatment effect heterogeneity along two dimensions, lower seniority and better understanding of the experiment. For these subgroups, we expect stronger reactions to the INFO treatment: lower seniority might imply a less precise prior, and hence more updating (Alfitian et al. 2021; Danilov and Sliwka 2017) and better understanding should reduce the noise in the responses. For both dimensions, we find some evidence for a *positive* signaling effect when incentives are set.

To better understand these results, we explore employees' beliefs about managers and the actual behavior of managers. It appears that the absence of a signaling effect is driven by the employees' interpretation of the managers' decision-making. Employees do not expect managers to choose incentives to maximize their own monetary benefit. Instead, they consider managers more likely to choose the costly incentive when managers expect higher levels of cooperation. Hence, employees appear to interpret managers' choices to "reward" cooperation through incentive provision. Managers, in turn, update their beliefs based on the information received, but the majority does not maximize their own payoff. Even with high beliefs about cooperation rates, managers choose to pay to set the incentive. Our preferred interpretation is that managers use the incentive as a coordination device or to show that they also contribute, consistent with the company's cooperative culture. Overall, our results highlight the importance of the general relationship between management and employees for the effectiveness of incentives.

Our findings relate to a large influential literature in economics and management 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 social behavior because they provide information about the person who sets the incentive, such as selfish intentions (e.g., Fehr and List 2004; Fehr and Rockenbach 2003) or his or her knowledge about the task (e.g., Benabou and Tirole 2003; Bremzen et al. 2015; Deserranno 2019). Another channel that this literature has studied is the signaling of principals' private information about social norms. In the experimental laboratory, Danilov and Sliwka (2017) investigate the 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 using incentives to increase truthful behavior in a reporting task signals that other agents were likely to report dishonestly before. Both studies differ from our design by analyzing individual decisions in the lab rather than interactions of multiple agents.[5] Galbiati et al. (2013) use a two-agent

[5]This implies that in both studies information about prevalent behaviors must affect agents' behavior via conformity preferences (Sliwka 2007) or social esteem (Benabou and Tirole 2011) of agents, rather than

minimum effort game and vary whether sanctions are endogenously set by an informed principal or exogenously set by the experimenter. They find that exogenous sanctions are more effective in enforcing high effort because they do not contain a negative signal. Our study contributes to this literature by providing a unique test environment of signaling effects where previous real-life experiences may matter. Our results on the signaling hypothesis are particularly informative because they point to important contextual factors that render signaling and crowding out effects more or less likely to occur.

2 Experimental Design

2.1 Setting and Sample

We conduct this study in partnership with a large software company. In most tasks within the company – reaching from software development, consulting, and sales to service activities (e.g., human resource management) – cooperation is essential to maximize the joint production output of work teams. 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 public goods experiment in which a total of 369 employees participated.[6] The data revealed high levels of cooperation (on average 79% of the endowment) and high expectations about others' cooperation behavior that were however significantly lower than actual cooperation rates (on average 66% of the endowment).[7] 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 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.

through reciprocity (Van der Weele 2012) or effort complementarities (Friebel and Schnedler 2011) as in our setting.

[6]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 maximization and collective efficiency maximization. In the game each player has a dominant 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 (Bolton and Ockenfels 2000; Charness and Rabin 2002; Fehr and Schmidt 1999).

[7]The level of cooperation is higher than in comparable lab experiments. While players in the public good game are anonymously matched and, due to the size of the company, are unlikely to be matched to their team members, all players are aware that they are playing with fellow employees. High cooperation rates may hence be explained by an in-group effect and/or the corporate culture.

The experiment of the current study takes place after Deversi et al. (2020), but precedes any announcement of the results to company employees. Invitations for our study were sent two months after the completion of Deversi et al. (2020). Participants of both studies are drawn from the same population but constitute separate and non-overlapping samples. While both studies examine cooperation, ours is explicitly designed to test the signaling effect with an experimental manipulation. The role of the manager is unique to our study. In contrast, Deversi et al. (2020) focus on the levels of cooperation, changes in cooperativeness when the returns to cooperation change, and how cooperation relates to characteristics of employees and their jobs such as the performance pay scheme or non-monetary rewards for cooperation they receive within the company. We use one of their results as our INFO treatment. Further, we employ a similar calibration and stake size as additional findings from Deversi et al. (2020) show that employees are responsive to this level of payments.[8]

The company actively propagates a pro-social management style, trying to establish "empathic leadership". This is why the company was not interested in exploring punishment for non-cooperation but wanted to focus on rewards-based incentives. The cooperative culture and the corresponding leadership style are also reflected in managers being more likely to be contributors than non-managing employees (Deversi et al. 2020). Managers appear to actively set examples for the culture they are trying to establish. Moreover, managers value cooperation: In a survey conducted by the company, the median agreement of managers to "People in my team cooperate to get the job done" was 89 out of 100.

Table 1 presents the characteristics of the 47 managers and 401 employees who participated in our experiment. Both 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 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.

[8]In their public goods game, a substantial share of participants reacted to variations in the marginal per capita return of contributions in the common account. In addition, in a surprise donation option at the end of their experiment, most participants decided to keep the final payoff for themselves rather than donate it to a charity.

Table 1: Participants' Characteristics

	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	0.79	0.41	0.70	0.46
Individual	0.21	0.41	0.30	0.46
Observations	47		401	

2.2 Experimental Game

In the experiment, three randomly and anonymously matched employees play a public goods game. Each employee receives an initial endowment of 10 Tokens (1 Token = € 1) to be allocated between a private account and a common account. 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 0.5 of the total sum of contributions.

