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Subjective performance evaluations and reciprocity in principal-agent relations

Alexander Sebald and Markus Walzl[*]

August 17, 2012

Abstract

We conduct a laboratory experiment with agents working on and principals benefiting from a real effort task in which the agents' performance can only be evaluated subjectively. Principals give subjective performance feedback to agents and agents have an opportunity to sanction principals. In contrast to existing models of reciprocity we find that agents tend to sanction whenever the feedback of principals is below their subjective self-evaluations even if agents' payoffs are independent of it. In turn, principals provide more positive feedback (relative to their actual performance assessment of the agent) if this does not affect their payoff.

JEL: D01; D02; D82; D86; J41.

Keywords: Contracts, Subjective Performance Evaluations, Reciprocity.

1 Introduction

Providing performance feedback and creating incentives through performance pay is an integral part of numerous variants of social and economic interaction. For example, teachers regularly grade the performance of their students and give feedback, employers regularly evaluate the performance of their employees, give feedback and pay for performance or decide upon career perspectives. To capture performance in a purely objective way is – if possible at all – very costly and hard to accomplish, as a lot of valuable information about performance is captured by subjective impressions rather than objective measures. As a result, it is often preferred to leave (part of the) performance feedback to more holistic subjective appraisals. Numerous contributions in economics have recognized the prevalence and importance of such subjective performance evaluations and corresponding performance pay in labor market relations [see e.g. Gibbs et al. (2004), Milkovich & Wigdor (1991), and Murphy & Oyer (2003)].

Compared to principal-agent relations where contracts are contingent on objective (and verifiable) measures of performance, subjective measures entail several potential drawbacks. First, performance pay on the basis of subjective performance evaluations may lack credibility. If labor contracts specify payments on the basis of the principals' subjective appraisals, principals have an incentive to claim that performance was poor according to their perception in order to establish low wages. As a consequence, inefficiently low effort may be spend by agents – unless principals can credibly commit to an honest revelation of their subjective information as, for instance, in repeated interaction or with a credible payment to a third party [see e.g. Levin (2003) or Macleod (2003)]. Second, subjective performance evaluations may generate conflicts initiated by the agent due to possibly diverging assessments by principals and agents. Of course, if the principal anticipates harmful conflicts in case of diverging evaluations, he has an incentive for a truthful or even a positively biased appraisal (even if this comes at a cost e.g. due to enhanced performance pay).[1] Hence, conflict creation by the agent may be welfare enhancing if it reduces the principal's incentive to untruthfully downgrade his subjective appraisal of the agent's performance thereby

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[1]The literature on personnel psychology and management emphasizes the practical relevance of such rating biases that distort performance appraisals towards reports that are too positive (leniency bias) or to undifferentiated (centrality bias) – see Prendergast and Topel (1993) or Murphy and Cleveland (1995). In a recent field study Breuer et al. (2010) demonstrate that the leniency of subjective performance appraisals increases in the intensity of social ties (and thereby in opportunities for conflict creation).

turning performance pay into a credible promise but it may also tempt principals to submit positively biased feedback.

This motivates the following research questions: Is it that agents create conflict at a cost for themselves in response to subjective performance feedback even in one-shot interactions? And can this conflict creation be properly described by established sanctioning motives such as distributional concerns or reciprocity?

In a laboratory experiment, we analyzed the agents' willingness to create conflict in response to subjective performance evaluations. We matched participants into pairs and randomly assigned them to the role of a principal or an agent. The agent had to work on a real-effort task and the principal could observe the agent working. The real-effort task consisted of clicking away boxes on a computer screen (for a screen-shot of the clicking task see Appendix 7). For a period of $50 - 120$ seconds, 20 screens with boxes appeared for various time intervals (i.e. between 3 and 9 seconds). At the end of each time interval the screen disappeared with the remaining (i.e. un-clicked) boxes and a new screen with a new set of boxes appeared. The principal's payoff depended on the percentage of boxes clicked away by the agent, i.e. the principal benefited from the effort of the agent. After the agent worked on the task, the principal gave performance feedback. Importantly, the principal's feedback to the agent was subjective as both the agent and the principal were only informed about the true performance of the agent after the end of the experiment. In reaction to the subjective feedback, the agent had the opportunity to reduce the principal's payoff at a cost for himself. In our experiment we find that agents' reactions to the principals' feedback strongly depend on their self-perceptions. Agents tend to reduce payoffs of principals, if the principals' feedback is below their self-perception, but accept the feedback and refuse to reduce payoffs if the feedback confirms/is higher than their own-evaluation.

This pattern can be observed in an *incentive* treatment where the principal's feedback determines the agent's payoff and in a *flat* treatment where the agent's payoff is constant and thereby unaffected by the feedback. The willingness to reduce payoffs in the *incentive* treatment can be explained by existing models of reciprocity [e.g. Rabin (1993), Dufwenberg & Kirchsteiger (2004), Falk & Fischbacher (2006) and Hart & Moore (2008)]. These contributions argue that agents act reciprocally towards principals whenever their *payoffs* fall short of or exceed certain reference values against which they judge the kindness of the principals' actions. The belief-dependent models

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of reciprocity by Rabin (1993) and Dufwenberg & Kirchsteiger (2004), for instance, suggest that agents create conflict whenever they believe that the payoff the principals intend to give them is unkind because it is lower than the average payoff that the principals could have given. In Hart & Moore (2008), on the other hand, agents act reciprocal whenever they receive less than the maximum that they could have gotten as specified by the contract. Similarly, in our setting, the agent may consider a feedback in the *incentive* treatment that is below his own-evaluation as an unkind act by the principal whose willingness to pay falls short of the agent's expectations or what the agent feels entitled to based on his perceived performance. However, the results of the *flat* treatment suggest that there also exists another motivation for payoff reductions that is independent of the payoff consequences of the principal's feedback, but driven by the tension between subjective feedback and the agent's self-evaluation as such. Although the agent's payoff is independent of the principal's performance evaluation in the *flat* treatment, he perceives performance feedback that falls short of his own-evaluation as unkind and has a propensity to reciprocate (i.e. reciprocity is here based on a *payoff-independent* measure of kindness).

While the existing lab- and field-experimental literature highlights the importance of reciprocal behavior as a corner stone of employment-relations [e.g. Fehr et al. (1998), Fehr & List (2004), and Fehr & Goette (2007)], our results for the *flat* treatment suggest that existing theoretical models of reciprocity may neglect relevant aspects in employment environments with subjective performance evaluations. Specifically, our experimental findings emphasize that not only the kindness of the payoff consequences of performance feedback, but the kindness of feedback as such drives conflict creation in principal-agent relations. Hence, as the literature on reciprocity in labor relations told us that optimal compensation should not ignore potential conflicts created by preferences that are based on more than individual profits, our experiment suggests that performance evaluation should not forget about potential conflicts created by preferences that are based on more than the kindness of monetary compensation. Understanding reciprocity in environments with subjective performance signals (and the resulting credibility of performance evaluations) therefore not only asks to capture the perceived unkindness of low compensation but also the perceived unkindness of negative feedback as such. This result is also in line with findings from social psychology showing that individuals dislike a tension between feedback and self-perception, and regard it as a threat to their self-esteem [see e.g.

