Who Should Set the Goal: Employers or Workers?*

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Abstract

We study how goal setting affects performance depending on who sets the goal. We first propose a theoretical model of a worker-employer game and then conduct an incentivized laboratory experiment to test our theoretical predictions. The game starts with either the worker or the employer setting a goal on output, and then the worker selects a costly (and unobservable) effort level which in turn determines both output and the employer's income. The worker's monetary earnings depend on neither goal achievement nor output. Our theory predicts that (i) the worker sets the minimum possible goal, (ii) the employer sets a higher goal than the worker does; (iii) effort is the highest when the employer sets a goal, the lowest when there is no goal at all, and in between when the worker sets a goal. Consistent with our theoretical predictions, our experimental results confirm that a higher goal is set by the employer and effort level is the highest when the employer sets a goal. However, we find deviations from our other theoretical predictions. We propose modifications to the original model that can explain these deviations.

Keywords: Goal setting, Self-Set, Assigned, Output, Laboratory experiment
JEL Codes: C91, C72, D90

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1 Introduction

The effects of goals on performance have attracted attention both in psychology and economics. A robust finding is that individuals perform better in the presence of goals (Locke and Latham, 2002). A not so well-understood question is how goal levels and performance are affected by whom the goal is set. A goal may be set by an individual himself/herself (the so-called *self-set goal*) or assigned by another individual, possibly a higher-authority one like an employer (the so-called *assigned goal*). Previous literature mostly focuses on understanding how performance differs under the same goal depending on by whom it is set. The aim of this study, however, is to understand the full effects of goal setting on performance. Specifically, not only how performance differs under a goal depending on by whom it is set, but also how selected goals differ which may in turn further affect performance.

We consider a simple three-stage game played between a worker and an employer. In the first stage, a goal is set either by the worker (self-set) or the employer (assigned); in the second stage, the worker chooses a costly effort which in turn determines the output; and in the third stage, the employer sends non-binding feedback to the worker. To isolate the intrinsic effects of goals on the worker's effort choice, we focus on an environment where we rule out any extrinsic motivation that are direct (such as bonus payments to the worker due to the achievement of a goal) or indirect (such as an increase in the worker's earnings with output).

The first part of the paper is devoted to studying this game theoretically. In our game-theoretic model, the worker earns a flat wage partially used to cover the cost of effort he/she has selected. Moreover, the worker receives some intrinsic utility that is composed of two parts: (i) utility from the employer's feedback, and (ii) reference-dependent utility from goal achievement where the goal acts as a reference point.[1] The employer only cares about the output level and rather views the goal as a tool to influence the worker's effort choice. To create benchmark predictions, utility functions here do not depend on who sets the goal.[2] This ensures that our theory does not impose a behavioral difference just because the goal is set by the worker or the employer. Our model generates the following predictions. In a Subgame Perfect Nash Equilibrium, the worker sets the lowest possible goal, and the employer sets a higher goal than the worker does. The worker exerts greater effort when the employer sets a goal than when the goal is self-set, and both of these effort levels are higher compared to when there is no goal at all.

In the second part of the paper, we report results from an incentivized laboratory experiment specifically designed to test hypotheses based on our theory. Consistent with our theoretical predictions, we observe that the employer sets a statistically significantly higher goal than the worker does. Moreover, the worker's effort level is the highest when there is a goal and that goal is set by the employer. In contrast to our theoretical predictions, the worker sets a positive goal (rather than zero—the lowest possible goal), and effort levels are not significantly different from each other when the worker sets a goal and when there is no goal at all. We discuss possible reasons behind these deviations and propose modifications in our theoretical framework to accommodate them (Section 6).

[1] Throughout the paper, we use the term *goal achievement* to refer to the gap between output and goal levels.
[2] We relax this assumption in Section 6.

Lastly, we make three additional observations from the experimental data. First, the worker's effort increases with the goal assigned by the employer up to a certain level. However, when the assigned goal is extremely high, it backfires causing the worker to decrease his/her effort. This is in line with our theory. Second, this positive relation between goal and effort levels, combined with higher goals being assigned by the employer, serve as one of the reasons for the worker's effort being higher when the employer sets a goal. The other reason we find is a direct effect: precisely, the worker exerts a higher effort just because it is the employer who sets the goal. Finally, our experimental data reveals that the employer's feedback depends on both the level of output and goal achievement when the employer sets a goal, but only on the output otherwise. While the last two additional findings challenge some of our theoretical assumptions, they don't affect the qualitative predictions of our theory (Section 6).

The rest of the paper is organized as follows. Section 2 presents a review of the related literature. Section 3 provides a theoretical model and its results. Section 4 outlines the experimental design and our hypotheses based on our theoretical predictions. Our main findings regarding goal and effort levels are presented in Section 5.1 and some additional findings are presented in Section 5.2. Section 6 provides a discussion on the deviations we observe and explains how to alter the model to accommodate these deviations. Finally, Section 7 concludes. Proofs of the theoretical results are provided in the Appendix. Additional data analyses and experimental instructions are presented in the online Appendix A and Appendix B, respectively.

2 Related Literature

Goal setting has recently attracted attention from scholars in both economics and psychology. Table 1 provides a comparison of important features between our study and related work in the experimental economics literature. Like most of the related studies in this literature, our work combines a theory and an experiment. Moreover, our theoretical set-up is in line with those studies in that the intrinsic effect of a goal is modeled via reference-dependent utility in which the goal serves as a reference. As can be seen in Table 1, our paper mainly differs from the literature in four aspects: settings where goals are determined, how the worker is paid, whether a particular cost function is imposed for the effort, and the type of feedback provided to the worker. We will now discuss each aspect in detail.

To our knowledge, our paper is the first to study the complete effects of goal setting on performance depending on who sets the goal. More precisely, we study how the goal level differs depending on who sets the goal and how the worker's performance differs under these possibly different goals. This is possible by considering the following settings simultaneously: a setting where there is no goal (as a benchmark), a setting where a goal is set by the worker, and a setting where a goal is assigned by the employer in the game. It is the *endogeneity* in our assigned setting (i.e. goals being assigned by another player in the game) that allows for assigned goals to be possibly *different* than self-set ones, thereby paving the way for a complete analysis of goal-setting depending on who sets it. This is different than the literature typically

using goals that are exogenously assigned by the experimenter at the same level of self-set ones, which would only allow for a partial analysis of the effects of goal setting.[3]

Our study differs from most of the previous papers also by its payment structure. In our setting, the worker receives only a flat payment which does not depend on the output level (unlike piecewise rate) and whether the goal is achieved (unlike wage-relevant goals). This allows us to see whether goals work even when any kind of monetary consequence that could motivate workers to exert effort is removed.

Unlike the previous literature, in our experimental design, we also control for the cost of effort by imposing the same cost function across all subjects through a chosen effort task (rather than using a real effort task). In addition to minimizing the confounding factors (as discussed in Section 4.1 in detail), this creates a stronger link between the theory and the experiment by guaranteeing subjects' use of a particular cost function that comes from the theory.

At the end of each round in our experiment, the employer sends feedback to the worker, adding a degree of realism to our set-up. The type of feedback we use differs from those studies that also provide feedback. We use subjective feedback (i.e., an emoji selected by the employer from a given list) instead of objective feedback such as the worker's absolute or relative performance. Letting employers send subjective feedback is consistent with our model and also allows us to discover new insights that have not been identified by the previous literature.

In the theoretical economics literature, self-set goals are also modeled as a self-control tool in multi-period decision settings for an agent with present-biased preferences (Koch and Nafziger, 2011; Hsiaw, 2013; Suvorov and Van de Ven, 2008). Our work differs from these in that in our setting exerting effort brings the agent extrinsic harm rather than benefit (as effort is costly and the agent's pay is a flat fee net of this cost) and, therefore, there is no need for a commitment tool.

Finally, instead of self-set goals as we study in this paper, the psychology literature mostly focuses on *participative* goals which refer to goals workers agree upon together with their employers (or experimenters).[4] Some studies in the psychology literature find that participative and assigned goals do not lead to significantly different performances when keeping the goal level constant (Latham and Saari, 1979b; Latham et al., 1982; Latham and Steele, 1983; Lozano and Stephens, 2010) or when allowing for the goal levels to vary (Latham and Yukl, 1976). However, there are also some studies that reach opposite findings when keeping the goal level constant (Latham and Saari, 1979a; Erez et al., 1985) or when allowing for the goal levels to vary (Latham and Yukl, 1975; Latham et al., 1978; Latham et al., 1982). Locke and Latham (2002) argue that there may be various reasons (such as not providing feedback, not measuring self-set goals, not getting goal commitment, etc.) behind these mixed findings in this literature (Latham and Yukl, 1975; Erez et al., 1985; Latham et al., 1988).[5]

[3] The main focus of these studies in the literature is the interaction of goal setting with monetary incentives (Goerg and Kube, 2012), feedback (Akin and Karagozoglu, 2018), and past achievement (Fan et al., 2020) rather than the comparison of the effort levels under the same goal level depending on whether it is self-set or assigned.

[4] In participative goal setting, it is typical that the experimenter or employer directs the worker to set a difficult but attainable goal. Since our focus is on self-set goals, we refrain from providing such a direction when workers set goals for themselves.

[5] In addition, the use of real effort tasks in these studies might allow for signaling effects (regarding ability, intelligence etc.) through a subject's high performance/goals, thereby creating further noise in understanding the impact of who sets a goal.

Table 1. Related studies in the experimental economics literature

	Type of Goals				**Type of Payment**			**Cost Function**	**Type of Feedback**	
	No goal[6]	Self-set goal	Exogenously assigned goal	Endogenously assigned goal	Wage-relevant goals	Piece-rate payment	Flat payment	Controlled for	Objective feedback	Subjective feedback
Our paper	+	+	-	+	-	-	+	+	-	+
Corgnet et al., 2015	+	-	-	+	-	+	-	-	-	-
Corgnet et al., 2018	+	-	-	+	-	+	-	-	-	-
Fan et al., 2020	+	+	+	-	-	+	-	-	-	-
Brookins et al., 2017	+	+	-	-	-	+	+	-	-	-
Dalton et al., 2016	+	+	-	-	+	+	-	-	+	-
Gonzalez-Jimenez et al., 2020	+	+	-	-	+	+	-	-	+	-
Goerg and Kube, 2012	+	+	+	-	+	+	-	-	-	-
Akın and Karagözoğlu, 2018	+	+	+	-	+	+	-	-	+	-

Explanations of the columns:

- Regarding the type of goals, "no goal" stands for no goal being set, "self-set goal" stands for subjects setting goals for themselves, "exogenously assigned goal" stands for goals being assigned by the experimenter, and "endogenously assigned goal" stands for goals being assigned by another subject in the experiment.
- Regarding the type of payment, "wage-relevant goals" represent a payment that depends on whether or not the goal is achieved, "piece-rate payment" represents a payment that is determined by multiplying the total output with a per-unit rate, "flat payment" represents a fixed payment that depends on neither output level nor whether the goal is achieved.
- The cost function column reports whether the cost of effort is controlled for in a study.
- Regarding the type of feedback, "objective feedback" stands for feedback on a subject's absolute performance or relative performance compared to others, "subjective feedback" stands for the feedback that is determined by another subject (such as an employer) in the experiment to convey his/her thoughts/feelings regarding his/her opponent's overall performance/decisions.

[6] The "no goal" situations in Corgnet et al. (2015, 2018) are formed endogenously (based on employers' decisions) in the experiment while other papers create a "no goal" treatment exogenously.

3 Theoretical Framework

In this section, we study a principal-agent problem with unobserved effort in a one-shot game. We will study Subgame Perfect Nash Equilibrium (SPNE) to solve for optimal goal and effort levels in three different scenarios: (i) when there is no goal at all, (ii) when the worker sets a goal, (iii) when the employer sets a goal. Proofs of all our theoretical results are presented in the Appendix.

