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Abstract

In this article we examine the influence of two goal compensation schemes on lying behavior. Based on the die rolling task of Fischbacher/Föllmi-Heusi (2013), we apply an individual goal incentive scheme and a team goal incentive scheme. In both settings individuals receive a fixed bonus when attaining the goal. We find that under team goal incentives subjects are less inclined to over-report production outputs beyond the amount which is on average necessary for goal attainment. Investigating subjects' beliefs on their team mates' behavior under team goal incentives reveals that subjects who either believe that lying is not profitable (i.e., the team goal cannot be reached with a lie) or not absolutely necessary (i.e., there is a good chance that the team goal can also be reached without lying) tend to be honest. We also find that subjects who believe that the team goal has already been reached by their team mates tend to over-report production outputs. Across treatments, women are found to be more honest than men. Subjects' personality is not associated with reported production outputs. Our work contributes to previous research on how different compensation schemes affect unethical behavior in organizational settings.

JEL-Classification:

C91, C92, M52

Keywords:

Compensation schemes, Lying, Teams, Goals, Individual differences, Experiment

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Team Goal Incentives and Individual Lying Behavior
[Zielanreize in Teams und individuelles Lügenverhalten]

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Abstract:

In this article we examine the influence of two goal compensation schemes on lying behavior. Based on the die rolling task of Fischbacher/Föllmi-Heusi (2013), we apply an individual goal incentive scheme and a team goal incentive scheme. In both settings individuals receive a fixed bonus when attaining the goal. We find that under team goal incentives subjects are less inclined to over-report production outputs beyond the amount which is on average necessary for goal attainment. Investigating subjects' beliefs on their team mates' behavior under team goal incentives reveals that subjects who either believe that lying is not profitable (i.e., the team goal cannot be reached with a lie) or not absolutely necessary (i.e., there is a good chance that the team goal can also be reached without lying) tend to be honest. We also find that subjects who believe that the team goal has already been reached by their team mates tend to over-report production outputs. Across treatments, women are found to be more honest than men. Subjects' personality is not associated with reported production outputs. Our work contributes to previous research on how different compensation schemes affect unethical behavior in organizational settings.

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1. Introduction

The application of work or performance goals can lead to significant increases in worker output (see Goerg/Kube, 2012, who study in a randomized field experiment the link between goals at work, adherent incentives, and worker performance). Indeed, many organizations use goal settings for motivational purposes. For instance, in Germany, 87% of the companies with more than 500 employees apply fixed target agreements.¹ Thereby, goals are often linked to organizational reward systems (Yearta/Maitlis/Briner, 1995). In practice, however, we also observe several cases where goal incentive schemes are connected to the misrepresentation of sales reports to ensure the obtainment of bonuses (Degeorge/Patel/Zeckhauser, 1999; Jensen, 2001). In this context, Jensen (2003) points out that the use of performance goals linked to monetary rewards may induce people to lie about their actual performance, measured, for example, in profits, sales or production outputs. This can result in detrimental repercussions for a company's profitability because the perception of the company's economic situation and ethicality might be distorted if such behavior is detected and made public.

Several recent experimental studies show how goals or targets tied to monetary rewards can negatively impact ethical behavior. In a laboratory experiment, Schweitzer/Ordóñez/Douma (2004) find that people, who get paid according to goals, lie more about their performance than people who are asked to do their best and only receive a lump-sum payment. In another experiment, Grover/Hui (2005) demonstrate that people tend to lie more about their performance when achieving a specific performance level is linked to obtaining a monetary bonus. Additionally, Cadsby/Song/Tapon (2010) show that a goal compensation scheme produces significantly more dishonesty than a piece-rate or a tournament compensation scheme (refer also to Ordóñez/Schweitzer/Galinsky/Bazerman, 2009, for a general discussion on the potential harm of goal setting).

The studies focus on the way in which individual goal incentive schemes affect unethical behavior. However, in practice people do not work alone and team work is very popular. Many companies use team incentives because it enhances workers' performance and workers associate non-pecuniary benefits with it (Hamilton/Nickerson/Owan, 2003). For instance, 70% of the Fortune 1000 companies in the United States use some form of team incentives (Ledford/Lawler/Mohrman, 1995). In this context, Hoffman/Rogelberg (1998) identify several categories of team incentive schemes and one of them entails team goal incentives.

Despite the popularity of goal and team incentives in practice, to the best of our knowledge current research on lying behavior mainly focuses on the effects of individual goal incentives but lacks insights on the impact of team goal incentive schemes. Therefore,

¹ See „Forschungsbericht Arbeitsmarkt 442: Arbeitsqualität und wirtschaftlicher Erfolg: Längsschnittstudie in deutschen Betrieben“ of the Federal Ministry of Labour and Social Affairs, released 30.6.2013.

the aim of this work is to experimentally investigate the influence of a team goal incentive scheme on lying about individual performance. In this respect, we look at the impact of a team goal compensation scheme on reporting individual production outputs compared to an individual goal incentive scheme. In our experiment, we adapt the die rolling game of Fischbacher/Föllmi-Heusi (2013), henceforth FFH. Subjects have to privately roll a six-sided die in order to determine their individual production output which is anonymously reported to the experimenter. To investigate the effects of team goal incentives, two treatments are implemented: one team goal incentive scheme for teams consisting of six team members and one individual goal incentive scheme. In the individual goal incentive scheme, subjects are given a fixed goal they have to reach by rolling the die in order to obtain a monetary bonus. In the team goal incentive scheme, subjects are given a fixed goal, which they have to reach together in order to obtain the monetary bonus. The sum of the team members' reported production outputs is compared to the provided team goal. In case the goal is reached, the team bonus is obtained and distributed equally among the team members.

As our main result, under the team goal incentive scheme we find less over-reporting beyond the average amount needed for goal attainment. Investigating subjects' beliefs on their team mates' reports under team goal incentives reveals that subjects who either believe that lying is not profitable (i.e., the team goal cannot be reached by lying) or not absolutely necessary (i.e., there is a good chance that the team goal can as well be reached by reporting truthfully) tend to be honest. We also find that subjects who believe that the team goal has already been reached by their team mates tend to over-report production outputs. The remainder of this paper is arranged as follows. In the next section 2, we present our experimental design and procedure. To enhance the understanding of subjects' behavior in our setup, in section 3 we provide a line of theoretical arguments on expected behaviors in our treatments, present previous empirical evidence and formulate two hypotheses. In section 4, we present our results. In the fifth and last section, we discuss our findings, reflect upon practical implications and conclude.