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Bushman & Baumeister (1998)]. The importance of self-esteem or ego-utility has also been acknowledged by recent economic contributions on individual decision making and incentive theory [see e.g. Bénabou & Tirole (2002), Compte & Postlewaite (2004), and Ellingsen & Johannesson (2008)].

Our experiment is related to the experimental analysis by Irlenbusch & Sliwka (2005) who investigate and compare reciprocal behavior in repeated gift exchange environments that differ in terms of the observability of the agents' effort choices. They find that reciprocal behavior is stronger the better principals can observe the agents' effort choices. Different to their setting, in our setting not only principals receive subjective signals concerning the agents' performance but also the agents themselves. In this way our setting allows to uncover the relation between subjective own-evaluations, performance feedback and reciprocal behavior. Our findings reveal that in situations in which both principals and agents cannot objectively evaluate the agents' performance, agents judge the kindness of principals not only on the basis of the monetary compensation they get, but also on the basis of the performance feedback as such.

In the following section we present the set-up of our experiment. In section 3 we present our hypotheses that are tested in section 4. Section 5 concludes with some remarks on the practical implications of our analysis.

2   Experimental Set-up

In this experiment we investigate individual reactions to performance feedback in environments in which people have subjective performance information. The experiment took place in June and November 2009 in the laboratory of the Center for Experimental Economics at the University of Copenhagen with in total 186 participants who completed the experiment.[2] We conducted two treatments, *incentive* and *flat*, each consisting of four experimental sessions. On average participants took 45 minutes to complete the experiment and received about 110 DKK ($\sim$ 15 Euros).

At the beginning of the experiment, all participants were randomly assigned to a group and one of two different roles principal (labeled *Person A*) and agent (la-

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[2]In total 190 persons participated but 4 participants (2 groups) did not complete the experiment due to a technical problem. The analysis is based on the 186 individuals that completed the experiment.

beled *Person B*). Each group consisted of one principal and one agent. Participants were provided with experimental instructions (see Appendix 6). After reading the instructions, participants took actions at four different stages: **i)** *control questions*, **ii)** *clicking-task*, **iii)** *evaluation and feedback*, and **iv)** *reaction*. Both participants (the principal and the agent) were informed by the instructions about the four stages of the experiment and all possible actions of the two types of players as well as the associated payoffs.

In stage **i)** (control questions), all participants had to answer a set of control questions before being able to proceed (for the corresponding screen-shots see Appendix 7).

In stage **ii)** (clicking-task), the agents had to work on a real-effort task. The real-effort task consisted of clicking away boxes on a computer screen (for a screen-shot of the clicking task see Appendix 7). For a period of x seconds, 20 screens with boxes appeared for various time intervals (i.e. between 3 and 9 seconds). At the end of each time interval the screen disappeared with the remaining (i.e. un-clicked) boxes and a new screen with a new set of boxes appeared. In order to create heterogeneity in agents' self-evaluations, we had one session in which $x = 120$, two sessions in which $x = 90$ and one session in which $x = 50$ in each treatment.[3] The principal saw the same screen as the agent and could observe him clicking away the boxes.

In both treatments, the principal's payoff was determined by the percentage of boxes clicked away by the agent during the clicking-task.[4] If

- the agent clicked away 0-20% of the boxes: Person A received 200 points.
- the agent clicked away 20-40% of the boxes: Person A received 300 points.
- the agent clicked away 40-60% of the boxes: Person A received 400 points.
- the agent clicked away 60-80% of the boxes: Person A received 500 points.
- the agent clicked away 80-100% of the boxes: Person A received 600 points.

At stage **iii)** (evaluation and feedback), the agent and the principal were asked to eval-

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[3]Note that the 20 screens were the same in all sessions. We only varied the number of seconds that the screens were shown.

[4]In the instructions (see Appendix 6), we informed participants about the payoff scheme. Payoffs in the experiment were expressed in points and participants were informed at the beginning of the experiment that points were exchanged into Danish crowns at the end of the experiment at an exchange rate of 10 points = 3.5 DKK. For a summary statistic concerning the number of participants per treatment/session, number of appeared boxes/average number of boxes clicked away etc see Appendix 8.

uate the agent's performance by telling the percentage of boxes that the agent clicked away (i.e., both participants had to state one of the five categories 0-20%, 20-40%, 40-60%, 60-80%, 80-100%). As can also be seen in the instructions, both were explicitly told that their evaluation was not revealed to the other person in their group. Note that we made this explicit during the experiment (see screen-shots in Appendix 6). As we are not interested in the accuracy of subjective performance evaluations (and, for instance, the occurrence of over-confidence or other biases) but rather focus on the impact of the relation between the principal's and the agent's subjective performance evaluation on conflict creation, we decided not to incentivise participants' subjective performance reports. This allows us to stay as close as possible to the labor market application as it does not create any additional "attachment" to the evaluation and avoids hedging between the decision how to evaluate the performance and the expected payoff due to actual performance.

Furthermore, the principal was asked to give feedback to the agent using the same categories. In the *incentive* treatment, the agent's payoff depended on the principal's feedback as follows:

- principal's feedback 0-20%: the agent received 100 points from A.
- principal's feedback 20-40%: the agent received 150 points from A.
- principal's feedback 40-60%: the agent received 200 points from A.
- principal's feedback 60-80%: the agent received 250 points from A.
- principal's feedback 80-100%: the agent received 300 points from A.

In the *flat* treatment, on the other hand, the agent's payoff was 200 points independent of the principal's feedback.

At stage **iv)** (reaction), the agent was able to react to the principal's feedback with a reduction of the principal's payoff by up to 100 points. To elicit reaction behavior, we used the strategy method: while the principal was giving feedback, we asked the agent to indicate for each possible feedback that he could receive by how much he would like to reduce the principal's payoff. Hence, for each possible feedback level (0-20%, 20-40%, 40-60%, 60-80%, 80-100%) the agent had to state between 0 and 100 points by which he wanted to reduce the principal's payoff in case this was the principal's actually stated feedback. For every point that the agent reduced the principal's payoff, the agent had to pay 0.25 points.

After stage iv) and a small questionnaire, the agent's real performance, the prin-

cipal's feedback and the agent's reaction to the principal's actual feedback was used to calculate payoffs. Finally, participants were shown the actual performance of the agent, the principal's feedback, the agent's reaction and the actual payoffs on their screen. Note that at the evaluation and feedback as well as the reaction stage, the principal and the agent decided on the basis of their subjective perception of the agent's performance. Only in the end of the experiment when payoffs were listed, participants learned about the agent's actual performance.