We start by introducing our benchmark model, which we call "NoGoal". There are two players: a risk-neutral employer (principal) and a worker (agent). The worker selects a costly effort level $e \in [0,1]$. The cost of effort to the worker is given by $c(e) = \frac{1}{2}e^2$.[7] The effort, together with a random shock ε that is drawn from a uniform distribution on $[-1,1]$, determines output y. Formally, $y = e + \varepsilon$. The employer observes only the output, but not the effort the worker has selected. In the end, the employer gives feedback f to the worker based on the observed output. Since this is a one-shot game, there is no reason for the employer to have strategic considerations when giving feedback to the worker. Hence, the feedback function is just a truthful reflection of the observed output. For simplicity, we assume the feedback function to be $f(y) = y$.

The employer receives a flat positive endowment K and output y as his/her earnings.[8] Out of these earnings, the employer pays a flat wage w to the worker. Formally, the employer's utility Π is as follows.[9]

$$\Pi(y, w) = K + y - w$$

The worker derives extrinsic utility from his/her flat wage net of the cost of effort he/she has selected. Moreover, the worker derives intrinsic utility from the employer's feedback. This feedback utility is weighted by $a \in (0,1]$ to reflect the fact that a worker might not fully internalize the employer's feedback. Formally, the worker's utility u is as follows.

$$u(w, e, y) = w - c(e) + ay$$

Note that, while we interpret ay as the worker's utility from feedback, our model is general enough to accommodate alternative behavioral motivations. For example, ay might also be interpreted as utility from altruism or social image concerns. To simplify the presentation, we focus on the feedback utility interpretation.

We now solve for the worker's optimal effort level. Proposition 1 provides the effort level the worker chooses in an SPNE.

[7] While in the text we focus on this specific cost function for simplification purposes, in the Appendix we prove all our results under a more general cost function $c(e) = \frac{1}{2}e^x$ where $x > 1$.

[8] While a positive endowment is not essential for our theoretical results, it makes the theoretical framework consistent with the experimental set-up we designed in a way to guarantee that subjects incur no monetary losses.

[9] To simplify the representation of the employer's utility, we exclude the utility he/she receives from feedback. One can easily modify his/her utility function such that giving a truthful feedback will be optimal. For example, suppose $\Pi(y, w) = K + y - w + s\mathbb{I}$ where $s \in \mathbb{R}_{++}$ and $\mathbb{I} = 1$ if the feedback is truthful and $\mathbb{I} = 0$ otherwise. In order to gain the positive additive utility in this one-shot game, the employer will prefer to give feedback that is a truthful reflection of his/her feelings based on observed output.

Proposition 1. *When there is no goal, the optimal effort is*

$$e^*_{NoGoal} = a$$

Proposition 1 states that, in the absence of a goal, the worker's optimal effort equals the feedback coefficient a. Therefore, the optimal effort is positive and, secondly, the more the worker cares about feedback, the more effort he/she exerts.

We now introduce an initial step of *goal setting* into the benchmark model. Specifically, at the outset of that game, either the worker or the employer sets a goal $g \in [0,2]$ for the output. Then, the benchmark game is played as usual. The goal set here is wage-irrelevant, that is, whether the goal is achieved does not yield any monetary consequences to any party.

We assume that the worker receives an intrinsic reference-dependent utility v from goal achievement where the goal g serves as the reference point. To make the exposition simpler, we assume standard reference-dependent preferences. Specifically,

$$v(y,g) = \begin{cases} (y-g)^{0.5} & if\ y \geq g \\ -(g-y)^{0.5} & if\ y < g, \end{cases}$$

Our results are robust to allowing for the v function to exhibit loss aversion as in Tversky and Kahneman (1991). In the Appendix, we conduct our theoretical analyses under that generalization.[10] All our results hold independently of the loss aversion parameter.

Considering both extrinsic and intrinsic utilities, the worker's utility in the presence of a goal is:

$$U(w,e,y,g) = w - c(e) + ay + bv(y,g)$$

Note that the value function v is weighted by $b \in (0,1]$ to allow for varying degrees of intrinsic motivation for goal achievement. Throughout the text, we further assume $a + b < 1$. When this sum is larger than or equal to one, the worker already has high intrinsic motivation that would induce him/her to exert the highest possible effort (independent of whether a goal exists and its level). Therefore, this is not an interesting case for studying the effects of goal setting. Nevertheless, in the Appendix, we work with a more general setting and solve our model for any $a, b \in (0,1]$.[11]

For simplification purposes, we also assume that the employer uses "goals" *only* as a tool to influence the worker's effort choice. In particular, the employer does not derive any intrinsic reference-dependent utility from the goal achievement. Hence, in the presence of a goal, the utility function of the employer is the same as in the benchmark model. Our main qualitative results still hold when we drop this assumption.[12]

[10] This is following Heath et al. (1999) who show in an experimental study that goals serve as reference points and affect outcomes in ways that are consistent with Tversky and Kahneman's (1991) loss averse value function, and others in the literature that model intrinsic effects of goals via loss aversion (e.g., Wu et al., 2008, Corgnet et al., 2015, 2018, and Brookins et al., 2017).

[11] As the Appendix shows, our results are robust to solving the model for any $a, b \in (0,1]$. However, note that in the general case, the highest possible effort can be selected by the worker in some cases and, therefore, in the comparison of goal and effort selections, some of the strict inequalities in the text are then replaced with weak inequalities in the Appendix.

[12] See Section 6 for a more detailed discussion on this assumption.

We first concentrate on the scenario in which the goal is set by the worker and call it "WorSet". Proposition 2 below identifies the optimal goal and effort levels in an SPNE.

Proposition 2. *When the goal is set by the worker,*

1. *the optimal goal is* $g^*_{WorSet} = 0$
2. *the optimal effort is*

$$e^*_{WorSet} = \hat{e}, \quad \textit{where } \hat{e} \textit{ satisfies } -2\hat{e} + 2a + b((1-\hat{e})^{0.5} + (1+\hat{e})^{0.5}) = 0$$

Proposition 2 shows that it is optimal for the worker to select the lowest possible goal, namely zero. This is because the worker receives negative utility whenever he/she fails to achieve the goal and positive utility upon achieving it. While it may not be clear at first sight, optimal effort function is also quite intuitive in the sense that the optimal effort increases with the feedback coefficient a and with the intrinsic goal achievement coefficient b (see Figure A.1 in the Appendix).

Finally, we study the scenario in which the goal is assigned by the employer and call it "EmpSet". Proposition 3 below provides the optimal goal and effort levels in an SPNE. Here, the employer strategically sets the goal to make the worker exert more effort, and the optimal goal and effort levels are the same.[13]

Proposition 3. *When the goal is set by the employer,*

1. *the optimal goal is*

$$g^*_{EmpSet} = a + b$$

2. *the optimal effort is*

$$e^*_{EmpSet} = a + b$$

The main question we ask in this paper is whether it is possible to rank goal and effort levels across three settings: NoGoal, WorSet, and EmpSet. Proposition 4 shows that one can do this independent of the parameters.

Proposition 4. *Goal and effort levels across settings can be compared formally as:*

1. $g^*_{EmpSet} > g^*_{WorSet} = 0$
2. $e^*_{EmpSet} > e^*_{WorSet} > e^*_{NoGoal} > 0$

[13] As can easily be seen, the worker's optimal effort increases with the weight of feedback (a) and intrinsic utility from goal achievement (b) here as well.

Proposition 4 shows that, independent of the model's parameters, both goal and effort levels are higher when the goal is set by the employer rather than the worker. Moreover, the optimal effort level is higher when there is a goal compared to when there is not.

In Section 4.1, we develop an incentivized laboratory experiment to formally test our main theoretical result, Proposition 4, and compare goal and effort levels experimentally among NoGoal, WorSet, and EmpSet treatments.

4 Experiment

4.1 Design and Procedures

We conducted a computer-based experiment at the experimental laboratory of Ozyegin University in Turkey during March – April 2019. The computer program was coded using z-Tree (Fischbacher, 2007). Subjects were recruited via Sona Systems from the participant pool at Ozyegin University. A total of 168 subjects participated in our experiment.

The experiment was composed of two parts where Part 1 was a *worker-employer game* to play and Part 2 was a questionnaire to fill out. Upon the arrival of subjects into the lab, the experiment started with reading instructions of Part 1 out aloud to ensure common knowledge and exposure of subjects to complete instructions. Then, subjects were asked to take a quiz to test their understanding of the game. After receiving the answer key, participants were given time to compare it with their own answers and were allowed to ask questions, if any. Each subject's question was answered individually. Then, subjects played the worker-employer game. After Part 1 was over, instructions for Part 2 (questionnaire) were read out loud and the experiment ended after subjects completed this part. At the end, each subject was paid a show-up fee of 10 TL and additional monies from Part 1. Subjects didn't earn any money from the quiz or questionnaire. The average total payment per subject was 31 TL.[14] Subjects received their payments in private. The entire process lasted approximately 90 minutes. Throughout the experiment, all payments were distributed in Turkish Lira (TL), that is, no experimental currency was used.

To simplify our experiment, we use a discrete setting rather than a continuous one as in the theory. Because we want to provide a clean test of our theory by minimizing the confounding factors, we use a *chosen effort* task instead of a real effort task. A chosen effort task guarantees the use of a particular cost function that comes from the theory so that we can form predictions for our experimental study based on our theory. Imposing the same cost function across all subjects leaves the experimental design agnostic to ability differences.[15] In addition, keeping the cost function the same over repetitions ensures that any observed changes in the effort level over periods cannot be attributed to subjects getting more experienced in the task. Finally, since a chosen effort task is relatively quick, we can maximize the number of observations we collect.

The worker-employer game was played between a worker and an employer for 14 rounds. The existence of multiple rounds is important to capture learning effects. Before rounds started, half of the subjects in a session were randomly assigned the role of a worker and the

[14] In March-April 2019, the average exchange rate was about \$1=5.60 TL. The opportunity cost of students in our subject pool was approximately 7 TL per hour. In addition, net *daily* minimum wage in Turkey in 2019 was 67.35 TL.

[15] In addition, a high performance in a chosen effort task does not create any signaling effect regarding workers' ability (such as intelligence and attention).

others were assigned the role of an employer, and these roles were fixed until the end of all rounds. Then, in each round, a worker and an employer were randomly matched to play the game and each specific match occurred only once throughout the experiment to guarantee that each round gave us a one-shot game (as analyzed theoretically in Section 3). Subjects' earnings from Part 1 were determined by the random selection of one round at the end of the experiment.

The worker-employer game in a round starts with each worker and employer receiving an endowment of 18 (TL) and then four stages follow. In **Stage 1**, the worker chooses his/her *effort* (e) from the set $\{0, 6, 12, 18\}$ and it is unobservable to the employer.[16] Moreover, effort is costly to the worker and the cost is convex. Subjects are provided with the following cost table:[17]

Table 2. Effort Levels and Their Costs

e	0	6	12	18
$c(e)$	0	1	4	9

The worker's earnings are $18 - c(e)$. In **Stage 2**, a number is randomly drawn from $\{-18, -12, -6, 0, 6, 12, 18\}$ where each is equally likely. The total output, y, is the sum of the effort and the random number. The employer's earnings are $18 + y$. In **Stage 3**, worker and employer are each shown tables with different pieces of information. The employer is shown the total output and his/her own earnings from that round. So, the employer knows neither the effort level the worker has chosen nor the realized random number, but he/she knows only the resulting total output. On the other hand, the worker is shown all the details: random number and total output, employer's earnings as well as his/her own earnings from that round. Finally, in **Stage 4**, employer sends feedback to the worker by choosing an emoji among angry (😡), sad (☹️), neutral (😐), happy (🙂), bravo (👏), and the game ends.