In addition, we anonymously match one manager to each group of employees. Managers earn a fixed amount of 15 Tokens and a variable pay equal to 0.5 of the sum of contributions. They cannot contribute. Before employees act, managers decide whether to give up 5 of their Tokens to set a monetary incentive for employees (called 'Conditional Payment' in the instructions). If the incentive is chosen, the employee with the highest contribution to the common account receives an additional payment of three tokens.[9] If more than one participant contributes the highest amount, the three tokens are evenly distributed among the highest contributors. We focus on this particular incentive because it is a policy that the upper management was interested in implementing.[10] The idea was to introduce a tournament incentive that rewards the most cooperative employee within

[9]Note that individual contributions cannot be observed by the manager. In this regard, our design differs from studies that explicitly vary audience effects. For example, Filiz-Ozbay and Ozbay (2014) find that observability by a third party does not influence public good contributions.

[10]Similar relative rewards for cooperation have been analyzed by Irlenbusch and Ruchala (2008).

each team. Within the company, cooperation would be measured by the number of received peer-to-peer recognition awards that can be sent within the company's intranet.

If the incentive is not implemented, the standard social dilemma equilibrium arises, i.e., it is welfare-efficient if each member contributed their whole endowment, but it is individually optimal to contribute nothing. If the incentive is implemented, contributing zero is not a Nash Equilibrium in pure strategies anymore.[11] Maximum contributions remain welfare-efficient. Overall, the incentive increases the expected payoff from contributing to the common account without affecting the action space of players. From the managers' perspective, the cost of the incentive will only be recovered if the sum of contributions increases by at least 10 Tokens (as this will earn them five Tokens). This implies that 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).

We use the strategy method to elicit employees' decisions conditional on the incentive choice by the manager. Within a given incentive setting, we first elicit employees' contribution to the common account (*unconditional contribution*). Second, we 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.[12] Third, we elicit their belief 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.[13]

Finally, we ask two further questions that capture employees' beliefs about managers' incentive choice and their beliefs about managers' expectations of the contribution behavior of employees. Both questions are incentivized by providing €1.5 for a correct

[11]There only exists an equilibrium in mixed strategies that include contributions larger than zero, such that in expectation, participants have a higher incentive to cooperate.

[12]To address the concern that this procedure may be confusing (Burton-Chellew et al. 2016), we compare the unconditional contribution to the conditional contribution at the level that the participant indicated as their belief. For conditional cooperators, the difference between the two contribution choices should be zero. We find that the median difference for conditional cooperators is indeed zero and the average absolute distance is smaller than 1.5.

[13]Note that payoffs from the belief elicitation are quite high relative to payments in the experimental game. While this reduces concerns about consistency effects or ex-post rationalization of behavior, it might give rise to an additional coordination game in which everyone contributes zero and receives the belief incentives. To mitigate these potential effects, beliefs were elicited only after unconditional and conditional contribution decisions were made and the belief elicitation was not announced before making contributions.

response. A full list of elicited variables, including additional, post-experimental survey variables, can be found in Appendix C.

2.3 Treatments and Hypotheses

The critical feature of our experiment is the information structure. Generally, there exists uncertainty about employees' behavior in the game. We provide information on average unconditional contributions measured by Deversi et al. (2020) to managers in INFO, but not in NO INFO. Prior to making the 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.[14]

> *"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 2: Treatment Overview

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

Table 2 summarizes the design that creates a setting in which the manager benefits from cooperation and in which we use the INFO treatment to vary whether asymmetric

[14]For employees in INFO, the treatment information was mentioned 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 we asked a question on whether the manager has been informed. Note that employees in NO INFO are not prompted to think about prevailing cooperation levels. Else, we would have needed to explicitly state that managers were not informed about cooperation, which might have induced experimenter demand effects. We hence opted for the current design.

information about the status quo of cooperation exists. The design enables us to measure the beliefs and cooperation of employees under different information sets of the managers while holding incentive choices constant. The INFO treatment is randomized between subjects. Table A.1 shows that employees' observable characteristics are balanced across the INFO and NO INFO treatment.

While actual contribution behavior might also be influenced by other factors, our treatment should directly affect employees' beliefs about cooperation. Beliefs about the cooperation of other employees are thus the primary focus of our analysis.[15] To derive testable predictions, we assume that employees update their beliefs in a Bayesian fashion and that they are either individual payoff maximizers or conditionally cooperative. We further assume that employees believe that managers maximize their own payoffs and set incentives to enhance cooperation.

Without additional information, employees should then be more optimistic about others' cooperativeness if the incentive is in place, as selfish employees may be steered away from free-riding and conditional cooperators will cooperate more.

Hypothesis 1: *In* NO INFO*, employees' average beliefs about others' contributions are higher in* INCENTIVE *than in* NO INCENTIVE*.*

With informed managers in INFO, the absence of incentive implies that contribution levels observed by the manager have been sufficiently high, as otherwise, it would have been worth to incur the cost of implementing the incentive.

Hypothesis 2: *With* NO INCENTIVE *in place, employees' average beliefs are more optimistic in* INFO *compared to* NO INFO*.*

Conversely, observing the incentive in INFO should reflect the information that contribution levels observed by the manager have been sufficiently low, such that it was worth

[15]Cooperation decisions are more complex as they not only depend on beliefs but also on cooperative types. For conditional cooperators, beliefs should correspond to actions, but this may not be true for selfish types. Further, while the negative signaling effect of incentives can be unambiguously seen in beliefs, equilibrium behavior in INCENTIVE/INFO is less straightforward. For example, inferring from the incentive that cooperation rates are low, employees might increase their contributions if the perceived likelihood of receiving the incentive is now larger.

it to incur the cost to implement the incentive.[16]

Hypothesis 3: *With an* INCENTIVE *in place, employees' average beliefs are more pessimistic in* INFO *compared to* NO INFO.

2.4 Procedures

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

We conducted the experiment in the spring of 2019 using the software Qualtrics. We invited 1,500 potential participants via e-mail with a personalized link. Participation took place in a two-week time period. 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.