3   Hypotheses

What can be conjectured about the agent's reaction to the principal's feedback in our experiment? First, as a payoff reduction is costly for the agent and the interaction between the principal and the agent is one-shot, assuming selfishness and rationality would yield the prediction of no payoff reduction in both treatments independent of the principal's feedback *and* independent of the agent's own-evaluation. Second, if the agent is inequity averse [as e.g. in Fehr & Schmidt (1999)], he may well have an incentive to reduce payoffs in our experiment in case of an unequal income distribution. However, in the *flat* treatment these incentives are either independent of the principal's feedback for a given own-evaluation of the agent (if the feedback is considered as uninformative regarding the actual payoff distribution) or increasing in the principal's feedback (if the feedback is considered as informative regarding the actual payoff distribution and higher feedback levels imply higher expected payoff for the principal).

Another motive for sanctions in our setting is reciprocity. In established models of reciprocity [e.g. Rabin (1993), Dufwenberg & Kirchsteiger (2004), Falk & Fischbacher (2006), or Hart & Moore (2008)], there exists an (endogenous) reference payoff against which people judge the kindness of their own as well as other people's actions. That is, reciprocal behavior is *payoff-dependent*.

In the *incentive* treatment, the agent's own-evaluation and the resulting expectation concerning the payoff his effort has generated for the principal may serve as such a reference payoff. The agent might feel unkindly treated by the principal, if he considers his own-evaluation as a good signal for his actual performance and the principal gives a feedback below the agent's own-evaluation and therefore passes e.g. less than half of the (expected) payoff to the agent. In reaction to such an unkind

act, the agent might behave negatively reciprocal and reduce the principal's payoff. If the difference between feedback and own-evaluation is regarded as a measure of unkindness in this way, we expect more payoff reduction in the *incentive* treatment if the feedback is below the agent's own-evaluation than if it is equal or above.

In contrast to the *incentive* treatment, the agent's payoff is independent of the principal's feedback in the *flat* treatment. Hence, the principal's feedback can neither be regarded as a kind nor an unkind act as long as kindness is measured by the monetary consequences of the principal's feedback. Therefore, payoff-dependent reciprocity would not predict any payoff reductions in the *flat* treatment. We summarize as follows.

Hypothesis 1 *If agents are motivated by payoff-dependent reciprocity, payoff reductions in the incentive treatment are smaller, for a given feedback, if the feedback is Equal/Above rather than Below the agent's own-evaluation. No payoff reductions are observed in the flat treatment.*

However, as suggested by the psychological literature on self-esteem and ego-protection [see e.g. Bushman and Baumeister (1998)], perceptions of unkindness and reciprocal reactions could also be triggered by a tension between the own-evaluation of the agents and the feedback of the principals as such. If the agent regards a feedback below his own-evaluation as unkind (i.e. an ego-threat), while no unkindness is perceived if the feedback confirms or exceeds the self-evaluation, then the motivation to reduce payoffs (i.e. to become aggressive) is larger if the feedback is below the agent's own-evaluation rather than equal or above in both treatments. The behavioral implications of this *payoff-independent* form of reciprocity resemble Hypothesis 1 for the *incentive* treatment but yield a new hypothesis for the *flat* treatment.

Hypothesis 2 *If agents are motivated by payoff-independent reciprocity, payoff reductions in both the incentive and the flat treatment are smaller, for a given feedback, if the feedback is Equal/Above rather than Below the agent's own-evaluation.*

The following section displays our experimental findings and the tests of these hypotheses.

4 Results

4.1 Actual payoff reduction

In Table 1 we report median levels of *actual* payoff reductions implemented in our experiment, i.e. the median payoff reduction in response to the principal's *actual* feedback. Medians are reported for the two treatments (*Incentive* and *Flat*) and for two types of feedback by the principal (*Below* and *Equal/Above* the agent's own-evaluation).

Table 1: Median actual payoff reduction per treatment and type of feedback

	Feedback vs. Own Evaluation		WMW-Test
	Equal/Above	*Below*	P-Value
Incentive	0 (21)	40 (21)	0.0002
Flat	0 (45)	30.5 (6)	0.0320

In Table 1 each row corresponds to the medium payoff reduction actually implemented per treatment at feedback levels *Below* and *Equal/Above* own-evaluations and the *p*-value for the Wilcoxon-Mann-Whitney test analyzing the difference in median payoff reduction between *Below* and *Equal/Above*. Numbers in brackets correspond to the number of observations.

In the *incentive* treatment 21 agents got an actual feedback from the principal that was below their own-evaluation and 21 got a feedback that was equal or above. The corresponding numbers for the *flat* treatment are 6 and 45. The median payoff reduction for feedback levels below own-evaluations (denoted *Below*) in the *incentive* and *flat* treatment were 40 and 30.5 points respectively. In contrast to this, the median payoff reduction for feedback levels equal or above own-evaluations (denoted *Equal/Above*) was 0 in both treatments. As indicated by the corresponding Wilcoxon-Mann-Whitney test, there is a significant difference between the payoff reductions at feedback levels below and equal/above own-evaluations in both treatments. Hence, our results suggest that individuals acting as agents in our experiment are not only driven by material self-interest. Their reaction behavior significantly depends on whether the feedback they get is below or equal/above their own-evaluation.

Furthermore, as agents reduce the payoff of principals significantly more if the feedback is below rather than equal/above their self-evaluation, the results from the *incentive* and *flat* treatment also suggest that mere inequity aversion cannot explain the agents' reaction behavior as observed in our experiment.

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4.2 Payoff reduction strategies

So far we have looked at actual choices regarding feedback and the correspondingly implemented payoff reductions. To further analyze the complete reaction behavior of agents in our experiment, we now exploit all data obtained by using the strategy method and consider the number of points by which each agent wanted to reduce the principal's payoff, if the principal's feedback was 0-20%, 20-40%, 40-60%, 60-80% and 80-100% relative to his own self-perception.[5]