2. Experimental Design and Procedure

In our experiment we apply a short one shot decision-making task after a different independent experiment (for this procedure, see also FFH). At the stage of our task, subjects do not receive any feedback on their earnings in the preceding experiment. Two treatments are designed to test our hypotheses formulated in the next section. The first treatment is implemented as an individual goal setting task, in the following referred to as the *Individual* treatment. The second treatment is a team goal setting with teams consisting of six subjects who are randomly assigned to the teams at the beginning of the task. In the following, we will refer to this treatment as the *Team* treatment.

Following the procedure of FFH, in the two treatments the instructions explain that subjects are rewarded for filling in a short questionnaire for a statistical survey and that payoffs depend on points p_i randomly determined through rolling a fair six-sided die. With a slight adaptation compared to FFH, we use *points* that are understood as “random production output” to investigate in which way different goal compensation schemes affect lying. Subjects are told that the diced number d_i determines the points p_i of subject i . In further detail, $p_i=d_i$ if $d_i \in \{1, 2, 3, 4, 5\}$ while no points are obtained if $d_i=6$, i.e., $p_i=0$. Due to the goal modification, subjects in the *Individual* treatment are told that they would get an individual payoff π_i of 5€ if they reach 3 points or more, i.e., that $\pi_i=5€$ if $p_i \geq 3$. Otherwise, the payoff π_i equaled 0€. Hence, subjects have a fair chance of 50% to reach the goal and receive 5€. In the *Team* treatment, a subject i is anonymously and randomly assigned to five other subjects j, k, l, m , and n . The members of one team roll the die individually without any interaction. The instructions inform the subjects that the team as a whole would earn $6 \times 5€ = 30€$ if the team members together reached 18 points or more, i.e., that $\pi = 30€$ if $p_i + p_j + p_k + p_l + p_m + p_n \geq 18$. When reaching the team goal, the 30€ are split equally among all team members. Thus, a subject i earns an individual payoff $\pi_i = 5€$ if $p_i + p_j + p_k + p_l + p_m + p_n \geq 18$. Otherwise the individual payoff π_i equaled 0€. The induced uncertainty on goal attainment (and attached reward payment) is typical for work practice when compensation depends on a subgroup’s performance and not solely on the individual’s performance (Gill/Prowse/Vlassopoulos, 2012).

To examine the impact of different goal incentive schemes on lying and to make incentive schemes comparable across treatments, we hold the potential reward for each subject with 5€ constant over both treatments. Moreover, for the *Team* treatment we want to ensure that 3 points, as in the *Individual* treatment, remains the individual reference point, i.e., if each member of a team on average reported 3 points (or more), the team goal was reached. Hence, for the *Team* treatment, we multiply the goal of 3 points from the *Individual* treatment with the number of team members leading to a goal of $3 \times 6 = 18$ points.

The instructions tell the subjects to roll the die and to report the rolled number on the instruction sheet.² Additionally, the instructions make clear that the subjects could roll the die several times to make sure it is fair but to only report the first number rolled. Due to the nature of the experiment’s procedure, the experimenters are neither able to reconstruct whether the subjects report their first diced number nor whether they honestly report an actually rolled number. Firstly, this is because the subjects privately sat in separate cubicles,

² The original instruction sheets for the *Individual* and the *Team* treatment were in German. They are available upon the authors request.

secondly, because the experimenters leave the experiment room after handing out the instructions and dices, and thirdly, because the subjects are allowed to roll the die several times. Through this procedure it is easy for the subjects to lie about their production output without risking detection. In line with FFH, in our experiment lying is understood as “reporting a different number than the one actually rolled on the first roll”, which we assume to be usually higher. As the true outcome of the individual die rolls is unknown, aggregated reported production outputs are compared to the distribution that can be expected from rolling the die truthfully. Differences in lying behavior across treatments are generally measured by the deviation of the frequencies of the distinct reported production outputs from the frequencies that can be expected from truthfully reporting and, more specifically, by the frequency subjects report a production output ≥ 3 in either treatment. In the *Individual* treatment a reported production output of 3 or more guarantees the reward of 5€. Analogously, in the *Team* treatment, team members need to – on average – report at least a production output of 3 points to get the reward.

After reporting their rolled number the subjects are asked to fold the instruction sheet and wait until the experimenters’ return to the laboratory. The folded instruction sheets are then collected and the questionnaire is handed out. In both treatments, the questionnaire included questions about subjects’ age, gender and personality. Personality is measured using a 10-item version of the Big Five Inventory introduced by Rammstedt/John (2007). Additionally, the subjects of our *Team* treatment are asked about their beliefs regarding the reported production output of each of their team mates. We also ask subjects whether they had participated in a similar experiment before to control for experience effects. After all subjects had filled in the questionnaire, the experimenters collected it. The sessions ended with paying out the money that had been earned by the subjects. The payment consisted of the possible 5€ and of the amount of money subjects had earned in the respective preceding experiment including a general participation fee of 2.50€.

The experimental sessions of the *Individual* treatment were conducted in the experimental economics laboratories of the University of Cologne and Bonn University from August to September 2010. The sessions for the *Team* treatment were conducted in the experimental economics laboratory at the University of Cologne from May to June 2013. In total, 181 subjects took part in our experimental sessions. The mean age of the subjects was 24.28 years. Our sample included 48.31% female students.

3. Theoretical Considerations and Hypotheses

Before turning to the results, we briefly discuss potential effects of different factors on subjects’ strategy choice in the *Individual* and in the *Team* treatment. Providing a line of theoretical arguments on expected behaviors and presenting prior empirical evidence, we

want to enhance the understanding of subjects' behavior in the setup at hand. We will derive two behavioral hypotheses which will be tested by our experiment.