Payout calculations and matching of managers and employees were administered ex post. While there was no feedback during the experiment, participants received payoff information afterward via a website created solely for this purpose. We asked participants to perform all experimental tasks individually and groups were randomly allocated to avoid coalition formation. A double-blind procedure ensured the anonymity of all managers and employees. Approval from the ethics committee at the University of Munich has been granted in January 2019 and our analyses have been pre-registered at the AEA RCT registry (AEARCTR-0003931).

[16]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, we 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.

3 Results

3.1 Main Effects on Beliefs

As described in our hypotheses, employees' beliefs about others' contributions are a crucial indicator of the mechanisms at work in the incentive and information conditions. Figure 1 presents the respective treatment comparisons.[17] 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 (Mann-Whitney U Test (MWU), $p = 0.236$).[18] The individual within-subject difference in beliefs between the two incentive 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.[19] 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 2 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, we do not find an indication of this effect. Both distributions appear very similar to each other and do not clearly diverge (Kolmogorov-Smirnov Test, $p = 0.402$).

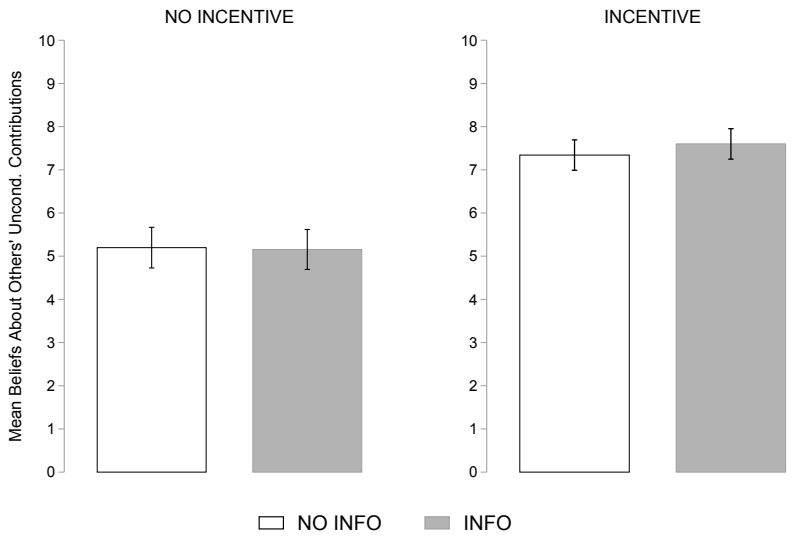
The estimation results in Column (1) of Table 3 confirm the non-parametric analyses. Here, we regress beliefs on treatment dummies. The OLS regression pools all decisions in the strategy method and clusters standard errors on the participant level. While the incentive significantly increases beliefs 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 effect of the treatment

[17] Cooperation decisions are in line with beliefs (i.e., higher beliefs lead to larger contributions) and are presented in Appendix B.

[18] Completion times show that participants in INFO took longer to read and complete the experiment (MWU, $p = 0.005$), indicating that employees paid attention to the information.

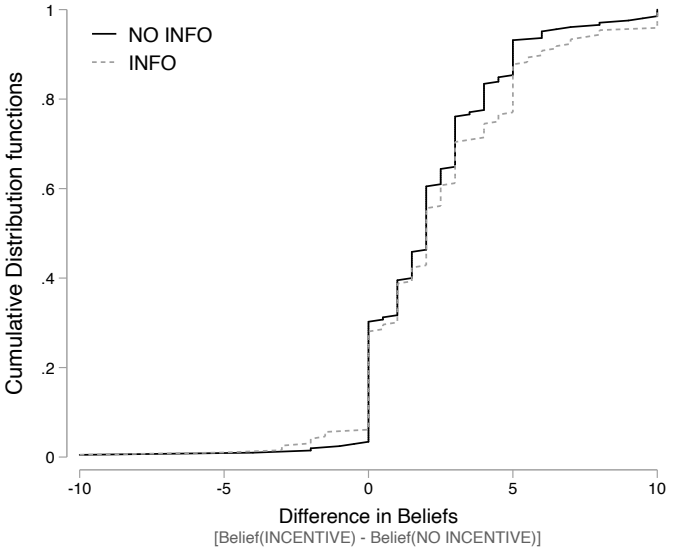
[19] This null result does not seem to be driven by low statistical power. In our *ex-ante* power analysis, we calculated a required sample size of 368, whereas our final sample size is 402. In the *ex-post* power calculation, given our sample size and the measured standard deviations in the belief difference between the incentive states, we 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 1: Average Treatment Effects on Employees' Beliefs



Notes: Mean belief of employees about the unconditional contribution decision of the other group members and 95% confidence intervals.

Figure 2: Treatment Effects on Employees' Belief Difference



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.

interaction is robust to controlling for a wide range of employee characteristics including *gender*, *age*, *seniority*, *incentive scheme*, *career level*, and *job function*, as shown in Column (2).

The null effect of INFO is surprising for two reasons. First, in comparison to standard student subject pools, employees in our study have a high average education level

including many employees with a PhD in natural sciences. The lack of strategic sophistication is hence unlikely to explain the absence of a signaling effect.[20] Second, the use of the strategy method makes it *more* likely to find an effect as inference is easier: Danilov and Sliwka (2017) find strong signaling effect using the strategy method and Cardinaels and Yin (2015) even argue that "[...] the strategy method may signal to agents that the experimenter wants them to infer information from contract choices" (p. 1012).