To get an impression how the tension between feedback and own-evaluation influences payoff reductions, Figure 1 depicts the median number of points that agents wanted to reduce the principals' payoff contingent on the difference between the principal's feedback and their own-evaluation.
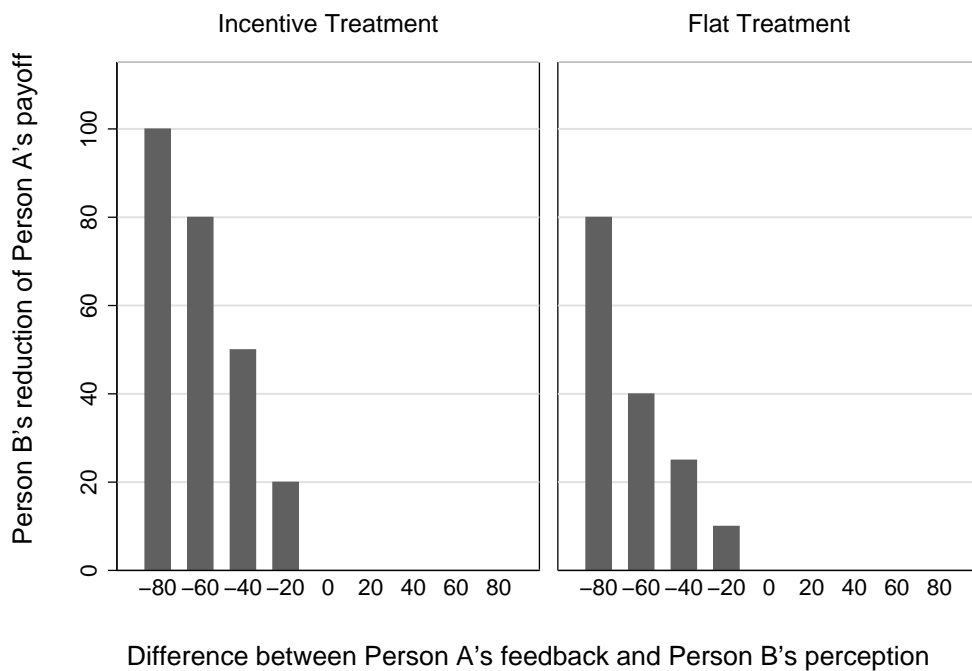
Figure 1: Median payoff reduction by B-Persons (agent) contingent on the difference between Person A's (principal) feedback and Person B's own-evaluation

Values on the x-axis correspond to the difference between the midpoints of the intervals for the principal's feedback and the agent's self-evaluation. For example,

[5]Agents reported their reaction to all possible feedback levels of the principal and decisions of participants were only (randomly) matched after the end of the experiment.

-80 represents a feedback of 0-20% by the principal and a self-evaluation of 80-100% by the agent (i.e. $10 - 90 = -80$), equivalently 0 corresponds to any feedback by the principal which confirms the self-evaluation of the agent and 80 corresponds to a feedback of 80-100% and a self-evaluation by the agent of 0-20%. In other words, negative values correspond to situations in which the feedback of the principal falls short of the agent's self-evaluation, whereas positive values correspond to situations in which the feedback of the principal is above the agent's self-evaluation. The more negative (positive) the difference, the lower (higher) the principal's feedback relative to the agent's self-evaluation.

As can be seen, in both treatments the median payoff reduction at feedback levels below the agents' own-evaluation is positive. Furthermore, the median payoff reduction increases the lower the principal's feedback relative to the agent's self-evaluation. In contrast to this, at feedback levels equal and above own-evaluations the median payoff reduction is 0 in both treatments. Hence, the median agents in our experiment reduce the principals' payoff, if they receive a feedback from the principal that falls short of their own-evaluation, but typically refuse to reduce the principal's payoff after feedback that confirms/is above their own-evaluation. Importantly this pattern is independent of whether the payoff that the agent receives is dependent or independent of the feedback that the principal gives.

To capture the distribution of payoff reductions contingent on the difference between the principal's feedback and the agent's own-evaluation, we provide a histogram of payoff reductions in Figure 2. As in Figure 1, values on the x-axis represent the difference between the principal's feedback and the agent's self-evaluation. The diameter of the circles corresponds to the number of observation at a specific pair of feedback/self-evaluation and payoff reduction levels.

[Figure 2 here]

The number of observations per level of difference, i.e. $-80, ..., 0, ...80$, of course depends on the number of people with a specific self-evaluation. For example, there is no observation at a difference level of 80 in the *incentive* treatment as there is no participant with an own-evaluation 0-20% in this treatment. On the other hand, in the *flat* treatment there are 6 participants who report a self-evaluation of 0-20% meaning there are 6 observations at the difference level of 80 in the *flat* treatment. 5 of them did not reduce the principals' payoff at the difference level 80 and only 1 reduced
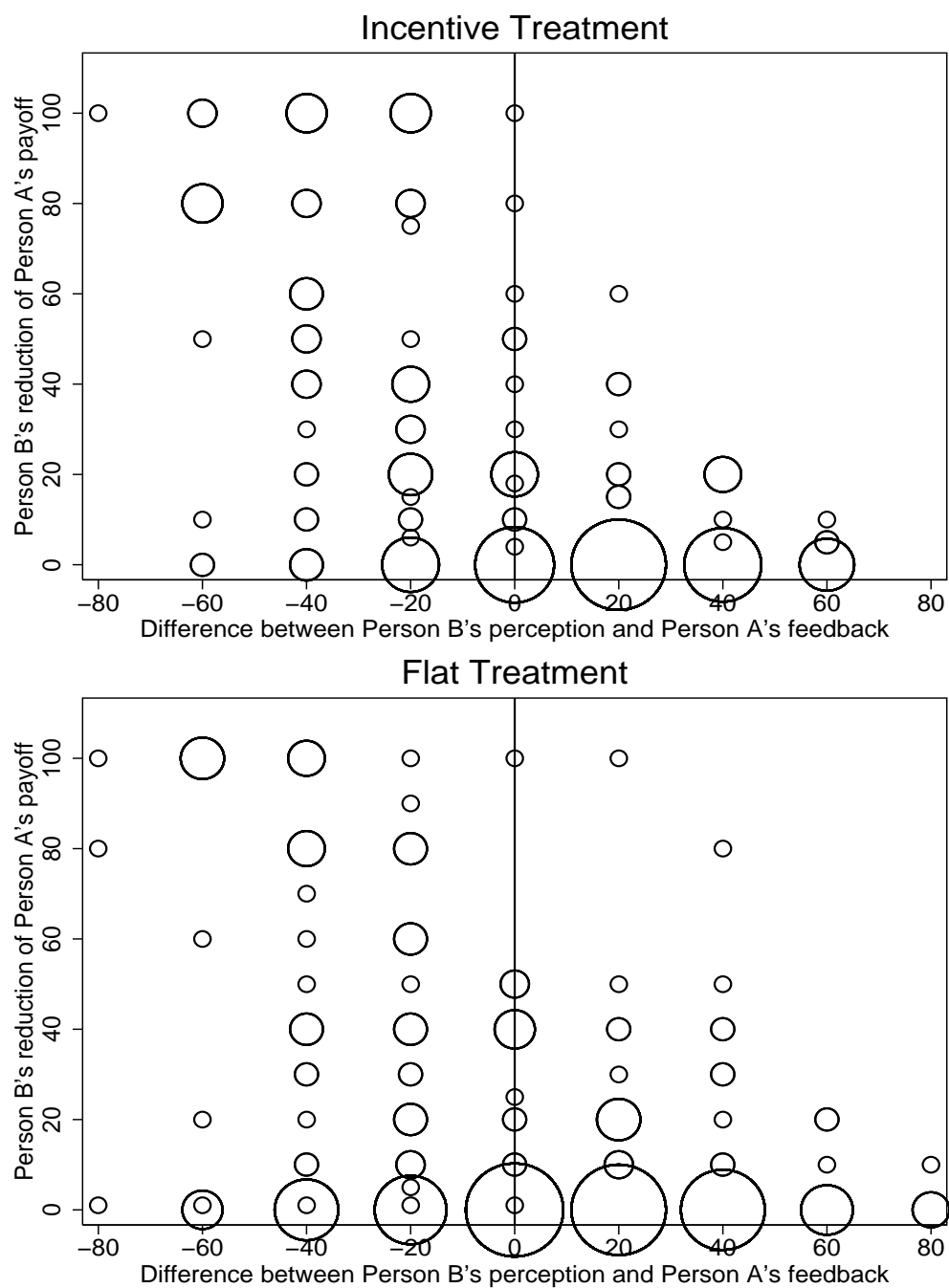
Figure 2: Person B's (agent) reaction behavior as a function of the difference between Person A's (principal) feedback and Person B's own-evaluation