From a purely self-interested, rational economic perspective, people solve the question of lying or not by trading off the potential benefit of lying against the potential cost of being detected and punished (e.g., Becker, 1968). Based on the fact that detection was ruled out in our experiment, a selfish subject without lying aversion, i.e., who has no cost for lying, will always report a production output of ≥ 3 in the *Individual* treatment. The subject should be indifferent regarding reporting 3, 4, or 5 as these production outputs all yield the same reward. In the *Team* treatment, it is dominant for a subject without lying costs to report a production output of 5 because – no matter what the other team members report – this production output yields the highest probability for obtaining the reward. Based on these considerations, we should observe no differences across the *Individual* and the *Team* treatment regarding the number of reported production outputs ≥ 3 .

Previous work has shown that lying involves ethical deliberations and a psychological cost for the liar. The growing literature on lying aversion (e.g., Gneezy, 2005, Mazar/Amir/Ariely, 2008, Kartik, 2009, Sutter, 2009, Erat/Gneezy, 2011, Shalvi/Handgraaf/De Dreu, 2011, FFH) suggests that people apparently face a conflict in situations like our die rolling task: on the one hand they want to pursue their monetary interest but on the other hand they want to avoid the cost of lying and (appear to) behave ethically. To handle this dilemma, people often look for ways to behave untruthfully enough to profit from their unethical actions but still truthful enough to not need to revise their positive self-image (e.g., Mazar et al., 2008, Gino/Ayal/Ariely, 2013). In line with this argument, recent studies show that people tend to avoid lying to the maximum extent giving up the opportunity to reap the greatest possible amount of money even if there appears to be no risk of getting caught (Shalvi et al., 2011, Conrads/Irlenbusch/Rilke/Walkowitz, 2013, FFH, Conrads/Irlenbusch/Rilke/Schielke/Walkowitz, 2014).

If subjects are lying averse (as the above literature suggests) different considerations have to be made. Subjects might only lie when there is an incentive to do so, i.e., when the expected benefit of the lie outweighs its costs. In the *Individual* treatment, the probability of getting the reward with an honest report is 50% (by truthfully reporting 3, 4, or 5 points). Hence, with 50% probability it is necessary but also profitable for subjects to lie and report a production output ≥ 3 . In the *Team* treatment, the distribution of truthfully reported production outputs has a mean of $6 \times 2.5 = 15$ points. There, the probability of getting a team total of 18 points (the team goal threshold) if all team members report truthfully drops down

to 27.9% (see Table A1 in the Appendix).³ Assuming that all other team members report truthfully, subjects in the *Team* treatment should consider lying to be necessary (because the sum of all die rolls is expected to be smaller than 18 points) and profitable (because the subject can move the sum to 18 or above by misreporting his/her own roll) in about 21.8% of all cases. As depicted above, in 27.9% of all cases the team wins honestly, while in 50.3% of all cases, a single subject's lying would be insufficient to increase the total amount of reported production outputs for the team to win the reward because the other team members reach in total at most only 12 points (see Table A2 in the Appendix). Thus, if subjects were perfectly informed and lied only when it was necessary and profitable, we could expect to see less than half of the lying frequency in the *Team* as compared to the *Individual* treatment.

The situation changes when subjects believe that their fellow team members do not necessarily report truthfully. If there is some (small) expectation that the other team members lie, e.g., by increasing their reports by one point if they roll a production output <3 , a subject's incentive to lie increases because the probability that he or she can influence the total outcome increases to 30.5%. Yet, if the expectation becomes that most or all team mates lie, lying-averse subjects' incentives to lie decrease again because it will be unnecessary for them to lie if they expect others to over-report their die throws which in turn most likely guarantees goal attainment. For example, if subjects believe that all other team mates over-report by one point (if they do not get 5 points), the probability for necessary and profitable lying decreases to 21.8%. Likewise, if subjects believe that all others lie to the maximum extent, i.e., that all team mates report 5 points, subjects do not need to lie because the team goal will be reached no matter what they report on.

Beyond these very particular examples, the incentive to lie - in the vast majority of possible distributions of beliefs - is smaller than 50% in the *Team* treatment.⁴ In general, in

³ The probabilities applied here were derived from simulations with $n=100.000$ random draws. Therefore, they might be slightly imprecise in a few cases.

⁴ There are $6^5=7776$ distinct five tuples of the other five team members' reported production outputs. In the *Team* treatment a subject has the highest probability that lying is necessary and profitable if he or she believes that the other team members' reported production outputs add up to 13 points (since the subject then has to lie in 5/6 of the cases). If the other five group members reported honestly the production outputs add up to exactly 13 points in 10.03% of the five-tuples. However, a sum of exactly 13 reported points can also be reached if the sum of true production outputs is smaller than 13 and lying is involved (assuming that subjects do not under-report). The proportion of five tuples that result in a true total production output of 13 and smaller amounts to 60.03%. In these cases a reported production output of exactly 13 can in principle arise – may it be by truthful reporting or by a combination of lying and truthful reporting or by all five team members lying. Thus, the probability that lying is necessary and profitable can never be higher than $60.03\% * 5/6 = 50.03\%$. This probability is already very close to 50%.

both treatments the incentives to lie may depend on the cost of lying. Assuming that subjects have constant cost of lying, i.e., whenever they lie they incur a constant cost irrespective how large their lie is, and these costs do exceed 1.99, we can show that there exists a Nash equilibrium in the *Team* setting where all team members report truthfully. In the *Individual* Treatment, a subject would lie only if the cost of lying is smaller than 5 (if they are equal to 5, a subject is indifferent between lying and not lying). In this case the benefit from lying outweighs the cost for lying. Thus, if the cost for lying is between 0 and 5, a subject lies in 50 % of all cases, i.e., when it does not honestly reach the goal (assuming that the cost for lying is constant, i.e., independent from how much a subject lies). Hence, in the *Team* treatment, there is a broad range of lying costs - between 2 and 5 (as compared to 0 and 5 in the *Individual* treatment) - where all team members report truthfully. If the cost of lying is lower than 1.99, the individual incentive to lie gradually increases in the *Team* setting, up to a threshold amount where all subjects lie (see Tables A1 to A3 in the Appendix for a detailed illustration).

Taken together, the expected return of lying tends to be lower in *Team* than in the *Individual* treatment. Based on these considerations, we expect to detect less lying in the *Team* as compared to the *Individual* treatment. Consequently, we formulate:

Hypothesis 1. Lying decreases under team goal incentives compared to an individual goal incentive scheme.