Table 3: Beliefs: Main Treatment Effects and Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)
I(INCENTIVE)	2.144***	2.172***	2.329***	2.000***	2.642***	2.640***
	(0.174)	(0.179)	(0.235)	(0.278)	(0.180)	(0.184)
I(INFO)	-0.0419	-0.0442	-0.654	0.454	-0.291	-0.346
	(0.335)	(0.339)	(0.486)	(0.472)	(0.340)	(0.346)
I(INCENTIVE×INFO)	0.300	0.294	0.712*	-0.0144	0.563**	0.620**
	(0.274)	(0.283)	(0.382)	(0.418)	(0.280)	(0.289)
Constant	5.198***	4.912***	4.677***	5.955***	4.559***	4.230***
	(0.239)	(0.494)	(0.662)	(1.072)	(0.251)	(0.488)
Sample	All	All	Lower Seniority	Higher Seniority	Correct Interpret.	Correct. Interpret.
Controls	No	Yes	Yes	Yes	No	Yes
Observations	802	784	384	400	640	628
R^2	0.131	0.156	0.198	0.168	0.220	0.243

Notes: The dependent variable is beliefs about average unconditional contributions of the group members. For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. The omitted category is No Info and No 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; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.2 Treatment Effect Heterogeneity

Following Alfitian et al. (2021) and Danilov and Sliwka (2017), one may expect that employees who 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 (3) and (4) of Table 3, we show OLS regressions for employees whose seniority is above and below the

[20] Appendix Table A.2 tests this more formally, showing that self-assessed math skills as a proxy for strategic sophistication (e.g., Czermak et al. 2016) are not a significant dimension of treatment effect heterogeneity.

median seniority level, respectively. For less senior employees, the interaction effect of the incentive choice and the information treatment is positive and marginally significant. Less senior employees exhibit a small tendency to infer relatively high cooperation rates from managers setting the incentive. For more senior employees, the interaction is very close to zero and insignificant, and a Wald-test rejects the equality of the two coefficients for high and low seniority.

Another important dimension of potential treatment effect heterogeneity is employees' interpretation of the manager's intention when choosing the incentive.[21] We find that 21% of employees believe that their manager does not expect higher cooperation levels from setting the incentive, or even negative effects. Focusing only on employees who believe that their manager sets the incentive to increase cooperation, Columns (5) and (6) in Table 3 provide results analogous to the first two columns. Contrary to our Hypothesis 3, the positive interaction effects *increase* compared to the full sample estimates. The signaling effect on beliefs captured by the interaction term is now statistically significant at the 5% level. These effects are robust to the inclusion of controls (Column 6). Employees infer high contribution levels from managers who select the incentive.

4 Exploring the positive signaling effect

4.1 Employees

What reasoning do employees expect from managers that can explain the positive signaling effect evident in beliefs?[22] In Figure 3a, we correlate the expected likelihood of the manager setting the incentive with employees' beliefs about the manager's expectation of the unconditional contribution levels.[23] If employees perceive the managers as individual profit-maximizers who trade off the expected incentive effect against its costs, one would observe a positive relationship between both variables. However, we 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 could fulfill a selfish purpose. This can explain the overall null result but not the observed tendency that signals crowd-in beliefs.

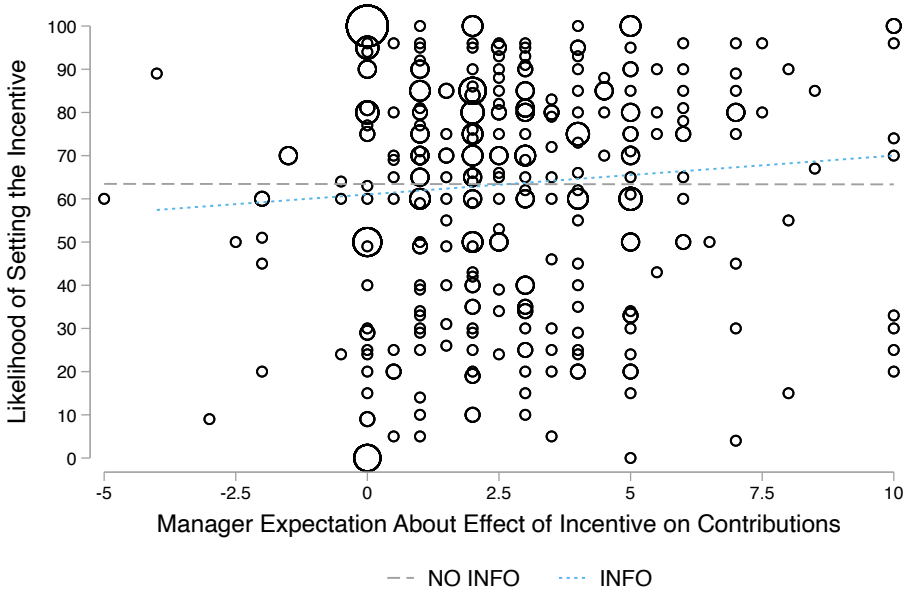
[21] The following is a post-hoc test that was not pre-registered.

[22] As indicated in the heading, this section is exploratory in nature to better understand the results. Further studies will be needed to corroborate the findings presented here.

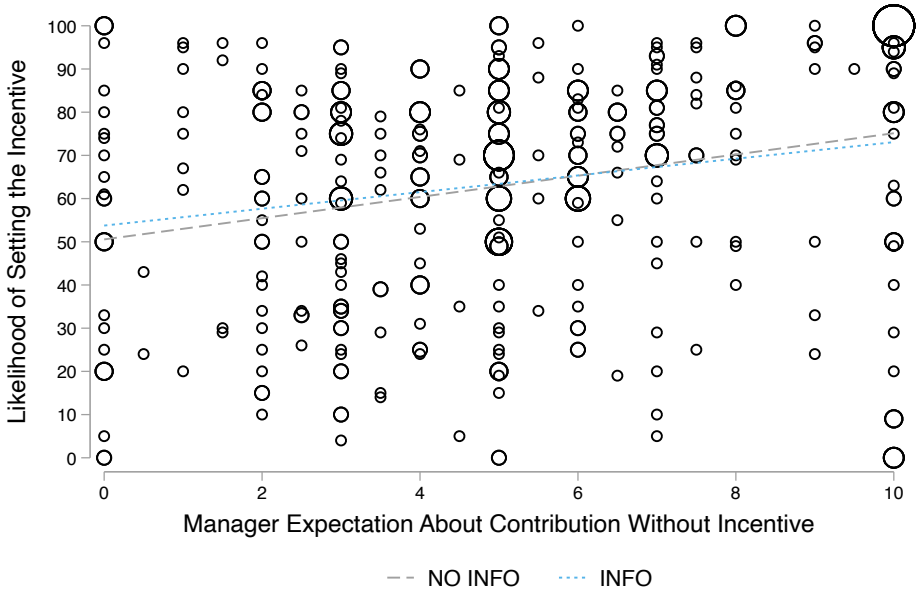
[23] There are no significant differences in these second-order beliefs between INFO and NO INFO (MWU, $p = 0.400$) corroborating the null result further.