Our experimental design consists of three treatments. We follow a between-subjects design. Subjects are randomly distributed across different treatments. While Stages 1-4 are common in all arms, treatments differ depending on whether a goal on production level is set prior to Stage 1 and, if so, by whom. In Treatment NoGoal, no goal is set, and the game is played between a worker and an employer with Stages 1-4 directly. This is our benchmark. In Treatment EmpSet, there is a **Stage 0** where the employer chooses a goal on total output from the set $\{0, 6, 12, 18, 24, 30, 36\}$, the worker is informed regarding the goal level, and then Stages 1-4 are played between the two as usual. In Treatment WorSet, in **Stage 0**, it is the worker who sets a goal on total output from $\{0, 6, 12, 18, 24, 30, 36\}$ and the employer is informed, and then Stages 1- 4 are played between the two. We conducted two sessions for each treatment and each session consisted of 28 participants. A summary of treatments is provided in Table 3.

[16] Note that effort choice set in the experiment is discrete with only four possible options. Moreover, the range for choices is between 0 and 18, instead of between 0 and 1 as in the theory. These together make the instructions much simpler and the differences between choices more salient in the experiment.

[17] To keep the theoretical and experimental settings equivalent to each other, the cost function in the experiment is adjusted accordingly. We use the cost function $c(e) = \frac{1}{36}e^2$.

Table 3. Summary of Treatments

	NoGoal	WorSet	EmpSet
Total # of Subjects	56	56	56
Total # of Workers	28	28	28
Total # of Employers	28	28	28
Stages Played	1-4	0-4	0-4
Is There a Goal?	No	Yes	Yes
Who Sets the Goal?	--	Worker	Employer
Total # of Goal Observations	--	392	392
Total # of Effort Observations	392	392	392

4.2 Hypotheses

We investigate five main hypotheses which we form based on our theoretical analyses in Section 3. Specifically, Proposition 4 gives rise to all our hypotheses below.

We first concentrate on goal levels. Our theory predicts that it is optimal for the worker to set the lowest possible goal. Based on this theoretical prediction, our first hypothesis for the experiment is given as follows.

Hypothesis 1. The goal level in WorSet will be zero.

Our second hypothesis compares the optimal goal levels when set by the worker and the employer.

Hypothesis 2. The goal level in EmpSet will be higher than the one in WorSet.

Next, we focus on effort levels. Our third hypothesis states that the worker always exerts a positive effort level.

Hypothesis 3. The effort level in all treatments will be positive.

Then, we compare effort levels across our treatments. In line with our theoretical predictions, we hypothesize that effort will be the highest when the employer sets a goal and this is stated in Hypothesis 3. Finally, Hypothesis 4 says that the worker exerts higher effort when he/she sets a goal compared to when there is no goal at all.

Hypothesis 4. The effort level in EmpSet will be higher than those in WorSet and NoGoal.

Hypothesis 5. The effort level in WorSet will be higher than that in NoGoal.

5 Experimental Findings

5.1 Main Findings

In this section, we study first goal levels and then effort levels observed in our treatments.[18] Table 4 shows the mean and median goals (as well as standard errors in parentheses) in each treatment.

Table 4. Summary Statistics for Goals

	Goals		No. of obs.
	Mean	Median	
WorSet	14.02	12	392
	(0.61)		
EmpSet	23.08	24	392
	(0.50)		

Note: Standard errors in parentheses.

The mean (median) goal is 23.08 (24) when the goal is set by the employer while the mean (median) goal is 14.02 (12) when it is set by the worker. One sample Wilcoxon Signed-Rank tests reject the hypotheses that median goals in WorSet and in EmpSet are each zero (p-value = 0.00 for each test). A Mann-Whitney test rejects the hypothesis that goals in Treatments EmpSet and WorSet come from the same distributions (p-value = 0.00). Figure 1 displays the histogram of goals in each treatment.

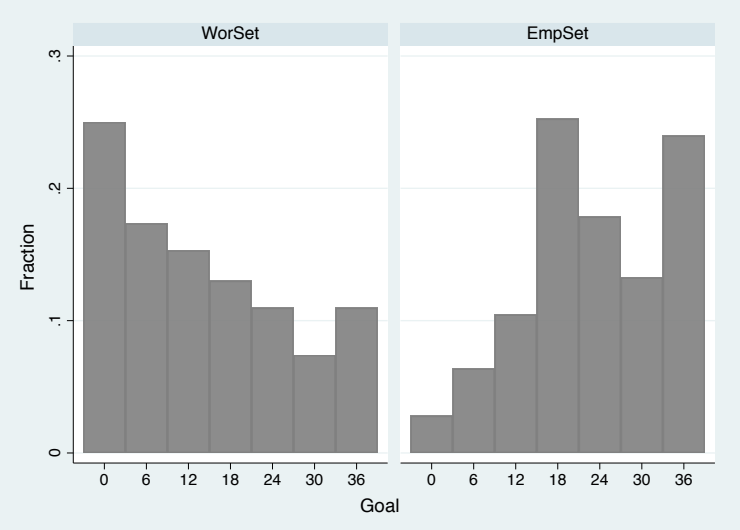

Figure 1. Histogram of Goals in Treatments

In addition, to study whether goal levels in the two treatments are different, we use regression analyses clustered at the subject level (Table 5).[19] The independent variable EmpSet is a dummy that takes value 1 if the treatment is EmpSet. Our similarly formed dummy,

[18] Throughout the paper, to be consistent in all analyses we do, we always report two-sided p-values. Note that, however, our hypotheses are appropriate for one-sided testing. If we were to report one-sided p-values corresponding to our hypotheses, statistical significance of our results would be stronger.

[19] We choose to cluster at the subject level because an employer and a worker never match together more than once and there is no direct interaction within workers or within employers.

WorSet, is left out as the base category. The variable Round indicates the round that the game is played. Specifications (1), (2), and (3) are OLS analyses where the dependent variable Goal denotes the goal level chosen by the employer or worker in each round.[20] Note that the constant in the OLS regression in Specification (1) captures the average goal level in the WorSet treatment and is significantly different than zero. This finding as well as the one sample Wilcoxon Signed-Rank test reported above are in contrast to Hypothesis 1. We discuss possible reasons behind this deviation in Section 6. OLS Regressions also reveal that goals in EmpSet are higher than in WorSet, and the difference is significant at the 1% level, both with and without control variables. This is consistent with Hypothesis 2. Finally, OLS analyses find no significant impact of Round (see also Figure 2).

Table 5. Regressions to Analyze Goals

	OLS Regression			Logistic Regression		
Dependent Var:	Goal			PositiveGoal		
	(1)	(2)	(3)	(4)	(5)	(6)
EmpSet	9.06***	9.06***	8.85***	11.55***	11.55***	11.68***
	(1.83)	(1.83)	(1.80)	(6.42)	(6.42)	(6.30)
Round		-0.02	-0.02		0.99	0.99
		(0.10)	(0.10)		(0.03)	(0.03)
Constant	14.02***	14.14***	23.19**	3.00***	3.18***	301.79*
	(1.34)	(1.45)	(11.24)	(0.90)	(1.01)	(1008.44)
Controls Added	No	No	Yes	No	No	Yes
N	784	784	784	784	784	784
R^2	0.14	0.14	0.17	-	-	-

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1%. Standard errors, clustered at the subject level, are in parentheses. Logistic Regressions (3) and (4) report odds ratios. Added controls are Age and Female.

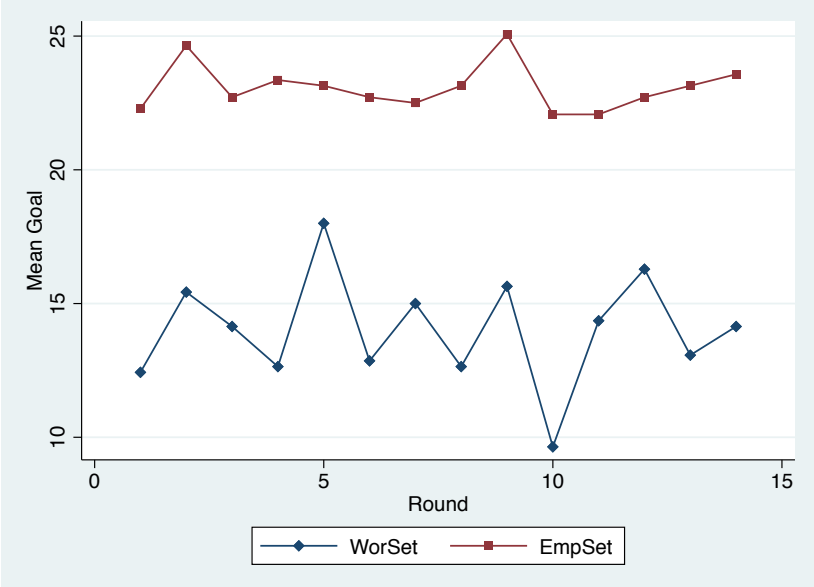

Figure 2: Mean Goal over Rounds in Treatments

[20] We conduct OLS regressions due to the ease of interpretation. However, our results are robust to ordered logit as well.

Recall our Hypothesis 1 that workers in WorSet treatment would pick the lowest goal, namely zero. While this is not what we observe in the experiment on average, the fraction of zero goals is much higher in WorSet than in EmpSet as can be seen in Figure 1. To analyze this formally, we conduct logistic regression analyses clustered at the subject level (see Specifications (4), (5), and (6) in Table 5). The dependent variable PositiveGoal is a dummy variable which takes 1 if the goal chosen by the employer or worker is positive and 0 otherwise. Results confirm that the positivity of goals is significantly different (with and without control variables) in WorSet and EmpSet treatments. Odds that the goal is positive are statistically significantly higher (or equivalently, odds that goals are zero are significantly lower) when the goal is set by the employer rather than the worker himself/herself. All these results regarding observed goal levels are summarized in Result 1.

Result 1. *While both workers and employers set positive goals on average, employers set significantly higher goals than workers do. In addition, the odds of goals being positive are significantly higher when employers set goals relative to when workers set goals.*

We now study effort levels. Table 6 shows the mean and median effort levels (as well as standard errors in parentheses) in each treatment.

Table 6. Summary Statistics for Effort

	Effort		
	Mean	Median	No. of obs.
NoGoal	5.92	6	392
	(0.32)		
WorSet	5.45	6	392
	(0.32)		
EmpSet	8.04	6	392
	(0.31)		

Note: Standard errors in parentheses.

In the benchmark treatment NoGoal, the mean (median) effort exerted by the worker is 5.92 (6). The mean (median) effort is 5.45 (6) when the worker sets a goal and 8.04 (6) when the goal is set by employer. One sample Wilcoxon Signed-Rank tests reject the hypotheses that median effort level in each treatment is zero (p-value = 0.00 for each test). While a Mann-Whitney test cannot reject the same distribution hypothesis for Treatments WorSet and NoGoal (p=0.652), it rejects the hypotheses that effort levels in Treatments EmpSet and WorSet (p-value = 0.048) and effort levels in Treatments EmpSet and NoGoal (p-value = 0.067) come from the same distributions. Hence, only the employer's goal setting seem to make a difference in the worker's effort choice. Histograms of effort levels are depicted in Figure 3.