Lying can also be considered as an act that (also) benefits others if the liar empathizes with the beneficiaries or if some sort of connection exists between them (Loewenstein/Thompson/Bazerman, 1989, Gino/Pierce, 2009, 2010, Gino/Ayal/Ariely, 2009, Erat/Gneezy, 2013, Gino et al. 2013). Wiltermuth (2011) asserts that people may be more inclined to lie when others benefit from it, even if no connections between the liar and the beneficiaries exist. Likewise, in their recent study Gino et al. (2013) show that caring for others' outcomes encourages people to act dishonestly even if the beneficiary is unknown to the liar. People can also more easily justify immoral actions to themselves if other people benefit from it, too. Once others benefit as well, a subject's motive for lying becomes ambiguous (Wiltermuth, 2011) and the liar appears to be better able to preserve a positive self-image (Gino et al., 2013). This effect is shown to mitigate the extent to which people perceive their dishonesty to be immoral (and therefore might reduce their cost of lying) since if only the liars themselves benefit from their dishonesty it clearly appears to be self-serving. The above literature points out that the justification motive together with the care motive apparently have the greatest affect in fostering individuals' inclination to lie. It also shows that people tend to lie more as the number of beneficiaries from the lie increases.

In a team setting, subjects also have the opportunity to hide their dishonesty within the team as recently highlighted by Conrads et al. (2013). With this opportunity to diffuse one's own responsibility for a lie, a team goal setting potentially disguises an individual's contribution and leads to a reduced risk of being identified as a liar and therefore held accountable (see also Bandura/Underwood/Fromson, 1975, Bandura/Barbaranelli/Caprara/Pastorelli, 1996).

Taken together, the above evidence suggests that people under a team goal incentive scheme can be expected to lie more than in an individual goal setting. In the *Team* treatment there are other subjects who can potentially benefit from a lie which helps to preserve a positive self-image and, likewise, other people are let down if the team reward is potentially not obtained due to having refrained from lying. Moreover, in the *Team* treatment people may be more inclined to lie because it is more difficult to identify them as liars within a group of people. Consequently, we formulate our second hypothesis:

Hypothesis 2. Lying increases under team goal incentives compared to an individual goal incentive scheme.

To assess which of the two hypotheses can be supported we will now turn to our data.

4. Results

Figure 1 and Table 1 display the results for the distributions of the reported numbers, converted into production outputs with 6 equaling 0 in the two treatments.⁵ For better readability, from now on we will refer to *reported production outputs* 0 to 5. Experienced subjects were excluded from the analyses.

4.1. Reported production outputs

To start with, we compare average reported production outputs across our two treatments. We find no evidence that average reported production outputs significantly differ across the *Individual* (3.55) and the *Team* (3.39) treatment ($p=.508$, Fisher-Pitman permutation test for two independent samples⁶). Similarly, the distributions of reported production outputs do not significantly differ across treatments ($p=.476$, Kolmogorov-Smirnov test). In both treatments reported production outputs are significantly different from the average outcome of 2.5 points one can expect if subjects report truthfully (both $p<.01$, binomial test), which indicates that in both treatments subjects over-reported their rolled numbers. If we assume that the difference between the relative frequency that can be expected from a truthfully conducted

⁵ A part of our data was collected for a master thesis project. They are presented in Ellenberger/Ohms (2013).

⁶ In the following denoted as FPPT. All statistical tests are carried out two-sided if not denoted otherwise.

die roll (16.67%) and the observed relative frequency of distinct reported production outputs displays subjects' dishonesty, we can estimate for each treatment the approximate amount of subjects who probably lied. In the *Individual* treatment, 32.46% of the subjects deviate from the benchmark distribution whereas in the *Team* treatment they amount to 20.15%.

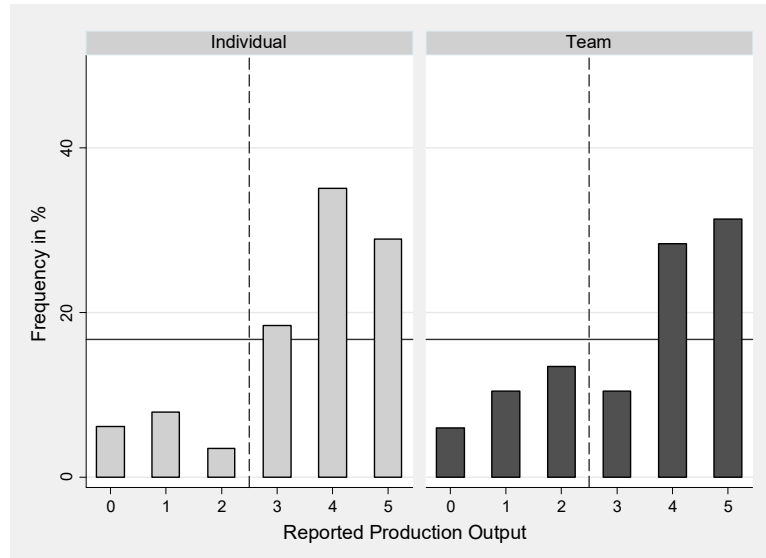


Figure 1. Relative frequencies of reported production outputs in the *Individual* and in the *Team* treatment. The solid line marks the frequency of reported production outputs (16.67%) according to a uniform distribution. The dashed line marks the induced goal threshold from an (average) individual perspective.

A set of binomial tests reveals that in both treatments the distribution of reported production outputs significantly differs from a uniform distribution and that there are differences across treatments in this regard. In the *Individual* treatment the production outputs 4 and 5 are reported significantly more frequently than 16.7% while, on the other hand, the production outputs 0, 1, and 2 are reported significantly less frequently than expected. Interestingly, the relative frequency of a reported production output of 3 is not found to be statistically different from 16.7% in both treatments even though this reported production output would (on average) already ensure goal attainment. With 35.09% the reported production output of 4 is reported most frequently in the *Individual* treatment while with 3.51% the reported production output of 2 is reported least frequently.