Figure 3: Employees' Beliefs About Managers

(a) Managers' Incentive Choice and Expected Incentive Effect



(b) Managers' Incentive Choice and Expected Contribution



To analyze the latter, we correlate employees' beliefs about the likelihood of setting the incentive with their beliefs about the manager's expectation of the unconditional contribution level without the incentive in place in Figure 3b. While one would expect a downward-sloping relationship in line with payoff maximization, we find the opposite. A standard deviation increase in the belief about the manager's expectation increases the belief about the likelihood of incentive selection by 2.5%-points (t-test of the regression coefficient, $p < 0.001$).

It appears that employees expect managers reciprocally provide rewards for high expected levels of cooperation. This effect is unlikely driven by managers reciprocating to high benefits from the common account. Employees knew that the information provided to managers stemmed from a distinct sample of employees and that they were randomly matched to a manager only after the experiment took place. However, it could be related to a general expectation regarding managers' reciprocity that is grounded in past experiences with managers of the company. If employees think that managers provide incentives based on high expectations about cooperation among employees, incentive provision signals high contribution levels and could, in turn, explain the belief update observed in Table 3. This interpretation is in line with the cooperative culture of the company.[24]

4.2 Managers

While the signaling effect of incentives hinges on the beliefs of employees, we can also examine managers' behavior. We first note that managers update their beliefs when receiving information. Figure A.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, we reject that beliefs in both conditions are from the same underlying distribution (MWU, $p = 0.001$). After receiving information, managers are well calibrated: In NOIN-

[24]This cooperative culture is also reflected in higher contributions than in one-shot lab experiments (see, e.g., the meta-analysis of Zelmer 2003).

CENTIVE/INFO, managers' beliefs correspond to actual contributions in our experiment (WSR, $p = 0.48$).[25]

Despite the belief update in INFO, we do not find a statistically significant difference in managers choosing the incentive in INFO vs NOINFO (Fisher exact test, $p = 0.245$). This is likely driven by a combination of the small sample size and the fact that the majority of managers choose the incentive: 91% in NOINFO and 75% in INFO. Importantly, holding beliefs according to which incentive setting would be payoff-maximizing, does not make managers more likely to use the incentive: Using incentivized beliefs about contributions with and without the incentive in place, we can determine on the individual level whether a manager would maximize their payoff by setting the incentive. Setting the incentive is only payoff-maximizing if expected average contributions without the incentive are below 6.67 Tokens, and the difference between expected contributions with the incentive and without the incentive is at least 3.34 Tokens. We find that only eight of the 47 managers hold beliefs that make incentive setting monetarily beneficial, and that these managers are not more likely to set the incentive (Fisher exact test, $p = 1$).

We explore other potential explanations for incentive setting, none of which appears to hold. Managers do not lack sophistication. Over 80% have a PhD or Master's degree and education is weakly *positively* correlated with incentive setting (see Column 2 of Table A.3). Social preferences (altruism and reciprocity) do not appear to matter, i.e., managers do not seem to compensate the group member that suffers the most from free-riding (see Columns 3 and 4 of Table A.3). Beliefs about contributions and expected effects of setting the incentive do not correlate with incentive setting, which speaks against strategic behavior (see Columns 5–7 of Table A.3). We also note that managers do not choose randomly and hence conclude that managers actively and consciously choose the incentive.

While the sample size is too small to conclusively investigate managers' motives behind setting incentives, our preferred interpretation is in line with the cooperative culture of the company: Managers use incentives as a costly signal that they contribute as well and/or as a coordination device for conditional cooperators (see, e.g., Cooter 1998). Importantly, managers do not expect negative signaling effects from setting the incentive (see Figure A.2) and this is in line with employees' beliefs and behavior. Overall, it appears that the company successfully established a setting in which incentives can be used to further increase cooperation without a backlash.

[25]While managers receive information about the average past behavior of a different sample from the same population, there is no reason to expect average behavior in this experiment to differ. This finding empirically supports this assumption.

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, we find that setting an incentive to cooperate significantly increases cooperation among employees of a large software company.

Further analyses suggest that the absence of a signaling effect in our setting relates 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 some employees infer high cooperation levels from incentives set by informed managers.

We study 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 our setting, it appears that incentives are perceived (and used) as rewards. 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 needed. An additional question for future research that arises from our setting is whether companies can prevent the 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 creating a perception among employees that the management pursues benevolent management strategies.

Finally, it must be noted that in most field experiments there exists a trade-off between using more artificial designs to discover causal mechanisms underlying the data and more natural designs that allow for bigger picture analyses (Deversi et al. 2020). Our 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 held by the management (Bowles and Polanía-Reyes 2012), into account.

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A Additional Tables and Figures

Table A.1: Balance Table

	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	

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 three 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.