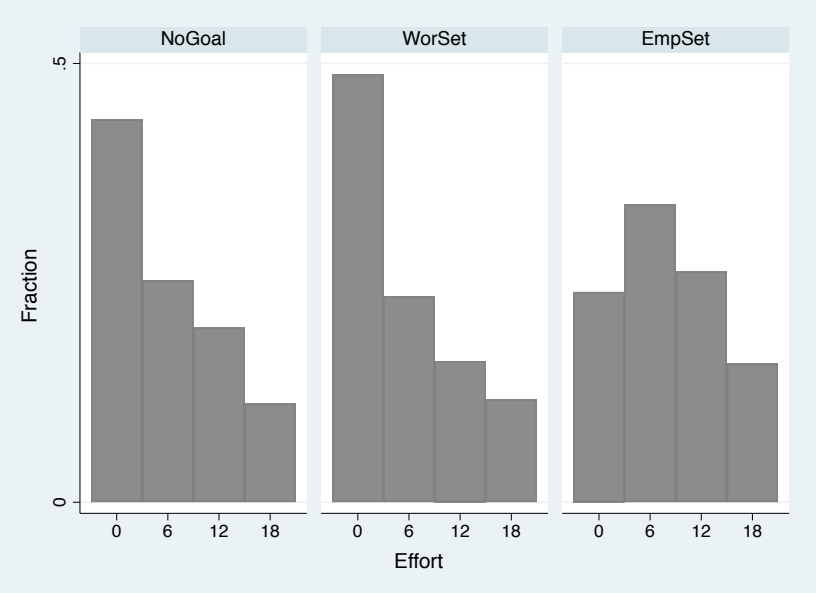

Figure 3. Histogram of Effort in Treatments

We now conduct regression analyses to study effort levels in more detail (Table 7). Specifications (1), (2), and (3) are OLS analyses (clustered at the subject level) where Effort denotes the effort level picked by a worker in each round. WorSet is again left out as the base category and we use dummy variables NoGoal and EmpSet to specify other treatments. Note that the constant in the OLS regression in Specification (1) captures the average effort level in the WorSet treatment and is significantly different than zero. While not shown here, we have also confirmed that effort levels in NoGoal and EmpSet are significantly different than zero (p-value = 0.00 for both). This finding as well as the one sample Wilcoxon Signed-Rank tests reported above for all treatments are in line with Hypothesis 3.

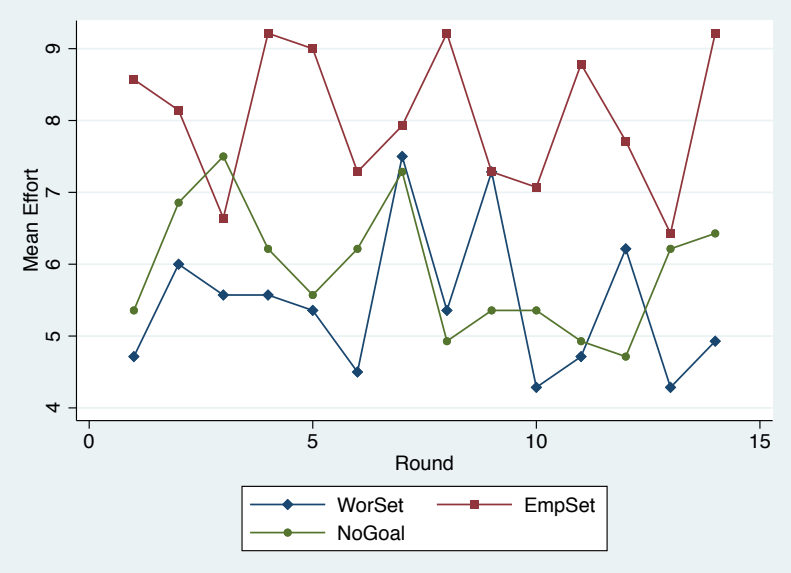

Figure 4: Mean Effort over Rounds in Treatments

Table 7. Regressions to Analyze Effort

	OLS Regression			Logistic Regression		
Dependent Var:	Effort			PositiveEffort		
	(1)	(2)	(3)	(4)	(5)	(6)
NoGoal	0.47	0.47	0.49	1.23	1.23	1.24
	(1.17)	(1.17)	(1.21)	(0.47)	(0.47)	(0.48)
EmpSet	2.59**	2.59**	2.55**	3.01***	3.02***	3.00***
	(1.03)	(1.04)	(1.01)	(1.05)	(1.05)	(1.01)
Round		-0.04	-0.04		0.98	0.98
		(0.04)	(0.04)		(0.01)	(0.01)
Constant	5.45***	5.78***	9.47**	1.05	1.21	4.63
	(0.82)	(0.86)	(4.00)	(0.28)	(0.32)	(7.59)
Controls Added	No	No	Yes	No	No	Yes
N	1176	1176	1176	1176	1176	1176
R^2	0.03	0.03	0.04	-	-	-
Wald tests for specification 1 (specification 2) (specification 3) (specification 4) (specification 5) (specification 6) H_0 : NoGoal = EmpSet, p-value = 0.046 (0.046) (0.057) (0.011) (0.011) (0.011)						

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1%. Standard errors, clustered at the subject level, are in parentheses. Logistic Regressions in (3) and (4) report odds ratios. Added controls are Age and Female.

In Specification (2), the variable Round and in Specification (3) control variables are additionally included in the analysis. We find that, with and without control variables, effort in EmpSet is significantly higher than those in WorSet and NoGoal, which is consistent with Hypothesis 4. The same analysis shows that effort level in WorSet is not significantly different than that in NoGoal. While this is not in line with our Hypothesis 5, we provide a discussion for that in Section 6. Finally, OLS analysis finds no significant impact of the variable Round (see also Figure 4).

From Figure 3, it is evident that the fraction of zero effort is smaller in EmpSet compared to the two other treatments. To analyze this, we also run logistic regressions (clustered at the subject level). In Specifications (4), (5), and (6) of Table 7, PositiveEffort is a dummy variable which takes 1 if the effort is positive and 0 otherwise. Results confirm our observation from Figure 3 (with or without control variables). Odds of providing positive effort are significantly higher (or equivalently, odds of providing zero effort are significantly lower) in EmpSet than in WorSet and NoGoal, whereas the odds are not significantly different in the latter two treatments. Our experimental findings regarding effort level comparisons are summarized in Result 2.

Result 2. *Workers exert the highest effort when there is a goal and the goal is set by their employers. Effort levels are not significantly different from each other when workers set goals and when there is no goal at all.*

Our main findings show that effort and goal levels are significantly the highest when the employer sets a goal, and effort levels are always positive. These are consistent with Hypotheses 2, 3, and 4. However, in contrast to Hypotheses 1 and 5, the worker sets a positive goal (not the lowest possible level) and effort levels are not significantly different when the

worker sets a goal and when there is no goal. In Section 5.2, we will delve into analyzing effort and goal levels in more detail so that we can grasp a better understanding of our experimental observations. Then in Section 6, we will improve our theoretical framework based on the results of Sections 5.1 and 5.2.

5.2 Additional Findings

As shown in Section 5.1, both goal and effort levels are higher in EmpSet than in WorSet. Now, the question is: do we observe a higher effort in EmpSet just because goals are higher there (indirect effect) or does the mere fact that employers are setting the goal also have an impact on effort levels on its own (direct effect)? To answer this question, we focus on WorSet and EmpSet treatments, and carry out a two-level mediation analysis via generalized structural equation modeling (GSEM) shown in Table 8. We assume that effort is affected by the variables EmpSet, Goal, and Round, and we introduce a latent variable at the workers' subject level. Moreover, we assume goals to be affected by EmpSet and Round and introduce a latent variable at the level of subjects who set goals.

Table 8. Two-Level GSEM to Analyze Direct and Indirect Effects of Goal on Effort

Dependent / Indep Var	(1)	(2)
Effort /		
Goal	0.10***	0.10***
	(0.02)	(0.02)
EmpSet	1.65*	1.66*
	(0.99)	(0.95)
Round	-0.03	-0.03
	(0.04)	(0.04)
Constant	4.21***	15.32***
	(0.81)	(4.85)
Goal /		
EmpSet	9.06***	8.85***
	(1.81)	(1.82)
Round	-0.02	-0.02
	(0.08)	(0.08)
Constant	14.14***	23.19**
	(1.42)	(11.71)
Controls Added	No	Yes
N	784	784

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1%. Standard errors, clustered at the subject level, are in parentheses. Added controls are Age and Female.

Table 8 analyzes the two channels through which effort might be affected. First, goals are significantly higher in EmpSet than in WorSet, and in turn higher goals are associated with significantly higher effort. This is the indirect effect of the treatment on effort and is significant at the 1% level ($p = 0.00$). In addition, EmpSet has a positive direct effect on effort: the mere fact that the employer setting the goal leads to an increase in effort. This direct effect is

marginally significant ($p = 0.08$). The total effect of EmpSet on effort is also positive: effort is significantly higher by a total of 2.57 ($p = 0.007$) when the goal is set by the employer rather than the worker. 0.92 of this total effect comes from the indirect effect and 1.65 of it comes from the direct effect. These respectively correspond to a 16.88% and 30.27% increase in effort when the employer sets a goal compared to when the worker sets a goal, adding up to a total of 47.15% increase.

Result 3. *Goal setting has both direct and indirect effects on effort. Both effects are positive and large in magnitude.*

Section 5.1 demonstrated that, in settings like ours, it is best if goals are set by employers. Can this research also inform us about how employers should set goals? Our purpose now is to gain a deeper understanding of the relation between effort and goal levels in the EmpSet treatment. Figure 5 depicts that mean effort increases with goal until goal level reaches 30, but it then declines when goal is set at 36. This is consistent with our model which predicts a positive relationship between effort and goal initially, and then a decline in effort with the goal (see Claim 2 in the proof of Proposition 3 in the Appendix).

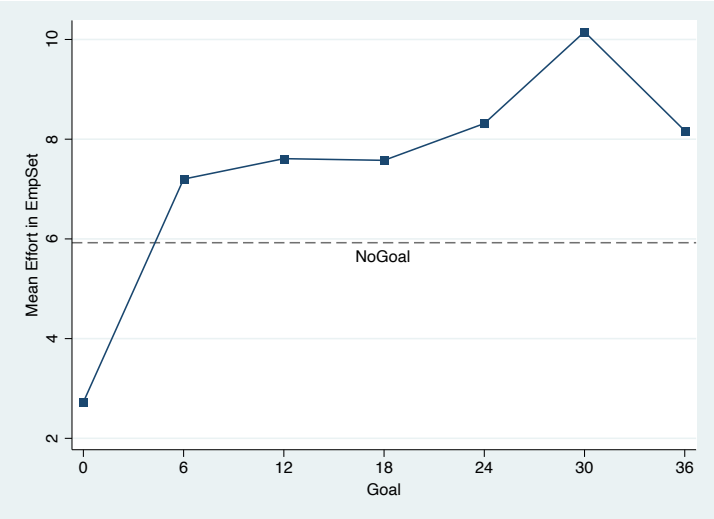

Figure 5. Mean Effort over Goal for Treatment EmpSet

Concentrating on the EmpSet treatment, we run OLS regressions with and without control variables (Table 9), all clustered at the subject level. Effort is the dependent variable; Goal and Round are the independent variables, defined as before. Specifications (1) and (2) find no significant overall impact of goals on effort. However, things change when we additionally include in the analyses the dummy variable Goal36 which takes value 1 if employer sets the maximum possible goal (36) and takes 0 for any other goal level. Specifications (3) and (4) reveal that higher goals lead to significantly higher effort but, consistent with our theory, increasing the goal to 36 backfires. In particular, we see that the motivational effect of goal on effort either disappears or reverses when the goal level is further increased from 30 to 36 (see also Table A.1 in Appendix A for a robustness check). Therefore, for goals to be effective, employers should not set them too high as they may discourage workers.

Result 4. *Effort significantly increases with the goal unless the employer sets it too high.*

Table 9. OLS Regressions to Analyze the Relationship between Effort and Goal in Treatment EmpSet

Dependent Var: Effort in EmpSet	(1)	(2)	(3)	(4)
Goal	0.08	0.08	0.16***	0.15**
	(0.05)	(0.05)	(0.06)	(0.06)
Round	-0.03	-0.03	-0.03	-0.03
	(0.07)	(0.07)	(0.06)	(0.07)
Goal36			-2.48**	-2.21*
			(1.04)	(1.08)
Constant	6.41***	21.23***	5.26***	19.92***
	(1.23)	(4.73)	(1.15)	(4.93)
Controls Added	No	Yes	No	Yes
N	392	392	392	392
R^2	0.02	0.10	0.03	0.12

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1%. Standard errors, clustered at the subject level, are in parentheses. Added controls are Age and Female.