In the *Team* treatment the reported production outputs 4 and 5 are also reported significantly more frequently than the expected 16.7% while the reported production output of 0 is reported significantly less frequently than expected. However, and partly contrary to the *Individual* treatment, the relative frequencies of the reported production outputs 1, 2, and 3 are not found to be statistically different from 16.7%.

Table 1. Descriptive statistics on reported production outputs

Treatment	Obs.	AV	$p_i \geq 3$ in %	Production output p_i (relative frequency in %)					
				0	1	2	3	4	5
<i>Individual</i>	114	3.55	82.46	6.14 ⁻⁻⁻	7.89 ⁻⁻⁻	3.51 ⁻⁻⁻	18.42	35.09 ⁺⁺⁺	28.95 ⁺⁺⁺
<i>Team</i>	67	3.39	70.15	5.97 ⁻⁻⁻	10.45	13.43	10.45	28.36 ⁺⁺	31.34 ⁺⁺⁺

AV is the average reported production output. Plus and minus signs display the significance of a one-sided binomial test indicating that the observed frequency is smaller (larger) than 16.67% (⁽⁺⁾=10%-level, ⁽⁺⁺⁾=5%-level, ⁽⁺⁺⁺⁾=1%-level).

Looking at the distributions of reported production output across treatments conveys that in the *Individual* treatment subjects tend to under-report production outputs <3 implying that they over-report production outputs ≥ 3 . The same tendency holds for the *Team* treatment. Though, in the *Team* treatment subjects under-report more frequently compared to the *Individual* treatment. The production output of 2 (i.e., the production output closest to the average amount needed for goal attainment) is reported significantly more often in the *Team* treatment ($p=.017$, Fisher's exact test). The depicted distributions disclose a further interesting detail: in both treatments we find that subjects do not over-report a production output of 3 which represents the threshold to be (on average) reached in order to attain the goal (the frequencies of this production output do not significantly differ across treatments, $p=.152$, Chi² test). Contrarily, in both treatments, the production output of 4 is significantly more often reported than expected according to a uniform distribution of reported production outputs. In the *Individual* treatment it even represents the mode within the distribution of reported production outputs and is weakly significantly more often reported than in the *Team* treatment ($p=.089$, Chi² test).

In the following, we will account for the specificity of the induced goal threshold considering a production output of 3 as a reference point because it represents the (average) individual contribution necessary for goal attainment. Therefore, we will compare the cumulative proportion of subjects reporting a production output of 3 or higher across treatments. A Chi²-test reveals that the proportion of subjects reporting a production output of 3 or higher is significantly lower in the *Team* treatment (70.15%) compared to the *Individual* treatment (82.46%) ($p=.059$, Chi²-test).

Table 2. Individual differences explaining reported production output ≥ 3

Reported production output ≥ 3	(1)	(2)	(3)
<i>Team</i> treatment	-.123* (.067)	-.118* (.068)	-.146** (.068)
Female		-.123* (.064)	-.160** (.064)
Age		.002 (.010)	-.002 (.010)
Openness			-.002 (.032)
Conscientiousness			.059 (.032)
Extraversion			.022 (.032)
Neuroticism			-.006 (.035)
Constant	.933*** (.138)	.952*** (.863)	.524** (1.214)
Observations	181	176	174
R^2	.005	.020	.023

Note. The table depicts marginal effects from a probit regression predicting reported production output ≥ 3 . Robust standard errors in parentheses. The number of observations slightly differs across models due to missing values. *** $p < .01$, ** $p < .05$, * $p < .1$

To assess the robustness of this finding, in the next step, we will control for the individual difference variables collected after the die roll task. Relating gender, age and Big Five personality traits with reported production outputs might unveil some further interesting insights about potential determinants of lying behavior under goal incentives. In Table 2 we run a series of probit regression models in order to predict reported production outputs ≥ 3 (a reported production output < 3 is coded 0, a reported production output ≥ 3 is coded 1) by stepwise including a dummy variable for the treatment (the *Individual* treatment is coded 0 and the *Team* treatment is coded 1), Female (male subjects are coded 0 and female subjects are coded 1), Age, and the elicited Big Five personality factors as explanatory variables. To assess the influence of the Big Five personality factors, we included four of the five personality factors in model (3). Scale reliability is acceptable for Extraversion (Cronbach's $\alpha = .768$), Conscientiousness (.493), Neuroticism (.601), and Openness (.645). For Agreeableness scale reliability is unacceptably low (.194). Therefore, we exclude this factor from our analysis.⁷ Models (1) – (3) show that our finding on the influence of team goal

⁷ Scale reliability is measured by calculating Cronbach's Alpha. It is a measure for the overall consistency of a measure (here the distinct personality factor scales) and expresses how a set of test items (the list of questions for each personality factor) can be considered measuring a single latent construct (the personality factor) (see Schnell/Hill/Esser, 2005). According to George/Mallery (2012) a Cronbach's Alpha $\leq .5$ is unacceptable. Rammstedt/John (2007) already note a loss in validity and reliability in their Agreeableness scale with two items compared to larger measures of the Big Five personality factors.

incentives on lying behavior is quite robust, i.e., the likelihood of reporting production outputs ≥ 3 decreases under the team goal incentive scheme. We also observe that women report significantly lower production outputs than men. This effect is also robust when controlling for individual personality factor scores (models (2) and (3)). There is no interaction effect between the treatment and subjects' sex. Model (3) shows that none of the four personality factors is significantly associated with reporting a production output ≥ 3 .

Taken together, the above figures indicate support for Hypothesis 1.

Observation 1. Under team goal incentives subjects are less likely to report production outputs larger than the average amount necessary for goal attainment than under individual incentives.

4.2. Beliefs in the Team treatment

In a second step, we will shed some light on the motives behind subjects' behavior in the *Team* treatment by assessing their beliefs regarding their team mates' reported production outputs. As argued above, subjects' beliefs might play a crucial role in determining subjects' reports because they might influence their calculation on the necessity and the profitability of lying. To elicit beliefs, subjects in the *Team* treatment were asked after they have reported their production output to state what they believe which number each of the other five team mates has reported as a result of the die roll.⁸ The belief elicitation was not incentivized. To carry out our analyses, we again convert subjects' stated beliefs into production outputs.