Table A.2: Treatment Effect Heterogeneity in Beliefs by Self-Assessed Math Skills

	(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)
Sample	Below median math skills	Above median math skills
Observations	406	396
R^2	0.137	0.134

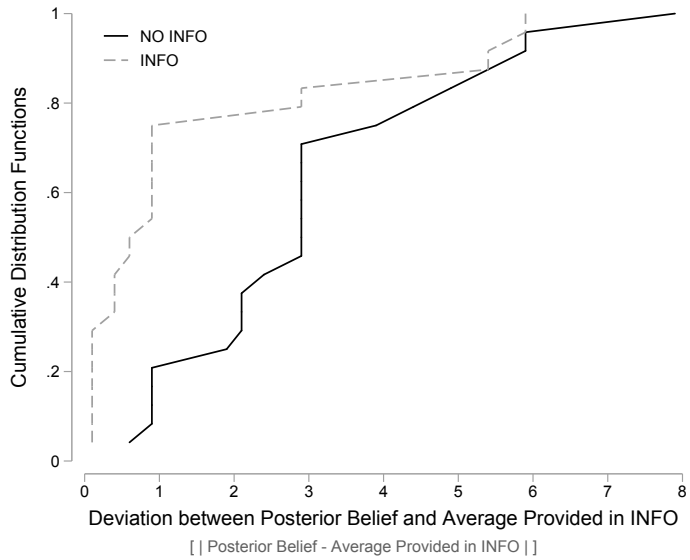
Notes: The dependent variable is beliefs about average unconditional contributions of the group members. For each employee and dependent variable two entries are observed: one entry under the incentive and one without the incentive. Standard errors are clustered on the subject level and are shown in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Correlates of Incentive Setting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Info	-0.16						
	(0.11)						
Education		0.15*					
		(0.07)					
Altruism			0.01				
			(0.02)				
Reciprocity				-0.02			
				(0.03)			
Beliefs about contributions (no inc)					-0.00		
					(0.02)		
Second order beliefs (no inc)						0.02	
						(0.02)	
Diff in contribution beliefs							0.02
							(0.03)
N	47	47	46	47	47	47	47

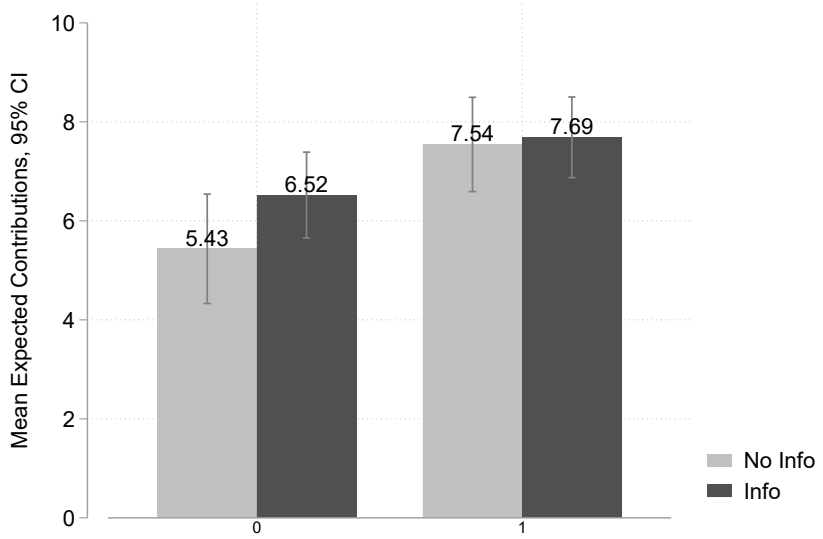
Notes: The dependent variable is a binary indicator for setting the incentive. *Info* is an indicator for the information treatment that was administered between subjects. *Education, altruism, and reciprocity* are elicited in a post-experimental survey (see also Appendix C). Marginal effects of probit regressions without control variables (to avoid overfitting) and standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.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.

Figure A.2: Managers' Expected Contribution



B Cooperation Decisions

Main Effect Table B.4 presents the unconditional contribution decisions following the logic of Table 3. Columns (1) and (2) provide estimates for the entire samples, without and with controls, respectively. In line with the beliefs, the incentive decision induces a statistically significant increase in unconditional contributions by 23% (1.5 Tokens), but there is no statistically significant effect of the information treatment or the treatment interaction. As shown in Column (2), 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*.

Table B.4: Unconditional Contributions: Main Treatment Effects and Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)
I(INCENTIVE)	1.346***	1.376***	1.369***	1.393***	1.580***	1.589***
	(0.216)	(0.219)	(0.278)	(0.331)	(0.238)	(0.242)
I(INFO)	-0.226	-0.168	-0.176	-0.303	-0.319	-0.269
	(0.363)	(0.364)	(0.433)	(0.667)	(0.403)	(0.402)
I(INCENTIVE×INFO)	0.391	0.329	0.692*	-0.468	0.668*	0.633*
	(0.319)	(0.326)	(0.412)	(0.504)	(0.355)	(0.366)
Constant	6.744***	6.552***	6.524***	6.497***	6.379***	5.919***
	(0.248)	(0.528)	(0.573)	(1.083)	(0.277)	(0.570)
Sample	All	All	Company Pay	Individual Pay	Correct Interpret.	Correct Interpret.
Controls	No	Yes	Yes	Yes	No	Yes
Observations	802	784	552	232	640	628
R^2	0.055	0.092	0.120	0.111	0.085	0.126

Notes: The dependent variable is unconditional contributions. 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; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