Finally, we analyze the employer's feedback in each treatment and whether/how it relates to other variables in the experiment. We define the variable Feedback such that it takes a value of 0 if the emoji the employer sends stands for angry, 1 if sad, 2 if neutral, 3 if happy, and 4 if bravo.[21] Note that this was the same order we presented emojis (from left to right) to subjects in the experiment. Table 10 provides summary statistics for employer's feedback.

Table 10. Summary Statistics for Feedback

	Feedback		
	Mean	Median	No. of obs.
NoGoal	1.96	2	392
	(0.07)		
WorSet	2.10	2	392
	(0.07)		
EmpSet	2.14	2	392
	(0.07)		

Note: Standard errors in parentheses.

In all treatments, the median feedback is 2. The mean feedback provided by the employer is 1.96 in NoGoal, 2.10 in WorSet, and 2.14 in EmpSet. A Mann-Whitney test rejects the same distribution hypothesis for Treatments EmpSet and NoGoal (p=0.09) but cannot reject it for other pairwise comparisons of treatments (p=0.23 for NoGoal and WorSet, p=0.69 for NoGoal and EmpSet).

To analyze the connection between feedback and other variables, we run OLS regressions (clustered at the subject level) for each treatment separately (Table 11). In all these analyses, while Feedback is always the dependent variable, the right-hand side varies. Total

[21] Our results in this section are robust to defining Feedback as 0 for neutral, -1 for sad or angry, and 1 for happy or bravo.

Output and Round are the only independent variables in the analyses of NoGoal treatment (Specifications (1) and (2)). In the analyses of EmpSet and WorSet treatments (Specifications (3) to (6)), the additional variable Gap is introduced to analyze whether feedback depends on how large total output is relative to the goal. Formally, we define Gap as Total Output minus Goal.

We find in all treatments that Total Output has a positive significant effect on employer's feedback: the higher the resulting total output, the better feedback the employer sends to the worker. The effect of Gap on feedback, however, differs depending on who sets the goal. When the employer sets the goal, feedback becomes significantly better as Gap increases.[22]

Table 11. OLS Regressions to Analyze Feedback

	NoGoal		EmpSet		WorSet	
Dependent Var: Feedback	(1)	(2)	(3)	(4)	(5)	(6)
Total Output	0.07***	0.07***	0.05***	0.05***	0.07***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Round	0.00	0.00	-0.02	-0.02	-0.03**	-0.03**
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Gap			0.02***	0.02**	0.01	0.01
			(0.01)	(0.01)	(0.01)	(0.01)
Constant	1.51***	0.90	2.25***	2.84**	1.99***	2.06**
	(0.14)	(0.75)	(0.24)	(1.14)	(0.18)	(0.76)
Controls Added	No	Yes	No	Yes	No	Yes
N	392	392	392	392	392	392
R^2	0.51	0.51	0.45	0.46	0.58	0.59

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1%. Standard errors, clustered at the subject level, are in parentheses. Added controls are Age and Female.

Result 5. *In all treatments, the employer sends more positive feedback as the total output increases. In addition, the gap between output and goal has a significant (and positive) effect on the employer's feedback only when the employer sets a goal.*

As indicated in Result 5, total output has a strong and positive effect on feedback. This is consistent with our theoretical assumption regarding feedback. On the other hand, in the experiment, how total output compares relative to the goal is observed to have a significant (positive) effect on the employer's feedback when the employer sets a goal and this is not in line with our theoretical assumption.

[22] Goal lvel is not included in the regression analyses in Table 11 due to multicollinearity. Table A.2 in Online Appendix A shows that when a goal is set by the worker, its level has no significant impact on the employer's feedback.

6 Discussion

Recall that we find employers set higher goals than workers do and workers exert the highest effort when employers set goals than otherwise. These are fully consistent with our theoretical predictions. At the same time we observe some deviations from our other predictions. In this section, we provide possible reasons for these deviations. Furthermore, we discuss how to alter our theoretical model based on what we have learned from the experiment.

Our experimental findings deviate from our main hypotheses in two particular directions. First, effort levels in WorSet and NoGoal are observed to not significantly differ from each other in the experiment (Result 2), but our theory predicts that effort in WorSet would be greater than that in NoGoal (Hypothesis 5). Second, workers are observed to set positive goals in the experiment (Result 1), but our theoretical model predicts that workers should set zero goals in the WorSet treatment (Hypothesis 1).

One possible reason behind the first deviation is that our assumption regarding the absence of a reference point in the NoGoal treatment is incorrect. In particular, the worker might always have a reference goal level in his/her mind even when he/she is not asked to report it. If the worker has a positive reference goal level, then his/her effort will be higher than the level predicted by our theoretical model. Moreover, if reference points in the NoGoal and WorSet treatments are identical/similar, then the effort levels in these two treatments will be identical/similar.

One might ask why the worker has a positive reference goal in the NoGoal treatment and why is that reference point identical or similar to the one in the WorSet treatment? A positive reference goal in the NoGoal treatment might be coming from the worker's belief regarding what an acceptable level of output is. The same goal level might then become a reasonable goal to set even in the WorSet treatment especially if the worker has self/social image concerns.[23] In other words, it is possible that in the WorSet treatment, the worker might be setting the goal truthfully rather than strategically by revealing the reference goal level in his/her mind (or at the very least heavily influenced by what he/she considers to be an acceptable goal level). This is consistent with both WorSet and NoGoal treatments sharing the same/similar reference goal levels as well as the worker setting a positive goal in the WorSet treatment, thereby explaining the second deviation we observe.

To summarize, if one updates our original model such that the worker uses the same/similar reference goal levels in the NoGoal and WorSet treatments and behave in a reference-dependent manner when selecting his/her effort, then both main deviations we observe in our experiment can be explained.

Now, it is natural to ask what goal will serve as a reference in EmpSet treatment as there are two possible candidates—the original reference goal in the worker's mind and the goal set by the employer. It is not unreasonable to expect that the employer will set a higher goal for strategic purposes than the reference goal in the worker's mind. While it is not clear what the worker's new reference would be in that case, we don't actually need to make a strong claim on that. Effort in EmpSet would still be higher than that in WorSet regardless of whether

[23] In a survey conducted at the end of the experiment, subjects are asked to rate their self- and social-image concerns in life. Analyzing these rating, we find that in the WorSet treatment, goal levels and workers' image concerns are positively correlated. The correlation is 0.19 for social-image and 0.15 for self-image.

the worker updates his/her original reference point to be either the same as the new goal set by the employer or somewhere in between the two levels.

Finally, our experimental findings also reveal two more interesting results that challenge our theoretical assumptions (but not our main theoretical predictions). One is that the goal being set by the employer rather than the worker has a positive direct impact on effort (Result 3). This in contrast to our model's assumption that how much the worker cares about the gap between the output and goal (which is reflected by the b coefficient in our model) is the same in EmpSet and WorSet. Moreover, we find that feedback in the EmpSet treatment depends on both the output and the gap (Result 5) and this challenges our theoretical assumption regarding feedback depending on the output only. While one can easily incorporate these two additional findings into our theoretical model, it is important to note that these modifications would not affect the qualitative predictions of our theory regarding goal and effort level comparisons which are the main hypotheses that we are interested in testing in this paper.[24]

7 Conclusion

In this paper, we propose a game theoretic model and conduct an incentivized laboratory experiment to study how goal levels and their effects on effort differ depending on by whom they are set. Ruling out any extrinsic motivation, our work guarantees that any observed effects of goals are due to intrinsic motivation.

In the experiment, while both the employer and the worker set a positive goal, the employer sets a higher goal than the worker does. We find that effort is the highest when the employer sets a goal, but effort levels are not significantly different from each other when the worker sets a goal and when there is no goal at all. The original theory we presented in Section 3, together with some modifications discussed in Section 6, can explain our main experimental findings. According to that modified theory, the worker always has a reference goal level such that he/she receives intrinsic utility from the gap between the goal and total output. The worker uses the same/similar goal level as his/her reference when asked to set a goal and when there is no goal at all; and updates that reference when the employer sets a different goal.

Our experimental data gives rise to other additional interesting findings. For example, we show that the worker exerts a higher effort when the employer sets a goal because not only the goal is higher then but also it is the employer who sets the goal. Next, when the employer sets a goal the employer's feedback depends on the output and its distance from the goal while it depends only on the output in the two other cases. Finally, the worker's effort increases with the goal unless the employer sets it too high. Therefore, in settings like ours, while it is best for managers to set goals, managers should select goals carefully at levels that are challenging enough but not too high either.

[24] Result 3 can be reflected in our model by assuming b coefficient in the worker's utility to be greater in EmpSet than that in WorSet. Result 4 implies that the employer's feedback function in EmpSet needs to be updated in a way to depend upon both the output and the gap. While it is not clear whether the employer's utility function in EmpSet should also be modified to include utility he/she could possibly obtain from the gap, our qualitative results continue to hold independent of this. Note that modifications based on Results 3 and 4 are also consistent with each other. Because the worker not only cares about the gap himself/herself (intrinsically) but also may infer that the employer's feedback is conditional on the gap in EmpSet but not in WorSet, thereby strengthening the gap's impact on the worker's utility in EmpSet compared to that in WorSet. The solutions of this updated model is available upon request.

We view our study as an initial step to understanding the full effects of who sets the goal in a clean and simple design, possibly at the expense of some degree of realism. To rule out possible confounding effects that may arise due to the nature of the task such as ability differences or possible signaling effects through high performance/goals, our experiment uses a chosen effort task rather than a real effort one. A future research agenda could investigate several different types of real effort tasks and how the type of the real effort task interacts with goal and effort levels.

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APPENDIX

In this section, we prove all our theoretical results under a general case where

1. In all treatments, the cost of effort to the worker is $c(e) = \frac{1}{2}e^x$ where $x > 1$.

2. In treatments where there is a goal (WorSet and EmpSet), we allow for the worker's intrinsic utility v from goal achievement to exhibit Tversky and Kahneman's (1991) loss aversion ($\lambda > 1$) as well as the standard reference-dependence preference ($\lambda = 1$). Formally,

$$v(y,g) = \begin{cases} (y-g)^{0.5} & if\ y \geq g \\ -\lambda(g-y)^{0.5} & if\ y < g, \end{cases}$$

3. For any $a, b \in (0,1]$ (not necessarily $a + b < 1$)

Proof of Proposition 1. When there is no goal, given the flat wage, w, the worker chooses his own effort, e. The worker's problem is to maximize the expected utility with respect to effort. The utility of the worker is $U = w - c(e) + ay$. Then, the expected utility becomes $EU = w - c(e) + ae$ as $y = e + \varepsilon$ and the random shock ε is distributed uniformly on $[-1,1]$. The optimal effort level for the worker is $e^*_{NoGoal} = \underset{e}{\operatorname{argmax}}(w - c(e) + ae)$. Since, $\frac{\partial^2 EU}{\partial e^2} = -\frac{\partial^2 c(e)}{\partial e^2} < 0$ for all parameter values, at the optimal e, we have $e^{x-1} = \frac{2a}{x}$ as long as $e \leq 1$. Then, the optimal effort satisfies $e = \exp\left(\frac{1}{x-1}\ln\left(\frac{2a}{x}\right)\right)$ if $a \leq \frac{x}{2}$ holds. Otherwise, $e^*_{NoGoal} = 1$. So, the worker's optimal effort function is as follows:

$$e^*_{NoGoal} = \begin{cases} \exp\left(\frac{1}{x-1}\ln\left(\frac{2a}{x}\right)\right) & if \quad a \leq \frac{x}{2} \\ 1 & if \quad a > \frac{x}{2} \end{cases}$$

Specifically, when $\lambda = 1$, $x = 2$, and $a + b < 1$, Proposition 1 is proved. ■

Proof of Proposition 2. When the goal is set by the worker, given the flat wage, w, the worker chooses his own effort, e as well as the goal. The worker's problem is to maximize the expected utility with respect to effort and goal. The utility of the worker is $U = w - c(e) + ay + bv(y,g)$ where $v(y,g) = (y-g)^{0.5}$ if $y \geq g$ and $v(y,g) = -\lambda(y-g)^{0.5}$ if $y < g$. The expected utility is $EU = w - c(e) + ae + \frac{b\lambda}{3}\left(-(1+g-e)^{3/2} + (-1+g-e)^{3/2}\right)$ if $e \leq g - 1$ and $EU = w - c(e) + ae + \frac{b\lambda}{3}\left(-(1+g-e)^{3/2} + (1-g+e)^{3/2}\right)$ if $g - 1 \leq e \leq g + 1$.