On average, subjects believe their team mates to report a production output of 3.65 which is statistically weakly higher than the average reported production output ($p=.09$, Fisher-Pitman permutation test for paired replicates). There is also a significant positive correlation between subjects' average belief on their team mates' reports and their own reported production output ($\rho=.539$, $p=.000$, Spearman rank correlation).

To analyze internally homogenous subgroups with regard to our theoretical considerations we cluster subjects according to their accumulated belief on their team mates' reported production output (i.e., the sum of all beliefs regarding their team mates).⁹ As we have reasoned, if subjects have lying costs, they will only lie when it is profitable (i.e., if they believe that lying contributes to the team's goal attainment) and necessary (i.e., if the team has not yet attained the goal according to their belief). In Table 3 we have depicted the distribution of subjects' beliefs and their reported production outputs.

⁸ Please refer to the Appendix for the questionnaire on belief elicitation.

⁹ Due to the limited number of observations for each subgroup, we mostly do not apply statistical tests. Hence, we believe that a descriptive analysis is still insightful with regard to our hypotheses.

Table 3. Subjects' beliefs and reported production outputs

Sum of Belief	Frequency (%)	IL	AV	Reported production output p_i (frequency)					
				0	1	2	3	4	5
10	2 (3.03)	0	.5	1	1				
11	1 (1.52)	0	4					1	
12	4 (6.06)	0	1.25	2	1			1	
13	1 (1.52)	.83	4						1
14	3 (4.55)	.67	1.67		2		1		
15	7 (10.61)	.50	3.14		1	2		3	1
16	4 (6.06)	.33	3	1			1	1	1
17	4 (6.06)	.17	2.75		1	1	1		1
18	9 (13.64)	0	3.33			3	2	2	2
19	3 (4.55)	0	3.33		1			1	1
20	4 (6.06)	0	4				1	2	1
21	13 (19.70)	0	4.08			2	1	4	6
22	3 (4.55)	0	5						3
23	2 (3.03)	0	3			1		1	
24	1 (1.52)	0	4					1	
25	5 (7.58)	0	4.8					1	4

Note. Sum of beliefs denotes the sum of beliefs on team mates' reported production outputs. AV denotes the average reported production output. IL denotes the incentive to lie which is given by $(1 - \text{the probability of truthful goal attainment})$.

We find that 10.45% of the subjects believe that their team mates have reached a total production output of <13, i.e., they believe that their team mates do not lie for their own or their team mates' advantage. In this range lying will not be profitable because, based on a subject's beliefs, the team goal threshold cannot be reached even with the highest possible production output of 5. Subjects in this range on average reported a production output of 1.43. We find no evidence that reported production outputs of this subgroup significantly differ from the expected output of an honest die roll ($p=.453$, binomial test). According to our deliberations, if subjects believe their team mates to report in sum at least 13 points (which is above the expected sum of production outputs yielded by truthful reports) they might consider lying to be profitable (because they can altogether reach the team goal) and necessary (if the team goal has not been reached yet). Based on our data, this subgroup consists of 28.36% of all subjects. However, this group on average believes that the sum of the other team members' reports is 15.37 points. Hence, lying is not quite necessary because the goal threshold can be almost reached by honesty. This subgroup of subjects reports an average production output of 2.84 points. Again, we find no evidence that reported production outputs of this subgroup significantly differ from the expected output of an

honest die roll ($p=.648$, binomial test). Taken together, the behavior of these two subgroups delivers some support for Hypothesis 1. Contrarily, 61.19% of our subjects believe that the team goal has already been reached by the reported production outputs of the other team members. Yet, they report on average 3.98 points, which is statistically significantly larger than the amount that can be expected from a truthfully conducted die roll ($p=.001$, binomial test). This finding regarding a third subgroup of subjects indicates some support for Hypothesis 2, i.e., these subjects might have lied in favor of their team members no matter what they expect the other team members to do or because others are expected to lie as well (care and justification motive). If subjects believe that others also lie for them their choice might have as well been guided by reciprocity considerations. Subjects in the later subgroup might have also shifted the responsibility for their lies relying on the fact that the final team output is a composite of all team members' individually reported production outputs, i.e., their share is indistinguishable from the other reports, especially when they believe that the others report high outputs as well. A third explanation addresses the possibility that dishonest subjects have ex-post adapted their beliefs to their reports in order to merely signal a care or justification motive. Alternatively, these subjects might have no lying costs and expect other subjects to also not have lying costs reflected by the expectation and the actual report of high production outputs.

Finally, based on subjects' beliefs we can also calculate their actual incentive to lie which is given by the probability of not reaching the goal truthfully. If the sum of a subject's beliefs is smaller than 13, subjects have no incentive to lie because lying is not profitable, i.e., even the highest possible production output will not be sufficient to attain the goal. Accordingly, if the sum of beliefs is larger than 17, subjects have no incentive to lie because it is not necessary, i.e., the goal is supposed to be attained by the expected production outputs of the other team members. If the sum of beliefs is larger than 12 but smaller than 18, subjects have an incentive to lie because lying can be profitable and necessary (see Table 3). The average incentive to lie in the *Team* treatment, given subjects' beliefs, is about 12.64% (assuming that each production output has an equal probability of 1/6). This number is significantly smaller than the incentive to lie in the *Individual* treatment which equals 50% for every subject. As we have shown, if subjects believe that the sum of reported production outputs is smaller than 17 the prevalence of lying must be very moderate. However, contrary to our considerations, subjects holding an aggregate belief larger than 17 tend to lie although they should (at least) be indifferent regarding the choice whether to lie or not.

Observation 2. Subjects' beliefs are positively correlated with subjects' reported production outputs. For subjects who believe that over-reporting is not profitable because the goal threshold cannot be reached and for subjects for whom, based on

their beliefs, over-reporting would be profitable and necessary, we find no evidence for over-reporting. Subjects who believe that their team mates have already reached the goal threshold - who represent the majority in our sample - tend to over-report.