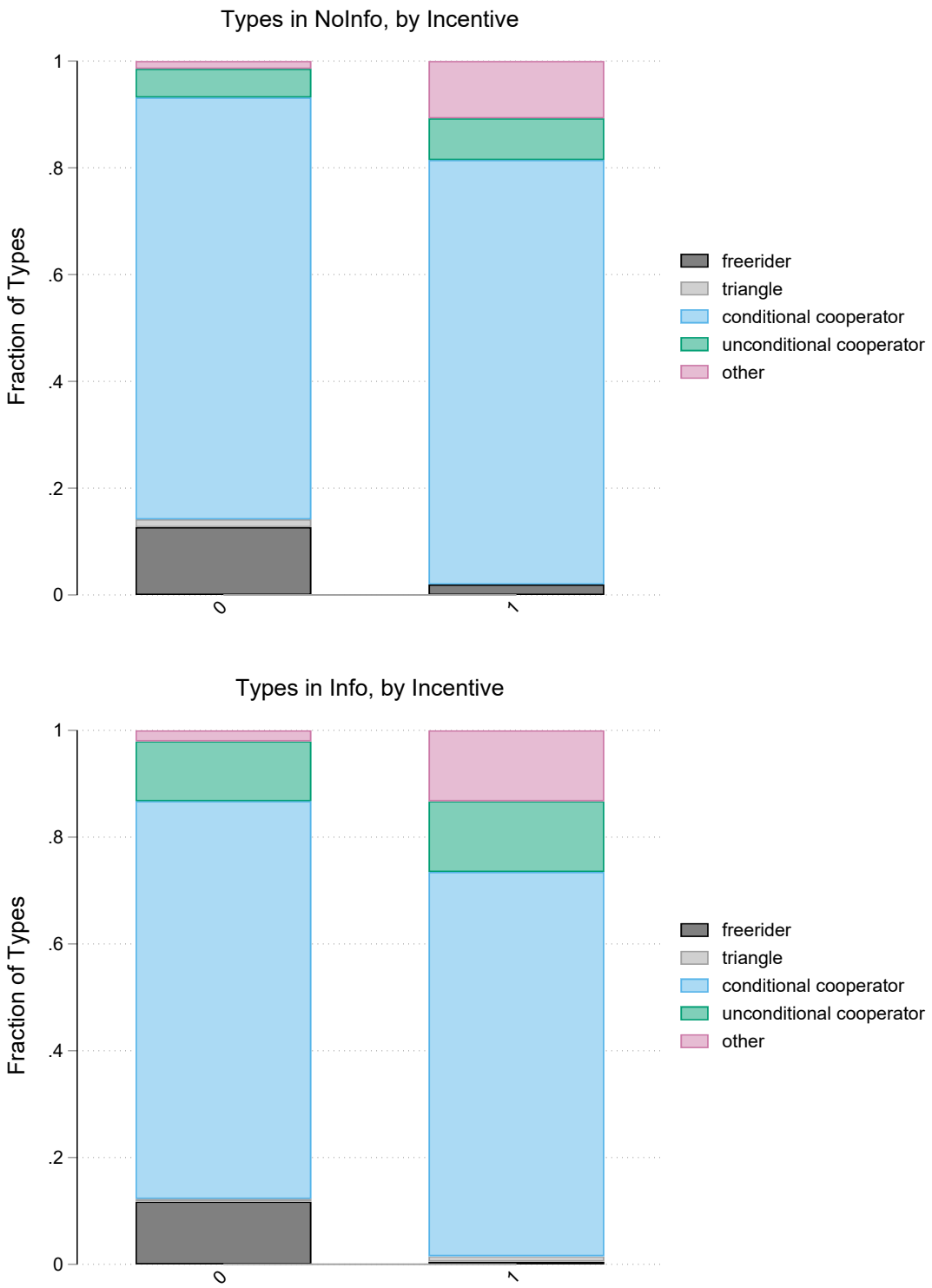
Treatment Effect Heterogeneity One may expect that employees with strong reciprocity preferences react more strongly to a belief update. Using data from the previous study, we observe that employees working under individual performance pay are less likely to be conditional cooperators than employees under company performance pay (MWU, $p = 0.028$). As shown in Columns (3) and (4) of Table B.4, we observe that for employees

in the company performance pay scheme the coefficient is positive and marginally significant, whereas for employees in the individual performance pay scheme, the coefficient of the treatment interaction is negative. Columns (5) and (6) show conditional contributions for those who expect the managers to set incentives to increase cooperation. In line with the positive signaling effect we observe in beliefs, we see weak evidence for crowding in.

Types We follow Thöni and Volk (2018) and classify types based on conditional contributions. *Freeriders* never contribute, whereas *unconditional cooperators* always contribute the same positive amount. *Conditional cooperators* have a weakly increasing conditional contribution schedule and *triangle cooperators* have a weakly increasing contribution schedule up to a certain point, after which the schedule becomes weakly decreasing. Everyone who is not classified as one of these types belongs to the *other* type. Figure B.3 presents the distribution by treatment. In both NOINFO and INFO, the incentive reduces the fraction of free-riders (from 13% to 2% in NOINFO, and 12% to 1% in INFO) and increases the fraction of others. Consistent with our main results, the type distribution is similar when comparing the information treatments.

In addition, we estimate the slope of individual contribution schedules and compare the slope parameters across treatments. We find no difference between the parameters in INFO as compared to NOINFO, neither absent the incentive (t-test, $p = 0.27$), nor with the incentive (t-test, $p = 0.32$). However, when incentives are in place, the slope is less steep. This can be explained by higher contributions induced by the incentive (see also Table B.4) that flatten the contribution schedule.