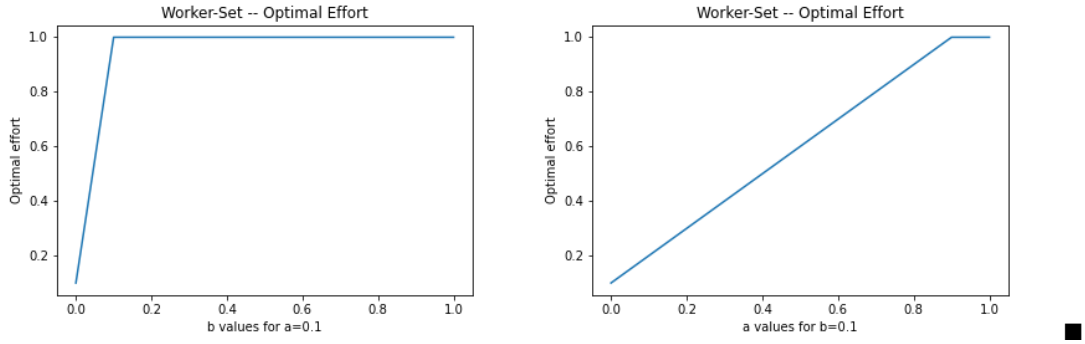
First, we observe that as the goal increases, the expected utility of the worker decreases; $\frac{\partial EU}{\partial g} < 0$ holds for all e. Then, the optimal goal is $g^*_{WorSet} = 0$. Given that $g^*_{WorSet} = 0$, we have $e^*_{WorSet} = \underset{e}{\operatorname{argmax}}\left(w - c(e) + ae + \frac{b\lambda}{3}\left(-(1-e)^{3/2} + (1+e)^{3/2}\right)\right)$ as $\frac{\partial^2 EU}{\partial e^2} = -\frac{\partial^2 c(e)}{\partial e^2} + \frac{b\lambda}{4}\frac{-\sqrt{1+e}+\sqrt{1-e}}{\sqrt{1-e^2}} < 0$ holds true for all parameter values. When $e^*_{WorSet} \in [0,1]$, then e^*_{WorSet} satisfies the first order condition $-xe^{x-1} + 2a + b\lambda((1-e)^{0.5} + (1+e)^{0.5})) = 0$. Second, we establish that $\frac{\partial e^*_{WorSet}}{\partial a} = -\frac{2}{\frac{\partial^2 EU}{\partial e^2}} > 0$ and that $\frac{\partial e^*_{WorSet}}{\partial b} = -\frac{\lambda((1-e)^{0.5}+(1+e)^{0.5})}{\frac{\partial^2 EU}{\partial e^2}} > 0$. Then, for the set of parameters satisfying $-x + 2a + b\lambda\sqrt{2} > 0$, we have $e^*_{WorSet} = 1$. So, the worker's optimal effort function is as follows:

$$e^*_{WorSet} = \begin{cases} \hat{e} & if \;\; a \le \frac{x}{2} - b\lambda\frac{\sqrt{2}}{2} \\ 1 & if \;\; a > \frac{x}{2} - b\lambda\frac{\sqrt{2}}{2} \end{cases}$$

where $-x\hat{e}^{x-1} + 2a + b\lambda((1-\hat{e})^{0.5} + (1+\hat{e})^{0.5}) = 0$.

Specifically, when $\lambda = 1$, $x = 2$, and $a + b < 1$, Proposition 2 is proved. For these specific values of λ and x, Figure A.1 shows the relation between optimal effort levels and parameters a and b. The graph on the right shows how optimal effort changes with the parameter a, for a given value of b (for example, when $b = 0.1$) and the graph on the left shows how optimal effort changes with the parameter b, for a given value of a (for example, when $a = 0.1$).

Figure A.1: How the optimal effort changes with respect to a and b



■

Proof of Proposition 3. When the goal is assigned by the employer, then the optimization problem of the employer becomes $\max_g(E\Pi)$ subject to $e^*_{EmpSet} = \underset{e}{\operatorname{argmax}}(EU)$. As the wage of the worker depends on neither the performance nor the goal, $E\Pi = e + K - w$. Then, the employer will choose the goal that would maximize the effort of the worker. As established in Proposition 2, The expected utility is $EU = w - c(e) + ae + \frac{b\lambda}{3}\left(-(1+g-e)^{3/2} + (-1+g-e)^{3/2}\right)$ if $e \le g - 1$ and $EU = w - c(e) + ae + \frac{b\lambda}{3}\left(-(1+g-e)^{3/2} +\right.$

$(1-g+e)^{3/2}\big)$ if $g-1<e\leq g+1$. Given the goal, the worker determines his own effort. Then, $\frac{\partial EU}{\partial e}=-\frac{\partial c(e)}{\partial e}+a+\frac{b\lambda}{2}\big((1+g-e)^{1/2}+(1-g+e)^{1/2}\big)$ if $g-1<e\leq g+1$ and $\frac{\partial EU}{\partial e}=-\frac{\partial c(e)}{\partial e}+a+\frac{b\lambda}{2}\big((1+g-e)^{1/2}-(-1+g-e)^{1/2}\big)$ if $e\leq g-1$.We establish that $\frac{\partial^2 EU}{\partial e^2}\leq 0$ for all $g\leq e+\gamma$ where $\gamma\geq 0$. Otherwise, if the employer sets a goal level that is higher than a certain threshold, the worker chooses to exert no effort. When $g-1<e\leq g+1$, we have $\frac{\partial EU}{\partial e\partial g}=\frac{b\lambda}{4}\big((1+g-e)^{-1/2}-(1-g+e)^{-1/2}\big)$ and when $e\leq g-1$, we have $\frac{\partial EU}{\partial e\partial g}=\frac{b\lambda}{4}\big((1+g-e)^{-1/2}-(-1+g-e)^{-1/2}\big)$.

Claim 1: The optimal effort and goal must satisfy $g-1<e\leq g+1$.

Proof of Claim 1: When $e\leq g-1$, as goal increases the optimal effort decreases, i.e., $\frac{\partial e^*}{\partial g}<0$. Hence, the employer would never choose a goal that would make the worker choose such an effort level that satisfies $e+1\leq g$.

Claim 2: When the goal is determined by the employer, we have

- $\frac{\partial e^*(g)}{\partial g}>0$ for $g<e^*(g)$
- $\frac{\partial e^*(g)}{\partial g}<0$ for $g>e^*(g)$

Proof of Claim 2: For a given goal, the optimal effort is determined by $\frac{\partial EU}{\partial e}=-\frac{\partial c(e)}{\partial e}+a+\frac{b\lambda}{2}\big((1+g-e)^{1/2}+(1-g+e)^{1/2}\big)\leq 0$. We can identify how the optimal effort of the worker responds to the goal level of the employer by $\frac{\partial e^*(g)}{\partial g}=-\frac{\frac{\partial EU}{\partial e\partial g}}{\frac{\partial^2 EU}{\partial e^2}}$. As $\frac{\partial^2 EU}{\partial e^2}<0$, the sign of $\frac{\partial e^*(g)}{\partial g}$ is the same as that of $\frac{\partial EU}{\partial e\partial g}$. We have $\frac{\partial EU}{\partial e\partial g}=\frac{b\lambda}{4}\big((1+g-e)^{-1/2}-(1+g+e)^{-1/2}\big)$. We observe that we have $\frac{\partial EU}{\partial e\partial g}>0$ for all $g<e^*(g)$ and that we have $\frac{\partial EU}{\partial e\partial g}<0$ for all $g>e^*(g)$.

Claim 1 and Claim 2 establish that at the optimal effort and goal combination we must have $g^*_{EmpSet}=e^*_{EmpSet}$. If we solve $=-\frac{\partial c(e)}{\partial e}+a+\frac{b\lambda}{2}\big((1+g-e)^{1/2}+(1-g+e)^{1/2}\big)=0$ and $g=e$, we can identify the optimal goal and effort. We have $g^*_{EmpSet}=e^*_{EmpSet}=\exp(\frac{1}{x-1}\ln(\frac{2(a+b\lambda)}{x}))$ if $\frac{1}{x-1}\ln\left(\frac{2(a+b\lambda)}{x}\right)>0$. That is, we have an interior solution exists, if $a\leq\frac{x}{2}-b\lambda$ holds. Otherwise, regardless of the value of the goal, $e^*_{EmpSet}=1$. So, the employer's optimal goal and worker's optimal effort functions are as follows:

$$g^*_{EmpSet}=\begin{cases}\exp(\frac{1}{x-1}\ln(\frac{2(a+b\lambda)}{x})) & if\ \ a\leq\frac{x}{2}-b\lambda\\ g\in[0,2] & if\ \ a>\frac{x}{2}-b\lambda\end{cases}$$

$$e^*_{EmpSet} = \begin{cases} \exp\left(\frac{1}{x-1}\ln\left(\frac{2(a+b\lambda)}{x}\right)\right) & if\ \ a \le \frac{x}{2} - b\lambda \\ 1 & if\ \ a > \frac{x}{2} - b\lambda \end{cases}$$

Specifically, when $\lambda = 1$, $x = 2$, and $a + b < 1$, Proposition 3 is proved. ■

Proof of Proposition 4. The proof of the goal comparison is as follows. When the goal is set by the worker, $g^*_{WorSet} = 0$ for all parameter values. However, when the goal is set by the employer, $g^*_{EmpSet} = \exp\left(\frac{1}{x-1}\ln\left(\frac{2(a+b\lambda)}{x}\right)\right)$ as long as $a \le \frac{x}{2} - b\lambda$ holds. That is, for $a \le \frac{x}{2} - b\lambda$, we have $g^*_{WorSet} < g^*_{EmpSet}$. However, for $a > \frac{x}{2} - b\lambda$, g^*_{EmpSet} can be any value. That is, for $a > \frac{x}{2} - b\lambda$, we have $g^*_{WorSet} \le g^*_{EmpSet}$.

The proof of the effort comparison is as follows. Given the effort level of the workers under different goal-setting cases, we establish that $0 < e^*_{NoGoal} < e^*_{WorSet} < e^*_{EmpSet}$ for $a \le \frac{x}{2} - b\lambda\frac{\sqrt{2}}{2}$. As $e^*_{NoGoal} = \exp\left(\frac{1}{x-1}\ln\left(\frac{2a}{x}\right)\right)$ for $a \le \frac{x}{2}$, we have $e^*_{NoGoal} > 0$.

For $\frac{x}{2} - b\lambda\frac{\sqrt{2}}{2} \le a \le \frac{x}{2}$ we have $0 < e^*_{NoGoal} < e^*_{WorSet} = e^*_{EmpSet} = 1$ and for $\frac{x}{2} < a$ we have $e^*_{NoGoal} = e^*_{WorSet} = e^*_{EmpSet} = 1$. That is, the optimal effort of the worker is weakly higher when there is a goal compared to when there is not and the optimal effort is weakly higher when the goal is set by the employer compared to when the goal is set by the worker.