5. Discussion and Conclusion

In this article we have examined the influence of two compensation schemes on individual lying behavior: an individual goal incentive scheme and a team goal incentive scheme. In both schemes subjects received a bonus when an externally fixed goal was attained. In accordance with our first hypothesis, we find that under the team goal incentive scheme subjects are less inclined to report production outputs beyond the reference production output (3 points) which is on average necessary for goal attainment. We show that this result is partly driven by those subjects who either believe that lying is not profitable (i.e., the goal cannot be reached with a lie) or not absolutely necessary (i.e., there is a good chance that the goal can as well be reached by reporting honestly). Based on their beliefs, these subjects in the *Team* treatment have a lower incentive to lie as compared to the subjects in the *Individual* treatment. In line with this notion, we do not find evidence that these subjects over-reported their production outputs. Hence, contrary to our theoretical considerations, we find that subjects who believe that the team goal has already been reached by their team mates significantly over-report their production outputs. Across treatment, women are found to be more honest than men. None of the personality factors was significantly associated with reported production outputs beyond the (reference) goal threshold.

Overall, our results provide further evidence on the influence of goals on performance (e.g., Goerg/Kube, 2012) and lying behavior (e.g., Cadsby et al., 2010). Regarding previous evidence on the prevalence of lying behavior in teams – which conveys that people tend to lie more in teams due to the possibility to split the benefits of lying with other persons (e.g., Wiltermuth, 2011) or because they can diffuse their responsibility for the lie (Conrads et al., 2013) – we contribute in different ways. Our analysis on subjects' beliefs in the *Team* treatment has shown that subjects' reports depend on their beliefs regarding the reports of their team mates. In line with our first hypothesis, we find most subjects with a low incentive to lie to evidently abstain from lying. However, the subgroup of subjects who believe that the goal has already been attained by the reported production outputs of their team mates tends to significantly over-report.

Taken together, as hypothesized, subjects lie less in the *Team* treatment because they have a lower incentive to lie as compared to the *Individual* treatment. However, some subjects might have lied in the *Team* treatment because others benefit from their lies or they can shift the responsibility for their lies. As subjects in the *Team* treatment in general tend to

report a production output beyond the individual reference production output less frequently, the former seems to over-compensate the later effect.

Our finding on the treatment difference in reporting a production output of 2 – the production output which is closest to the (reference) output needed for goal attainment – is related to previous results from Cadsby et al. (2010) and Schweitzer et al. (2004). They find that people under an individual goal compensation scheme are more inclined to lie about their performance when being close to reaching the goal. In line with these studies, our data suggest that subjects in the *Individual* treatment may feel particularly more encouraged to lie about their die roll outcome (because lying costs induced by shifting the reported production output by one point might not be perceived high as compared to the lost benefit from not lying) if their actual production output is close to the goal threshold.

Moreover, the depicted distribution of reported production outputs in the *Individual* treatment adds to an observation made by FFH. They convey that many subjects do not lie to the full extent, i.e., they report an outcome of 4 instead of 5 in their individual piece-rate framework. FFH argue that subjects are aware that honesty might be a favorable trait and if a 4 is assessed differently than a 5 in respect to honesty, it might be reasonable not to lie to the full extent and to try to disguise the lie and appear honest (see also Conrads et al., 2013 for a similar reasoning). Hence, subjects in our *Individual* treatment might think that reporting a production output of 4 – which implies the same monetary benefit as a 3 or a 5 – is assessed differently than exactly hitting the goal (or clearly reaching it with 5 points) which may look suspicious. Therefore, they might find it reasonable to disguise their lie by reporting an output of 4.

Regarding the question whether women are more honest than men when payoffs are at stake the literature is split. Some studies provide support for this notion (e.g., Ross/Robertson, 2000, Dreber/Johannesson, 2008, Pruckner/Sausgruber, 2008, Ellingsen/Johannesson/Lilja/Zetterqvist, 2009). Yet, there are also studies which endorse that women are bigger liars (e.g., Tyler/Feldman, 2004, Tyler/Feldman/Reichert, 2006) or that there are no differences in lying behavior among sexes (Lewis, 1993, DePaulo/Kashy/Kirkendol/Wyer/Epstein, 1996, Rowatt/Cunningham/Druen, 1998, Cadsby et al., 2010, Belot/Schröder, 2013). Our study backs the first stream of literature.

Regarding the disassociation of personality traits with lying behavior, our evidence is contrary to previous evidence on lying in teams (e.g., Conrads et al., 2013). As an explanation for this difference might serve the multiplicity of motives which can potentially influence subjects' behavior and beliefs in our team setting (see Lönnqvist/Verkasalo/Wichardt/Walkowitz, 2013, for a discussion on the association between personality factors and behavior dependent on the complexity of potential motives for a behavior).

From an applied perspective, our findings suggest that although goal settings appear to be an effective means for motivating agents in order to improve their performance, some caution is required in situations of asymmetric information regarding the observability of agents' actual performance, e.g., concerning employees' presence at work, or their actual responsibility for desired outcomes. In this respect, according to our study, individual goals might distort people's ethicality in such settings more as compared to team goal settings and might represent a better alternative, especially for male employees. Referring to the underlying motives for reporting production outputs under a team goal setting, our suggestion is twofold: Firstly, to attenuate the diffusion of responsibility motive, organizations should enhance working environments which foster transparency and shape beliefs on actual ethical behavior of others. In other words, if agents believe others to behave honestly, they may also tend to do so. Secondly, based on our theoretical considerations, we argue that if goals are set realistically (e.g., by involving agents' opinion, see also Goerg/Kube, 2012, on the effectiveness of self-chosen goals) agents might have a positive belief on the contribution of their team mates for reaching the common goal and therefore refrain from unethical action.

Finally, there are some potential limitations to our work that we want to address. Firstly, our experiment is a laboratory experiment entailing a non-real effort task. This restricts generalizability to organizations. Moreover, we only compared two treatments including one team setting and, in the end, we cannot know whether our subjects *actually* lied. Future research could examine our research question in more natural non-laboratory settings, e.g., in field experiments, altering the number of subjects building a team and tracking actual individual behavior. Secondly, subjects in our team treatment were not able to interact with each other which may not be representative of typical team work situations within organizations. It would therefore be interesting to see how unethical behavior is linked to team goals and bonuses when interaction and communication between the team members are enhanced. Thirdly, we are not able to derive causality with our experimental design concerning subjects' (non-incentivized) beliefs. The influence of beliefs can, at this point, only be assumed but seems very plausible (see, e.g., Gächter/Renner, 2010, for a discussion on this issue). In addition, we elicited beliefs after the die rolling task which might have distorted them (e.g., those who reported high production outputs might have ex-post rationalized this choice by stating that they expect others to do the same). Yet, we decided to elicit beliefs after the main task to not influence subjects' decision in the die rolling task.