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the principal's payoff by 10 points (see the corresponding markers at difference level 80 in the graph for the *flat* treatment in Figure 2). At the other extreme, there are respectively 1 and 3 participants who report a self-evaluation of 80-100% in the *incentive* and *flat* treatments. These are the observations underlying the reaction behavior at difference level −80 in Figure 2. The participant in the *incentive* treatment who reports a self-evaluation of 80-100% reacts to a feedback of 0-20% by reducing the principal's payoff by 100 points (see the corresponding marker at difference level −80 in the graph for the *incentive* treatment in Figure 2). In contrast to this, the three individuals reporting 80-100% in the *flat* treatment reacted to a feedback of 0-20% by reducing the principal's payoff by respectively 100, 80 and 1 point.

As in the analysis of median payoff reductions, the figures reveal that in both treatments positive reductions of the principal's payoff are much more prominent in case the principal's feedback falls short of the agent's self-evaluation. In respectively 78% and 60% of the cases in which the principal's feedback was lower than then agent's self-evaluation (left of the vertical 0 line in Figure 2) in the *incentive* and *flat* treatment a positive punishment was chosen. The corresponding percentages for cases in which the principal's feedback was higher than then agent's self-evaluation (right of the vertical 0 line in Figure 2) are about 30% in the *incentive* treatment and about 28% in the *flat* treatment.

Finally, consider Tables 2 and 3 that display the specific median payoff reduction conditional on the agents' own-evaluations in the *incentive* and the *flat* treatment, respectively.

[Tables 2 and 3 here]

Tables 2 and 3 indicate that in both treatments the median payoff reduction is positive at each and every feedback level below the agents' own-evaluation. Furthermore, for the *incentive* treatment, the median payoff reduction increases in the gap between feedback and own-evaluation of agents. In contrast to this, at feedback levels equal and above own-evaluations the median payoff reduction is 0 in both treatments (with two exceptions: the payoff reduction of people with own-evaluation 40-60 and 60-80 at feedback levels 40-60 and 60-80, respectively, in the *incentive* treatment). Hence, also the disaggregated data in Tables 2 and 3 suggests that the median agents in our experiment reduce the principals' payoff if they receive a feedback from the principal that falls short of their own-evaluation, but typically refuse to reduce the

Table 2: Median payoff reduction: *incentive* treatment

Feedback	Own Evaluation					
	0-20	20-40	40-60	60-80	80-100	
0-20	...	20	50	80	100	
20-40	...	0	30	50	80	
40-60	...	0	10	27.5	60	
60-80	...	0	0	12	10	
80-100	...	0	0	0	0	
Total No:	0	14	15	12	1	Sum: 42

Table 3: Median payoff reduction: *flat* treatment

Feedback	Own Evaluation					
	0-20	20-40	40-60	60-80	80-100	
0-20	0	30	25	20	80	
20-40	0	0	10	10	60	
40-60	0	0	0	10	40	
60-80	0	0	0	0	1	
80-100	0	0	0	0	0	
Total No:	6	7	22	13	3	Sum: 51

In Tables 2 and 3 each row (beside the last) and column correspond to a feedback level and a level of own-evaluation, respectively. The last row indicates the number of agents that have levels of own-evaluation 0-20%, 20-40%, 40-60% etc. For example, there are 14 agents with an own-evaluation of 20-40% in the *incentive* treatment. In total we have 42 agents in the *incentive* and 51 agents in the *flat* treatment (the asymmetry is induced by non-show ups). Each row indicates the median payoff reduction agents with a certain own-evaluation choose at this specific feedback level. For example, the median payoff reduction of agents with an own-evaluation of 20-40 at a feedback level of 0-20 and 20-40 in the *incentive* treatment is respectively 20 and 0 points.

principal's payoff after feedback that confirms/is above their own-evaluation – regardless of whether the payoff that the agent receives is dependent or independent of the feedback that the principal gives.

4.3 Payoff dependent and independent reciprocity

To test our hypothesis 1 and 2, we consider each feedback level separately and ask whether the behavior of the agents for whom this feedback level lies '*Below*' their own-evaluation significantly differs from the agents for whom this feedback level is '*Equal/Above*' their own-evaluation.
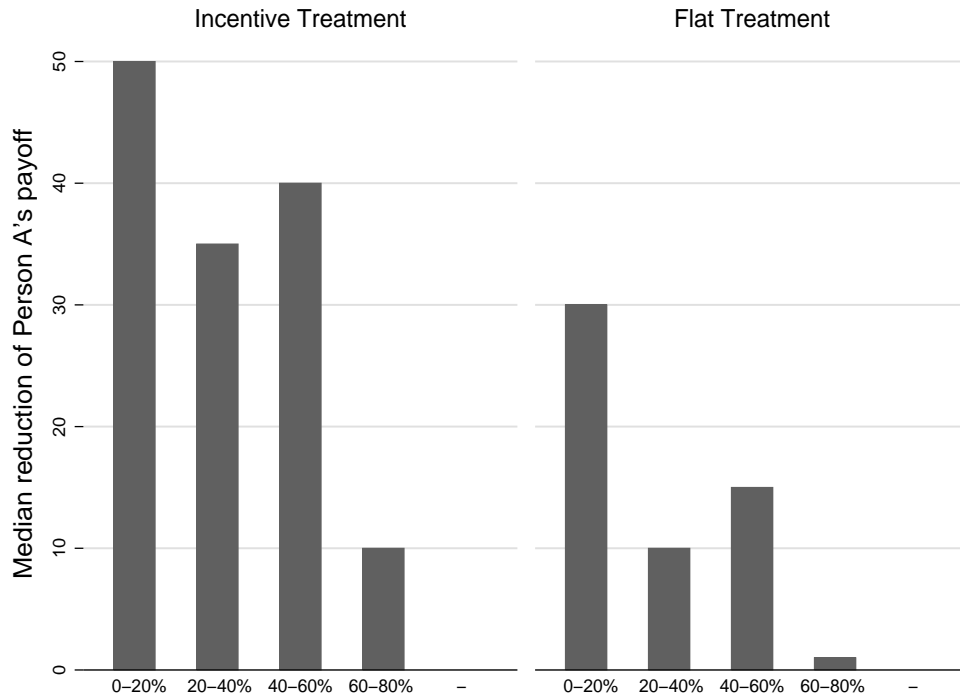
Figure 3: Median reaction behavior at different feedback levels given that the feedback was below Person B's (agent) own-evaluations

Figure 3 displays for each feedback level the median agent's reaction for whom this feedback lies below his self-evaluation.[6] That is, in the *incentive* treatment the median agent with a self-evaluation above 0-20% reacts to a feedback by the principal of

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[6]Note that Figure 3 does not report a median payoff reduction at feedback level 80-100% as evaluations above 100% are not possible.