Figure B.3: Distribution of Types



C Overview of Variables

C.1 Company Records

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 employees (describes contribution based on 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

C.2 Experiment

Variable	Scale	Description
Employees		
contribute	ratio	Unconditional contributions with and without the incentive
x-contribute	ratio	Contribution conditional on x contributed by other team members with and without the incentive
belief contribute	ratio	Belief about average contribution of the other team members with and without the incentive
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
2nd order belief	ratio	Belief about employees' beliefs about contributions of others with and without the incentive

C.3 Survey

Variable	Scale	Description
altruism	ordinal	Social preference measure indicating the participant's tendency for altruistic behavior
neg. reciprocity	ordinal	Social preference measure indicating the participant's tendency for negative reciprocity
pos. reciprocity	ordinal	Social preference measure indicating the participant's 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 participant's number of friends

D Instructions

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

D.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. They can put the 10 tokens into a private account, or can deposit them in whole or in part into a joint account. Any tokens that they do not deposit into the joint account are automatically added to their respective 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 joint 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 joint account: For each token that is added to the joint 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 joint 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 joint 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 joint 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 joint account.
- Each group member earns one euro for the tokens in the respective private account and €0.50 for each contributed token in the joint account.
- You as a manager earn €0.50 for each token contributed in the joint account. You cannot contribute tokens to the community account.
- The manager knows the average contribution of 369 other [Company] employees to the joint 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 joint 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 joint account.*

D.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 + joint account) of a group member in tokens?
- What is your income from the group's joint 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 + joint account) of a group member in tokens?
- What is your income from the group's joint 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

D.1.2 Incentive Choice and Belief Elicitations

Please choose whether you want to pay the member with the highest contribution to the joint 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 joint account, you will receive a further payout for estimating the average contribution of the other two members of your group to your joint 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 joint account with additional payment?
- What do you think is the average contribution of your group members' tokens to the joint account without additional payment?
- What is the average expectation of the group members about the contribution of the other group members to the joint account with additional payment?
- What is the average expectation of the group members about the contribution of the other group members to the joint account without additional payment?

D.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 joint account. Any tokens that you do not deposit into the joint 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 joint 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 joint account: For each token that is added to the joint 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 joint account. For example, if the sum of all three group members' contributions to the joint account results in 30 tokens, then you and the other two group members each receive 30 x 0.5 = €15 from the joint account. If the three group members pay a total of 10 tokens into the joint account, you and the other two group members receive 10 x 0.5 = €5 each from the joint account.

Income of your 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 joint 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 joint 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 joint 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 joint 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 joint account.
- Each group member earns one euro for the tokens in the respective private account and €0.50 for each contributed token in the joint account.
- The manager also earns €0.50 for each token contributed in the joint account. He / she cannot contribute tokens to the community account.
- *The manager knows the average contribution of 369 other [Company] employees to the joint 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 joint 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.

D.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 joint 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 joint 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 joint 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.

D.2.2 Contribution Decisions

When choosing the contribution to the joint account, you determine how many of the 10 tokens you want to deposit into the joint account. The deposit to your private account is automatically the difference between 10 tokens and your contribution to the joint account. Please enter the amount you would like to pay into the joint 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 joint account for each possible (rounded) average contribution of the other two group members to the joint 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 joint 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 joint 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 joint 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 joint account. You now have to specify how many tokens you want to deposit into the joint 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 joint account if the other group members deposit an average of 0 tokens into the joint 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.

D.2.3 Incentive Compatibility Display

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 D.4) 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.

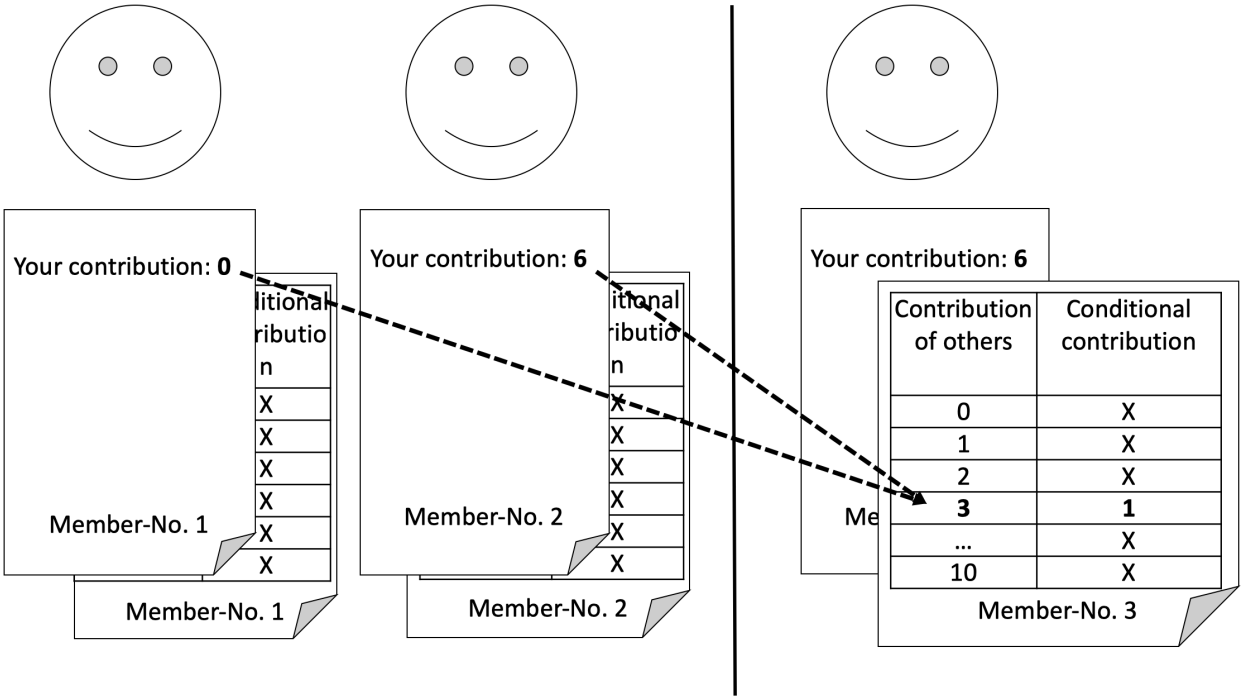


Figure D.4: Incentive Compatibility

D.2.4 Belief Elicitation

In addition to your earnings from your private and joint account, you will receive a further payout for estimating the average contribution of the other two members of your group to your joint 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 joint 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 joint account if ...

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