Despite these potential limitations, to the best of our knowledge, our study is the first that provides controlled evidence on the influence of a team goal incentive scheme on lying behavior. Hence, fruitful future work could shed more light on the question whether team

incentives are effective compared to individual incentive schemes in reference to performance and ethical considerations.

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Appendix

Table A1 shows results from simulations with $n=100.000$ random draws of 6 team members' die rolls. The first column indicates each distinct case. The second column displays all possible sums of production outputs which can be achieved in a team. The third column shows the probability for each distinct case if team members are honest.

Table A1. Possible sums and probabilities of all team members' productions outputs under honesty

Case	Sum	Probability
1	0	0.00001
2	1	0.00014
3	2	0.00035
4	3	0.00117
5	4	0.00272
6	5	0.00543
7	6	0.00984
8	7	0.01614
9	8	0.02482
10	9	0.03540
11	10	0.04753
12	11	0.06104
13	12	0.07548
14	13	0.08452
15	14	0.09186
16	15	0.09115
17	16	0.09105
18	17	0.08233
19	18	0.07419
20	19	0.06131
21	20	0.04764
22	21	0.03560
23	22	0.02458
24	23	0.01651
25	24	0.00956
26	25	0.00514
27	26	0.00265
28	27	0.00121
29	28	0.00047
30	29	0.00013
31	30	0.00003

The probability that the team goal is reached honestly (27.9%) is given by the accumulated probability of cases 19 to 31 (gray area).

Table A2 shows results from simulations with $n=100.000$ random draws of 5 team members' die rolls. The first column indicates each distinct case. The second column displays all possible sums which can be achieved. The third column provides the probability for each distinct case if the 5 team members are honest. The gray area shows cases where lying is necessary (the team goal has not yet been reached) and profitable (the team goal can be reached by lying) for the sixth subject. The fourth column indicates the incentive to lie for the sixth subject. In cases 14 to 18 the incentive to lie is given by the probability of achieving a distinct sum (13, 14, 15, 16, 17) multiplied by the number of instances where the sixth subject has to lie ($5/6$, $4/6$, $3/6$, $2/6$, $1/6$) in these cases in order to reach the goal.

Table A2. Incentives to lie dependent on the other team members' honestly reported die rolls

Case	Sum	Probability	Incentive to lie
1	0	0.00012	0
2	1	0.00056	0
3	2	0.00194	0
4	3	0.00442	0
5	4	0.00937	0
6	5	0.01562	0
7	6	0.02677	0
8	7	0.03914	0
9	8	0.05391	0
10	9	0.07042	0
11	10	0.08387	0
12	11	0.09561	0
13	12	0.10144	0
14	13	0.09856	* $5/6=0.08213$
15	14	0.09520	* $4/6=0.06347$
16	15	0.08303	* $3/6=0.04152$
17	16	0.06860	* $2/6=0.02287$
18	17	0.05375	* $1/6=0.00896$
19	18	0.03910	0
20	19	0.02599	0
21	20	0.01608	0
22	21	0.00962	0
23	22	0.00422	0
24	23	0.00186	0
25	24	0.00065	0
26	25	0.00015	0
Total:			0.21894

As shown in Table A1, the team wins honestly with 27.9%. With a probability of 50.3% it is not profitable to lie for the sixth subject. This number is given by the accumulated probability of cases 1 to 13. The sixth subject has an incentive to lie of 21.8% - there lying is necessary and profitable. This number is given by the accumulated probability of cases 14 to 18.

Table A3 shows results from simulations with $n=100.000$ random draws of 5 team members' die rolls. The first column displays the actual outcome of the sixth team member's die roll. The second column displays the sixth team member's strategy (report honestly, lying) depending on the actual outcome of her die roll. The third to sixth column depict the sixth team member's expected payoff depending on whether she has reported honestly or not and on her cost of lying (5, 2.00, 1.99, or 0). The gray area indicates cases where the expected payoff from lying is larger than the expected payoff from reporting honestly.

Table A3. Expected payoffs dependent on actual outcome of die roll, honesty and cost of lying

Actual outcome of die roll	Report (honestly/lying)	Cost of lying			
		5	2.00	1.99	0
0	0	0.48835	0.48835	0.48835	0.48835
	5	-2.51595	0.48405	0.49405	2.48405
1	1	0.75710	0.75710	0.75710	0.75710
	5	-2.51595	0.48405	0.49405	2.48405
2	2	1.1001	1.1001	1.1001	1.1001
	5	-2.51595	0.48405	0.49405	2.48405
3	3	1.51525	1.51525	1.51525	1.51525
	5	-2.51595	0.48405	0.49405	2.48405
4	4	1.99125	1.99125	1.99125	1.99125
	5	-2.51595	0.48405	0.49405	2.48405

Expected payoffs are calculated in the following:

- a) In case of honesty: Multiplying the probability of reaching the goal honestly and the resulting payoff (i.e., 5). For example, in case the sixth subject has actually rolled an outcome of 0 and reports it honestly, the team wins honestly with 9.8% (this is the accumulated probability that the other five team members have already reached a sum of 18; this probability is given by the sum of the respective probabilities of cases 19 to 26 in Table A2). The expected payoff in this case is $9.8\% \cdot 5 = 0.48835$.
- b) In case of lying: Multiplying the probability of reaching the goal by lying and the resulting payoff (i.e., 5). For example, in case the sixth subject has actually rolled an outcome of 0 but reports 5, the team wins with 49.7% (this is the accumulated probability that the team members reached a sum of 18; this probability is given by the sum of the respective probabilities of cases 14 to 26 in Table A2). The expected payoff in this case is $(49.7\% \cdot 5) - 0(2) = 2.48405(0.48405)$ if costs of lying are equal to 0(2).

The table shows that all team members always report truthfully if they have lying costs larger than 1.99. In this range, the expected payoff from lying does not outweigh the cost associated with it, no matter what the outcome of the die roll actually was (assuming constant costs for lying).