0-20% by reducing the principal's payoff by 50 points. The median agent with a self-evaluation above 20-40% reacts to a feedback of 20-40% by reducing the principals payoff by 35 points etc. In contrast, the median agent for whom the feedback of the principal is equal or above his self-evaluation always reacts by not reducing the principal's payoff in our experiment (see also Tables 4 and 5).

Table 4: Median payoff reduction per feedback level: *incentive* treatment

Feedback	Feedback vs. Own Evaluation			WMW-Test
	Equal/Above	*Below*	Diff	P-Value
0-20	- (0)	50 (42)	-	-
20-40	0 (14)	35 (28)	35	(0.001)
40-60	0 (29)	40 (13)	40	(0.043)
60-80	0 (41)	10 (1)	10	(0.439)
80-100	0 (42)	- (0)	-	-

Table 5: Median payoff reduction per feedback level: *flat* treatment

Feedback	Feedback vs. Own Evaluation			WMW-Test
	Equal/Above	*Below*	Diff	P-Value
0-20	0 (6)	30 (45)	30	(0.053)
20-40	0 (13)	10 (38)	10	(0.055)
40-60	0 (35)	15 (16)	15	(0.019)
60-80	0 (48)	1 (3)	1	(0.2415)
80-100	0 (51)	- (0)	-	-

In Tables 4 and 5 we report for each feedback level the median payoff reduction of agents for whom this feedback level is *Equal/Above* their own-evaluation and for whom this feedback level is *Below* their own-evaluation. The corresponding number of observations is given in brackets. Furthermore we report the results of the Wilcoxon-Mann-Whitney (WMW) test which analyzes whether the difference between *Equal/Above* and *Below* is significant.

The results of the *incentive* treatment (see Table 4) show that for feedback levels below 80-100% the median payoff reduction of agents for whom the principal's feedback lies below their own-evaluation (*Below*) is higher than the median payoff reduction of agents for whom the principal's feedback is confirming or above their own-evaluation (*Equal/Above*). Remember, as in the *incentive* treatment there is no agent with an own-evaluation 0-20%, we cannot report a median payoff reduction for the group *Equal/Above* at feedback level 0-20%. The differences in payoff reductions in the *incentive* treatment are significant up to the feedback level 60-80% for which the

difference of the medians is still positive (10 points) but the result of the Wilcoxon-Mann-Whitney shows insignificance.

Result 1 *In the incentive treatment, for a given feedback level, (i) the median agent reduces payoffs of the principal if feedback is below their own-evaluation, but (ii) does not reduce payoffs if feedback is confirming or above own-evaluation. This is consistent with Hypotheses 1 and 2.*

Hence, payoff reductions at stage iv) in the *incentive* treatment are in-line with the assumption of payoff-dependent as well as payoff-independent reciprocity.

As already suggested above, the results in the *flat* treatment (see Table 5) resemble the results from the *incentive* treatment. Using the Wilcoxon-Mann-Whitney test shows a significant difference between own-evaluations above and equal/below the principal's feedback at all feedback levels up to 60-80%. Hence, even if the payoff of the agent is independent of the principal's feedback, payoff reductions are significantly higher in situations in which the feedback falls short of own-evaluations compared to situations in which the feedback is confirming or above the agent's self-perception.

Result 2 *In the flat treatment, for a given feedback level, (i) the median agent reduces payoffs of the principal if feedback is below his own-evaluation, but (ii) does not reduce payoffs if feedback is confirming or above the own-evaluation. This rejects the corresponding part of Hypothesis 1 and is consistent with Hypothesis 2.*

Hence, behavior regarding payoff reductions at stage iv) in the *flat* and *incentive* treatment can hardly be explained by payoff-dependent reciprocity alone. Results from the *flat* treatment rather suggest that reaction behavior is also driven by payoff-independent reciprocity, i.e. participants seem to perceive it as unkind to receive a feedback that falls short of their own-evaluation of performance (independent of the associated payoffs) and react with payoff reductions.

4.4   Evaluation and feedback

We conclude our report of the experimental findings with an account of the behavior of principals. In particular, we consider the number of observations for which the feedback of the principals is below and equal/above the own-evaluations of the agents (see Table 1). In the *incentive* treatment, the principal's feedback was below the

agent's own-evaluation in 21 cases and equal/above the agent's own-evaluation in 21 cases. In the *flat* treatment feedback was below own-evaluation in 6 and above/equal own-evaluation in 45 cases. Hence, the agents seem to give more positive feedback in the *flat* treatment. In Table 6, we further analyze this difference between the *incentive* and *flat* treatment by looking at the difference between the principals' evaluation (which is not communicated to the agent and does not affect the agent's payoff) and the principals' feedback (which is communicated to the agent and affects the principal's payoff in the *incentive* treatment).

Table 6: Difference between the principals' subjective evaluations and feedback per treatment

	Treatment		WMW-Test
	Incentive	*Flat*	P-Value
Evaluation − Feedback	0 (7.441)	0 (-5.384)	0.0009

Table 6 reports the median difference between the principals' evaluation and feedback per treatment and the *p*-value for the Wilcoxon-Mann-Whitney test of the hypothesis that both treatments exhibit the same median difference. Numbers in brackets correspond to the average difference between the principals' subjective evaluation and feedback.