Specifically, when $\lambda = 1$, $x = 2$, and $a + b < 1$, we have $g^*_{WorSet} < g^*_{EmpSet}$ and $0 < e^*_{NoGoal} < e^*_{WorSet} < e^*_{EmpSet}$.■

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APPENDIX A: Additional Data Analyses

We now conduct OLS regression analyses specifically for the EmpSet treatment (Table A.1) to study the relation between effort and goal levels. Effort level selected by the worker in the EmpSet treatment is the dependent variable. The variables Round and GoalX constitute the independent variables where GoalX is a dummy that takes a value 1 if goal assigned to the worker is X and takes 0 otherwise. Goal30 is left out the as the base variable. The variable Round is defined as usual. Results show that a goal of 30 works best to motivate workers to exert effort.

Specification (1) and (2) show that the observed effort when the goal is 30 is either significantly higher or not significantly different than the effort observed at any other level of goal. Note that, in particular, setting a goal at the highest possible level, namely 36, backfires as the effort is marginally significantly lower in that case compared to what a goal of 30 can achieve (p=0.067 in Specification (1) and p=0.103 in Specification (2)).

Table A.1 OLS Regression Analyses

Dependent Var: Effort in EmpSet	(1)	(2)
Goal0	-7.43***	-7.22***
	(2.10)	(2.22)
Goal6	-2.97*	-2.82•
	(1.70)	(1.67)
Goal12	-2.55*	-1.94
	(1.36)	(1.36)
Goal18	-2.57**	-2.41**
	(1.07)	(1.01)
Goal24	-1.84•	-1.6
	(1.13)	(1.14)
Goal36	-1.99*	-1.69•
	(1.04)	(1.00)
Round	-0.03	-0.03
	(0.06)	(0.07)
Constant	10.35***	24.61***
	(1.33)	(4.86)
Controls Added	No	Yes
N	392	392
R^2	0.04	0.13

Note: • indicates statistical significance at the 15% level, * at 10%, ** at 5%, and *** at 1% standard errors in parentheses. Added controls are Age and Female.

Focusing specifically on the WorSet treatment, we now analyze the impact of goal level on the employer's feedback. Table A.2 presents OLS regression analyses where we use the employer's feedback as the dependent variable; TotalOutput and Round as independent variables as before. In addition, we introduce the independent variable Goal to indicate the goal level selected by the worker. Analyses show the goal level has no significant impact on the employer's feedback.

Table A.2. OLS Regression Analyses

Dependent Var: Feedback in WorSet	(1)	(2)
TotalOutput	0.08***	0.08***
	(0.00)	(0.00)
Round	-0.03**	-0.03**
	(0.01)	(0.01)
Goal	-0.01	-0.01
	(0.01)	(0.01)
Constant	1.99***	2.06**
	(0.18)	(0.76)
Controls Added	No	Yes
N	392	392
R^2	0.58	0.59

Note: * indicates statistical significance at the 10% level, ** at 5%, and *** at 1% standard errors in parentheses. Added controls are Age and Female.

APPENDIX B: Instructions

Recall that the experiment is composed of two parts: the partnership game in Part 1 and a questionnaire in Part 2. While Part 1 differs across treatments, Part 2 is the same for all subjects. First, we will present the instructions for Part 1 for each treatment and then finally, we will present the instructions for Part 2.

INSTRUCTIONS FOR PART 1 (Worker-Employer Game)

NoGoal Treatment

In this part, half of the participants will take the role of a "worker" and the other half will take the role of an "employer". Your role will be determined randomly in the beginning of the experiment and will stay constant throughout the experiment. Note that your identity will be kept anonymous throughout the experiment, so you will play with other participants anonymously.

There will be 14 rounds in this experiment. At the beginning of each round, an employer and a worker will be randomly matched. In this pair, you will play the following game once. After each round, you will be matched with another person and play the following game

again. This will repeat 14 times. You will never be matched with the same person more than once throughout the experiment. Once the experiment is over, one of these 14 rounds will be randomly chosen and your net payoff in section 1 will be based on that selected round.

Three types of output production will occur in each round in the experiment: sure output, random output, and total output. The values of the output levels to be realized during the experiment will be expressed in TL. The experiment will proceed through the following steps, in order:

1. The worker will choose the sure output value.
2. The computer will determine the random output value.
3. The total output will be the sum of the sure output and the random output values.
4. The payoff levels will be shown to the worker and the employer.
5. The employer will select a feedback level to be sent to the worker.
6. The worker will see the feedback sent by the employer on the screen.

Below presents how to determine sure and random output values and the steps mentioned above in detail.
In every round, workers and employers will each be given an endowment of 18 TL.

Every round will start with the worker. The worker will choose one of the following options to determine **the sure output values.**

- Option 1 generates a *sure output* of 0TL.
- Option 2 generates a *sure output* of 6TL.
- Option 3 generates a *sure output* of 12TL.
- Option 4 generates a *sure output* of 18TL.

After an option is submitted, it cannot be changed. The option submitted by the worker will be kept private and hence will not be revealed to the employer.

Each option is costly to the worker. This cost will be deducted from the worker's endowment in each round. Hence, for a given round, **the net payoff for the worker = 18 TL – the cost of the selected option**. See Table 1 below.

Table 1. Possible option choices and the corresponding sure output, cost and payoff levels for the worker

Option	1	2	3	4
Sure Output	0 TL	6 TL	12 TL	18 TL
Cost of the Option to the Worker	0 TL	1 TL	4 TL	9 TL
The Worker's Net Payoff	18 TL	17 TL	14 TL	9 TL

The Effect of the Option Chosen by the Worker on the Net Payoff of the Worker: As shown above, the option chosen by the worker affects the net payoff of the worker only through the cost of the option. The sure output value generated by the chosen option has no effect on the worker's net payoff.

The Effect of the Option Chosen by the Worker on the Net Payoff of the Employer: The option chosen by the worker will result in a sure output value and this realized sure output value will be used to determine the net payoff of the employer. Therefore, the worker will directly affect the employer's net payoff with the option he/she chooses. This effect is described in detail below.

The computer will select a *random output* from the set {-18, -12,-6, 0, 6, 12, 18}. Each number is equally likely to be selected. This random output determined by the computer and the sure output determined by the option selected by the worker will together give rise to a *total output:*

Total Output = Random Output + Sure Output

See Table 2 for all possible output values. In the table, total output values are shown in red. In the end of each round, both the employer and the worker will learn the amount of the realized total output. However, the employer will not be told the amount of sure output or random output.

Table 2. Possible Total Output Values
(All the values in the table are in TL)

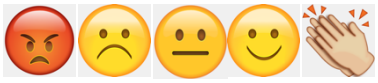
Sure Output / Random Output	0	6	12	18
-18	-18	-12	-6	0
-12	-12	-6	0	6
-6	-6	0	6	12
0	0	6	12	18
6	6	12	18	24
12	12	18	24	30
18	18	24	30	36

For a given round, **the net payoff for the employer = 18 TL + Realized Total Output**. See Table 3 for the net payoff levels the employer is likely to receive.

Table 3. Possible payoff levels for the employer (18TL + Realized Total Output)
(All values in the table are in TL)

Sure Output / Random Output	0	6	12	18
-18	0	6	12	18
-12	6	12	18	24
-6	12	18	24	30
0	18	24	30	36
6	24	30	36	42
12	30	36	42	48
18	36	42	48	54

Employer Choosing a Feedback for the Worker: In each round, after production and payoff levels are revealed, the employer will be asked to select one feedback to be sent to the worker. The employer will make this feedback selection among the following emojis:



We would like to remind you that the selected feedback will have no effect on the calculation of the employer's and worker's net payoffs.

SUMMARY

Each round will progress through the following steps:

Step 1: The worker will choose between Options 1, 2, 3, and 4 to determine the sure output value.

Step 2: The computer will select a random output value from the set {-18TL, -12TL,-6TL, 0TL, 6TL, 12TL, 18TL}.

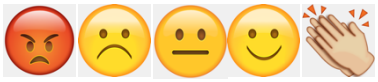
Step 3: Total output will be determined: Total Output = Sure Output + Random Output.

Step 4: A payoff table will be shown to the employer and worker. In these tables

- The employer will be informed about the realized total output value at the end of the round and his own net payoff.

- The worker will be informed about the random output value, the total output value at the end of the round, the worker's own net payoff, and the employer's net payoff.

Step 5: The employer will select a feedback to be sent to the worker. This feedback will be one of these emojis:



Step 6: The worker will see the feedback sent by the employer on his/her own screen.

At the end of the experiment, one round will be randomly selected from the 14 rounds that have been played. Each participant will receive their own net payoff, which they see in the table on the 4th step of this selected round, as part 1 paoff of the experiment. That is,

• The worker will be given the remaining money after the cost of the option chosen in this round is deducted from the 18 TL given to him/her at the beginning of the round. That is, the worker's net payoff is:

18 TL - Cost of the Option Chosen by the Worker

• The employer will be given money equal to the total amount of production realized in this round and the sum of 18 TL given to him at the beginning of the round. So the employer's net payoff is:

18 TL + Total Realized Output

EmpSet Treatment

In this part, half of the participants will take the role of a "worker" and the other half will take the role of an "employer". Your role will be determined randomly in the beginning of the experiment and will stay constant throughout the experiment. Note that your identity will be kept anonymous throughout the experiment, so you will play with other participants anonymously.

There will be 14 rounds in this experiment. At the beginning of each round, an employer and a worker will be randomly matched. In this pair, you will play the following game once. After each round, you will be matched with another person and play the following game again. This will repeat 14 times. You will never be matched with the same person more than once throughout the experiment. Once the experiment is over, one of these 14 rounds will be randomly chosen and your net payoff in section 1 will be based on that selected round.

Three types of output production will occur in each round in the experiment: sure output, random output, and total output. The values of the output levels to be realized during the experiment will be expressed in TL. The experiment will proceed through the following steps, in order:

1. The employer will select a total output goal for the worker.
2. The total production goal chosen by the employer will be announced to the worker.
3. The worker will choose the sure output value.

4. The computer will determine the random output value.
5. The total output will be the sum of the sure output and the random output values.
6. The payoff levels will be shown to the worker and the employer.
7. The employer will select a feedback level to be sent to the worker.
8. The worker will see the feedback sent by the employer on the screen.

Below presents how to determine sure and random output values and the steps mentioned above in detail.

In every round, workers and employers will each be given an endowment of 18 TL.

Every round will start with the employer. The employer will set a goal for **the total output value** that can be realized. After a goal selection has been submitted, it cannot be changed.

The worker will receive a message on his/her screen that shows the goal amount selected by the employer.

Next, the worker will choose one of the following options to determine **the sure output value**.

- Option 1 generates a *sure output* of 0TL.
- Option 2 generates a *sure output* of 6TL.
- Option 3 generates a *sure output* of 12TL.
- Option 4 generates a *sure output* of 18TL.

After an option is submitted, it cannot be changed. The option submitted by the worker will be kept private and hence will not be revealed to the employer.

Each option is costly to the worker. This cost will be deducted from the worker's endowment in each round. Hence, for a given round, **the net payoff for the worker = 18 TL – the cost of the selected option**. See Table 1 below.

Table 1. Possible option choices and the corresponding sure output, cost and payoff levels for the worker

Option	1	2	3	4
Sure Output	0 TL	6 TL	12 TL	18 TL
Cost of Option to the Worker	0 TL	1 TL	4 TL	9 TL
The Worker's Net Payoff	18 TL	17 TL	14 TL	9 TL

The Effect of the Option Chosen by the Worker on the Net Payoff of the Worker: As shown above, the option chosen by the worker affects the net payoff of the worker only through the cost of the option. The sure output value generated by the chosen option has no effect on the worker's net payoff.

The Effect of the Option Chosen by the Worker on the Net Payoff of the Employer: The option chosen by the worker will result in a sure output value and this realized sure output value will be used to determine the net payoff of the employer. Therefore, the worker will directly affect the employer's net payoff with the option he/she chooses. This effect is described in detail below.