A positive median and average difference between the evaluations of the principals and their feedback implies a feedback level that lies below the evaluation of the principal. A negative difference implies a feedback level above. As one can see from Table 6, the median difference is 0 in both treatments. However, average feedback levels in the *incentive* treatment fall short of the evaluations of the principal, whereas they exceed evaluations in the *flat* treatment. Furthermore, looking at the *p*-value of the Wilcoxon-Mann-Whitney test reveals that the difference of the median differences between the two treatments is highly significant. Hence, relative to their subjective evaluations, principals give higher feedback in the *flat* treatment than in the *incentive* treatment. As principals in the *flat* treatment do not face the financial incentive to give low feedback (an incentive present in the *incentive* treatment), this finding does not come as a surprise. To the contrary, would principals anticipate that agents negatively react to subjective feedback below their own-evaluation, they had an incentive to give the highest possible feedback in the *flat* treatment to avoid any negative response. However, this is not supported by our data. One possible explanation for non-maximal feedback by principals in the *flat* treatment could be a preference for

truthtelling (or a cost of lying) [as e.g. suggested by Gneezy (2005)]. If principals derive some utility from truthtelling (or suffer from lying) they might face a trade-off between truthtelling and the incentive to evade conflict with high feedback levels and give subjective evaluations which are more positive but not too different from their own-evaluation.[7]

5   Concluding Remarks

Payoff independent reciprocity We conducted an experiment with subjective performance evaluations and feedback to investigate individual conflict creation in response to a tension between self-perceptions and performance evaluations by others. Our experimental data indicates that in contrast to the predictions of existing models of reciprocity, conflicts are not only created in response to payoff-relevant actions. Individuals rather tend to act reciprocally and create conflicts whenever their own-evaluation exceeds the feedback by another party even if the feedback leaves their payoff unaffected. This suggests that individuals regard feedback below their self-perception as such as sufficiently unkind to trigger a reciprocal reaction.

Principal-agent relations with subjective performance reports The prospect of reciprocal reactions to subjective performance evaluation as observed in our experiment may facilitate principal-agent relationships even if performance signals are subjective, parties do not interact repetitively as e.g. in Malcomson & Spinnewyn (1988), and no third-party can enforce truth-telling as in Macleod (2003). In a companion working paper [Sebald and Walzl (2012)], we propose a simple representation of preferences that exhibit payoff-independent reciprocity in reaction to subjective performance appraisals and we develop a principal-agent model to investigate the impact of the conflict level, the psychological sensitivity to performance feedback, and the quality of the information technology on optimal effort levels and social welfare. While conflict based on reciprocal reactions to performance appraisals unambiguously rises agency costs and reduces social welfare in the absence of a truth-telling problem for the principal, some conflict potential is needed to establish a positive effort by the agent if the principal cannot credibly commit to reveal his own signal of the agent's performance truthfully. In particular, enhanced conflict levels have a positive effect

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[7]As the focus of our analysis here lies on the reaction behavior of agents, we leave the investigation of this question to future research.

on social welfare in the case of valuable projects which require substantial bonus payments to the agent. E.g. a well-established (internal or external) system of appeals against managerial decision making is not only providing a more peaceful workforce, it may also create the conflict opportunities needed to make bonus payments credible and thereby increase firm profits.

Technically, higher levels of conflict unambiguously rise the maximum credible bonus a principal can promise and thereby relax the principal's truth-telling constraint in a potentially welfare enhancing way. In contrast, the impact of the psychological sensitivity towards a tension between performance feedback and self-perception is more subtle. First of all, some sensitivity is needed to establish the prospect of conflict for the principal which is indispensable for truth-telling incentives. The more aggressive the agent reacts to reports perceived as unkind, the higher the anticipated level of conflict and the less restrictive the principal's truth-telling constraint. Hence, a more aggressive agent will induce a welfare improvement in case of valuable projects. However, the higher the sensitivity of the agent, the larger the required compensation for anticipated psychological costs of "unjust" performance appraisals. This ceteris paribus enhances necessary bonus payments for a given effort level and thereby reduces the principal's profit and social welfare. The ideal agent from the point of view of a principal who is residual claimant and wishes to conduct a very valuable project is therefore someone who reacts very aggressively to feedback perceived as unkind (i.e., who has low costs of sanctioning) but does not suffer too much from an 'unkind' signal and the corresponding retaliation. This reinforces our above-made appraisal of appeal systems and suggests to ensure low costs of conflict creation for the employee (e.g. low costs of law suits etc.).

Leniency bias While the theoretical literature on principal-agent relations with subjective performance evaluation emphasizes the truth-telling problem by the principal who is a residual claimant and may therefore be tempted to understate the agent's performance (see the previous paragraph), the empirical literature emphasizes right the opposite. In reality, principals are seldom residual claimants and tend to overstate an agent's performance generating a leniency bias. E.g. Berger et al. (2012) demonstrate in a laboratory experiment that principals provide more favorable feedback if feedback choices are unrestricted rather than if they are forced to rank a team of agents. A field study in call-centers by Breuer et al. (2010) shows that evaluations are more upwardly biased in smaller teams and after repeated contact

supporting the hypothesis that social ties enhance the leniency bias. The focus of our study on the agents' propensity to create conflict in reaction to feedback below their self-evaluation also contributes to this branch of the literature. Specifically, we observe a more lenient feedback in the *flat* treatment and we show that feedback falls short of evaluations in the *incentive* treatment (where feedback determines the payoff distribution between principal and agent) while it exceeds evaluations in the *flat* treatment (where feedback is costless). This suggests that principals identify a trade-off between the benefits of favorable feedback that avoids conflict and the costs of favorable feedback in the *incentive* treatment. This supports the findings in Breuer et al. (2010) that social ties (or in our setting the opportunity to generate costly conflicts) may induce more favorable feedback, and it enlarges the scope of Berger et al. (2012) who demonstrate the existence of a leniency bias in an environment where feedback is (almost) costless for the principal.

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6 Appendix: Experimental instructions

Dear Participant,

Welcome to the experiment.

> **Important:** Please do not communicate with other participants during the experiment and switch off your mobile phones. Read the instructions carefully. If something is not well explained or any question turns up now or at any time later in the experiment, then ask one of the experimenters. Do, however, not ask out loud, but raise your hand! We will clarify questions privately. You can use the instructions throughout the experiment whenever you want to re-clarify certain things and you may take notes on them, if you wish.

This experiment is a project from researchers from the University of Copenhagen and Bamberg University (Germany). It studies people's behavior in work situations.

You can earn money in this experiment. The amount of money that you will receive depends on your decisions as well as another person's decisions. All earnings will be paid out at the end of the experiment.

During the experiment, your income will be calculated in points. These points are converted into Danish kroner (DKK) according to the following exchange rate:

> 10 points = 3.5 DKK

In this experiment you will be randomly grouped into pairs and assigned to one of two different roles. We name these roles Person A and Person B. This means, during the experiment you will be paired with one other person in this room and you will be either Person A or Person B. If you are Person A, you will be paired with Person B and vice versa.

Note, both of you start with an endowment of 200 points in the beginning of the experiment that will be part of your final payoff.

On the following page we will reveal your role, i.e. Person A or Person B, and explain to you what the experiment is about.

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You have randomly been assigned to the role of **Person B**.

During this experiment you are paired with another person in this room: Person A.

The experiment has 4 stages:

Stage 1 (Questions): After reading the instructions, please answer the questions that you find on the screen. These questions are related to the instructions and they should check in how far the information in the instructions is clear. Please answer all the questions. When Person A has answered the questions a "Next" button will appear at the bottom of your screen. Please click it. When the answers to all questions are correct, clicking the button "Next" will start stage 2 of the experiment.