The computer will select a *random output* from the set {-18, -12,-6, 0, 6, 12, 18}. Each number is equally likely to be selected. This random output determined by the computer and the sure output determined by the option selected by the worker will together give rise to a *total output:*

Total Output = Random Output + Sure Output

See Table 2 for all possible output values. In the table, total production values are shown in red. In the end of each round, both the employer and the worker will learn the amount of the realized total output. However, the employer will not be told the amount of sure output or random output.

Table 2. Possible Total Output Values
(All the values in the table are in TL)

Sure Output / Random Output	0	6	12	18
-18	-18	-12	-6	0
-12	-12	-6	0	6
-6	-6	0	6	12
0	0	6	12	18
6	6	12	18	24
12	12	18	24	30
18	18	24	30	36

For a given round, **the net payoff for the employer = 18 TL + Realized Total Output**. See Table 3 for the net payoff levels the employer is likely to receive.

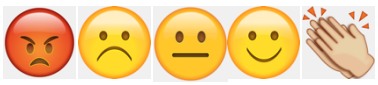
Table 3. Possible payoff levels for the employer (18TL + Realized Total Output)
(All values in the table are in TL)

Sure Output / Random Output	0	6	12	18
-18	0	6	12	18
-12	6	12	18	24
-6	12	18	24	30
0	18	24	30	36
6	24	30	36	42
12	30	36	42	48
18	36	42	48	54

Setting a Goal for the Total Output: We would like to remind you that each round will start with the employer setting a goal for the total ouput value. The employer will be asked to determine this goal for the value of the total output from the set {0TL, 6TL, 12TL, 18TL, 24TL, 30TL, 36TL}. The level of this total output goal will not play a role in calculating the net payoffs of the employer and the worker.

The Total Output Goal and the Realized Total Output: If the realized total output at the end of the round is greater, less than or equal to the total output goal set at the beginning of the round – that is, whether the total output goal has been achieved or not - will not play a role in the calculation of the net payoffs of the employer and the worker.

Employer Choosing a Feedback for the Worker: In each round, after production and payoff levels are revealed, the employer will be asked to select one feedback to be sent to the worker. The employer will make this feedback selection among the following emojis:



We would like to remind you that the selected feedback will have no effect on the calculation of the employer's and worker's net payoffs.

SUMMARY

Each round will progress through the following steps:

Step 1: The employer will select a goal for the total output value from the set {0TL, 6TL, 12TL, 18TL, 24TL, 30TL, 36TL}.

Step 2: The goal chosen by the employer will be communicated to the worker.

Step 3: The worker will choose between Options 1, 2, 3, and 4 to determine the sure output value.

Step 4: The computer will select a random output value from the set {-18TL, -12TL,-6TL, 0TL, 6TL, 12TL, 18TL}.

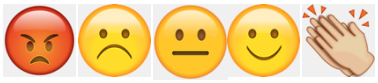
Step 5: Total output will be determined: Total Output = Sure Output + Random Output.

Step 6: A payoff table will be shown to the employer and worker. In these tables

- The employer will be informed about the total output goal set by himself at the beginning of the round, the realized total output value at the end of the round, and his own net payoff.

- The worker will be informed about the random output value, the total output value at the end of the round, the total output goal set by the employer at the beginning of the round, the worker's own net payoff and the employer's net payoff.

Step 7: The employer will select a feedback to be sent to the worker. This feedback will be one of these emojis:



Step 8: The worker will see the feedback sent by the employer on his/her own screen.

At the end of the experiment, one round will be randomly selected from the 14 rounds that have been played. Each participant will receive their own net payoff, which they see in the table on the 6th step of this selected round, as part 1 paoff of the experiment. That is,

- The worker will be given the remaining money after the cost of the option chosen in this round is deducted from the 18 TL given to him/her at the beginning of the round. That is, the worker's net payoff is:

18 TL - Cost of the Option Chosen by the Worker

- The employer will be given money equal to the total amount of production realized in this round and the sum of 18 TL given to him at the beginning of the round. So the employer's net payoff is:

18 TL + Total Realized Output

<u>WorSet Treatment</u>

In this part, half of the participants will take the role of a "worker" and the other half will take the role of an "employer". Your role will be determined randomly in the beginning of the experiment and will stay constant throughout the experiment. Note that your identity will be

kept anonymous throughout the experiment, so you will play with other participants anonymously.

There will be 14 rounds in this experiment. At the beginning of each round, an employer and a worker will be randomly matched. In this pair, you will play the following game once. After each round, you will be matched with another person and play the following game again. This will repeat 14 times. You will never be matched with the same person more than once throughout the experiment. Once the experiment is over, one of these 14 rounds will be randomly chosen and your net payoff in section 1 will be based on that selected round.

Three types of output production will occur in each round in the experiment: sure output, random output, and total output. The values of the output levels to be realized during the experiment will be expressed in TL. The experiment will proceed through the following steps, in order:

1. The worker will select a total output goal for herself/himself.
2. The total production goal chosen by the worker will be announced to the employer.
3. The worker will choose the sure output value.
4. The computer will determine the random output value.
5. The total output will be the sum of the sure output and the random output values.
6. The payoff levels will be shown to the worker and the employer.
7. The employer will select a feedback level to be sent to the worker.
8. The worker will see the feedback sent by the employer on the screen.

Below presents how to determine sure and random output values and the steps mentioned above in detail.

In every round, workers and employers will each be given an endowment of 18 TL.

Every round will start with the worker. The worker will set a goal for **the total output value** that can be realized. After a goal selection has been submitted, it cannot be changed.

The employer will receive a message on his/her screen that shows the goal amount selected by the worker.

Next, the worker will choose one of the following options to determine **the sure output value**.

- Option 1 generates a *sure output* of 0TL.
- Option 2 generates a *sure output* of 6TL.
- Option 3 generates a *sure output* of 12TL.
- Option 4 generates a *sure output* of 18TL.

After an option is submitted, it cannot be changed. The option submitted by the worker will be kept private and hence will not be revealed to the employer.

Each option is costly to the worker. This cost will be deducted from the worker's endowment in each round. Hence, for a given round, **the net payoff for the worker = 18 TL – the cost of the selected option**. See Table 1 below.

Table 1. Possible option choices and the corresponding sure output, cost and payoff levels for the worker

Option	1	2	3	4
Sure Output	0 TL	6 TL	12 TL	18 TL
Cost of Option to the Worker	0 TL	1 TL	4 TL	9 TL
The Worker's Net Payoff	18 TL	17 TL	14 TL	9 TL

The Effect of the Option Chosen by the Worker on the Net Payoff of the Worker: As shown above, the option chosen by the worker affects the net payoff of the worker only through the cost of the option. The sure output value generated by the chosen option has no effect on the worker's net payoff.

The Effect of the Option Chosen by the Worker on the Net Payoff of the Employer: The option chosen by the worker will result in a sure output value and this realized sure output value will be used to determine the net payoff of the employer. Therefore, the worker will directly affect the employer's net payoff with the option he/she chooses. This effect is described in detail below.

The computer will select a *random output* from the set {-18, -12,-6, 0, 6, 12, 18}. Each number is equally likely to be selected. This random output determined by the computer and the sure output determined by the option selected by the worker will together give rise to a *total output:*

Total Output = Random Output + Sure Output

See Table 2 for all possible output values. In the table, total production values are shown in red. In the end of each round, both the employer and the worker will learn the amount of the realized total output. However, the employer will not be told the amount of sure output or random output.

Table 2. Possible Total Output Values
(All the values in the table are in TL)

Sure Output / Random Output	0	6	12	18
-18	-18	-12	-6	0
-12	-12	-6	0	6
-6	-6	0	6	12

0	0	6	12	18
6	6	12	18	24
12	12	18	24	30
18	18	24	30	36

For a given round, **the net payoff for the employer = 18 TL + Realized Total Output**. See Table 3 for the net payoff levels the employer is likely to receive.

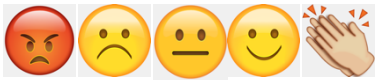
Table 3. Possible payoff levels for the employer (18TL + Realized Total Output)
(All values in the table are in TL)

Sure Output / Random Output	0	6	12	18
-18	0	6	12	18
-12	6	12	18	24
-6	12	18	24	30
0	18	24	30	36
6	24	30	36	42
12	30	36	42	48
18	36	42	48	54

Setting a Goal for the Total Output: We would like to remind you that each round will start with the worker setting a goal for the total ouput value. The worker will be asked to determine this goal for the value of the total output from the set {0TL, 6TL, 12TL, 18TL, 24TL, 30TL, 36TL}. The level of this total output goal will not play a role in calculating the net payoffs of the employer and the worker.

The Total Output Goal and the Realized Total Output: If the realized total output at the end of the round is greater, less than or equal to the total output goal set at the beginning of the round – that is, whether the total output goal has been achieved or not - will not play a role in the calculation of the net payoffs of the employer and the worker.

Employer Choosing a Feedback for the Worker: In each round, after production and payoff levels are revealed, the employer will be asked to select one feedback to be sent to the worker. The employer will make this feedback selection among the following emojis:



We would like to remind you that the selected feedback will have no effect on the calculation of the employer's and worker's net payoffs.

SUMMARY

Each round will progress through the following steps:
Step 1: The worker will select a goal for the total output value from the set {0TL, 6TL, 12TL, 18TL, 24TL, 30TL, 36TL}.

Step 2: The goal chosen by the worker will be communicated to the employer.

Step 3: The worker will choose between Options 1, 2, 3, and 4 to determine the sure output value.

Step 4: The computer will select a random output value from the set {-18TL, -12TL,-6TL, 0TL, 6TL, 12TL, 18TL}.

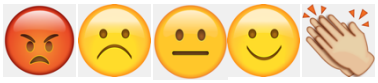
Step 5: Total output will be determined: Total Output = Sure Output + Random Output.

Step 6: A payoff table will be shown to the employer and worker. In these tables

- The employer will be informed about about the total output goal set by the worker at the beginning of the round, the realized total output value at the end of the round, and his own net payoff.

- The worker will be informed about the random output value, the total output value at the end of the round, the total output goal set by himself/herself at the beginning of the round, the worker's own net payoff and the employer's net payoff.

Step 7: The employer will select a feedback to be sent to the worker. This feedback will be one of these emojis:



Step 8: The worker will see the feedback sent by the employer on his/her own screen.

At the end of the experiment, one round will be randomly selected from the 14 rounds that have been played. Each participant will receive their own net payoff, which they see in the table on the 6th step of this selected round, as part 1 paoff of the experiment. That is,

- The worker will be given the remaining money after the cost of the option chosen in this round is deducted from the 18 TL given to him/her at the beginning of the round. That is, the worker's net payoff is:

18 TL - Cost of the Option Chosen by the Worker

• The employer will be given money equal to the total amount of production realized in this round and the sum of 18 TL given to him at the beginning of the round. So the employer's net payoff is:

18 TL + Total Realized Output

INSTRUCTIONS FOR PART 2 (Questionnaire)

Please fill in the questionnaire on the screen.

When you are done, you will see the payment screen. After you examine the details of your payment, please raise your hand and wait for the assistant to fill in your payment form.

(On the screen, the following questions are displayed)

1. "I care about my social image (i.e. what others will think of me) when making a real-life decision"
   To what extent, do you agree with the above statement?
   Not at all
   Not so much
   Neutral
   Some
   Completely

2. "I care about my self-image (i.e. how I will feel about myself) when making a real-life decision"
   To what extent, do you agree with the above statement?
   Not at all
   Not so much
   Neutral
   Some
   Completely

3. Age?

4. Gender?
   a) Female
   b) Male

5. Program
   a) Undergraduate
   b) Masters
   c) Ph.D.

6. Year
   a) English Preparatory School
   b) 1st year

c) 2nd year
d) 3rd year
e) 4th year
f) 5th year or more

7. Major

8. Family income (per month)?
   a) Less than 2,500TL
   b) 2,500TL – 5,000 TL
   c) 5,000 TL – 10,000 TL
   d) 10,000 TL – 20,000TL
   e) More than 20,000TL

9. Any feedback for us?