Stage 2 (Clicking-Task): You will be given a task. The task that you will be given is "clicking away boxes". This means, for a period of 90 seconds screens with boxes will appear for various time lengths and your task is to click the boxes away.

Note, Person A will be able to observe on his screen how you work on your task. This means, he / she will see the same screen as you and observe you clicking away the boxes.

Important: your performance will generate Person A's payoff.

If you click away:

- 0-20% of the boxes that appear during the 90 sec., then Person A will receive 200 points,
- 20-40% of the boxes that appear during the 90 sec., then Person A will receive 300 points,
- 40-60% of the boxes that appear during the 90 sec., then Person A will receive 400 points,
- 60-80% of the boxes that appear during the 90 sec., then Person A will receive 500 points,
- 80-100% of the boxes that appear during the 90 sec., then Person A will receive 600 points.

Stage 3 (Evaluation and Feedback): After the clicking-task, both of you will be asked to evaluate your performance. Note, these evaluations will NOT be communicated to the person that your

are paired with. In addition, you will be given feedback by Person A which is communicated to you at the end of the experiment.

Important: by giving feedback to you, Person A decides how much he / she wants to give you from his / her payoff that was generated through your performance during the clicking-task.

If Person A's feedback is:

- 0-20%, then you receive 100 points from Person A,
- 20-40%, then you receive 150 points from Person A,
- 40-60%, then you receive 200 points from Person A,
- 60-80%, then you receive 250 points from Person A,
- 80-100%, then you receive 300 points from Person A.

Stage 4 (Reaction): Following the feedback stage, you will be able to use the 200 points initial endowment and the points that you receive because of Person A's feedback to react to his / her evaluation of your performance. This means, you will be asked by how much you would like to reduce Person A's payoff given his / her feedback.

Your answer to this question can reduce Person A's payoff by up to 100 points. However, note that for every point that you reduce Person A's payoff, you have to pay 0.25 points. This means, for example, a reduction of 40 points of Person A's payoff, costs you 10 points etc.

Important: Note, neither you nor Person A will be informed about your actual performance in the clicking-task before the end of the experiment. So all decisions that you and Person A take during the experiment are based on your own subjective opinions. Note, however, that whatever decision you take your final payoff will NOT be negative.

On the next page you find a simple payoff-example:

Consider the following payoff-example:

Example:
- If you click away 20-40% of the boxes Person A receives 300 points.
- This means, Person A has a total of 300 + 200 = <u>500</u> points including his / her initial endowment of 200 points.
- If his / her feedback to you after the clicking-task is 20-40%, then you receive 150 points from Person A's 500 points, i.e. Person A is left with 500 - 150 = <u>350</u> points.
- Person A's feedback also implies that you have a total of 150 + 200 = <u>350</u> points including your initial endowment of 200 points.
- If you than reduce Person A's payoff by 40 points in reaction to his / her feedback, this costs you 10 points from your 350 points.
- Given this, Person A's final payoff (in points) is 300 + 200 − 150 − 40 = <u>310</u> points including the initial endowment of 200 points.
- Your final payoff (in points) is 150 + 200 − 10 = <u>340</u> points including the initial endowment of 200 points.

At the end of the experiment:

At the end of the experiment there will be a small questionnaire to fill out. Furthermore, payoffs will be calculated - on the basis of your performance, your feedback and Person B's reaction to it – a summary of all this will be displayed on your screen. Please remain seated until your client number (which you will find on your summary screen) is announced. Upon announcement please come forward so that you can be paid.

Please raise your hand now, if you have any questions. Otherwise, please answer the questions on the screen and press "Next" to start stage 2 of the experiment.

7 Appendix: Screen-shots

In this Appendix you can find a selection of the screen-shots. The full set of screen-shots can be obtained from the authors upon request.

[Figures 4 - 8]

8 Appendix: Data

[Tables 7 and 8 here]

Looking at Table 7 one can see that in the *incentive* treatment there were 17 A- and B-Persons in the 50 second session, 17 A- and B-Persons in the 90 second sessions and 9 A- and B-Persons in the 120 second session. In all sessions 400 boxes appeared in the effort task and the average number of boxes increased the more time B-Persons had.

Looking at Table 8 one can see that in the *incentive* treatment the average ratio of As' evaluations to feedback is for all sessions above 1. This means, the evaluations of A-Persons were on average better than their feedback in the *incentive* treatment. As can easily be seen, the same is true for the average ratio of B-Persons' evaluations and feedback. Interestingly, the ratio is higher in case of B-Persons. This indicates that on average B-Persons had a better evaluation of their own work as A-Persons.

[Tables 9 and 10]

Looking at Table 9 one can see that in the *flat* treatment there were 12 A- and B-Persons in the 50 second session, 27 A- and B-Persons in the 90 second sessions and 13 A- and B-Persons in the 120 second session. In all sessions 400 boxes appeared in the effort task and the average number of boxes increased the more time B-Persons had. The increase is actually a bit sharper than in the *incentive* treatment.

Looking at Table 10 one can see that in the *flat* treatment the average ratio of As' evaluations to feedback is above 1 only for the 90 second sessions. Generally, the ratio is lower than the comparable ratio for the *incentive* treatment. With regard to the average ratio of B-Persons' evaluations and feedback, one can see that in the fast 50 second sessions the ratio is even lower than the average ratio of As' evaluations to feedback. In the other two sessions it is higher, but it is generally lower compared to the *incentive* treatment.

Table 7: Descriptive Statistics A: *incentive* treatment

Sessions	Number of A-Persons	Number of B-Persons	Number of Appeared Boxes	Average Number of Clicked Boxes
50 seconds:	17	17	400	101
90 seconds:	17	17	400	193.35
120 seconds:	9	9	400	202

Table 8: Descriptive Statistics B: *incentive* treatment

Sessions	Average Ratio of A's evaluation / Feedback	Average Ratio of B's evaluation / Feedback
50 seconds:	1.48	1.85
90 seconds:	1.20	1.58
120 seconds:	1.05	1.26

Table 9: Descriptive Statistics A: *flat* treatment

Sessions	Number of A-Persons	Number of B-Persons	Number of Appeared Boxes	Average Number of Clicked Boxes
50 seconds:	12	12	400	87
90 seconds:	27	27	400	196
120 seconds:	13	13	400	247.5

Table 10: Descriptive Statistics B: *flat* treatment

Sessions	Average Ratio of A's evaluation / Feedback	Average Ratio of B's evaluation / Feedback
50 seconds:	0.841	0.552
90 seconds:	1.082	1.084
120 seconds:	0.989	1.014

Person B P1

Questions:

Please indicate the answer to each question in the associated box to the right. Note, there is only one correct answer to each question.

Please raise your hand, if you have any questions.

Q1: How many points does Person A receive (excluding the initial endowment of 200 points), if your performance during the clicking-task is 60-80%?

Q2: What is the initial amount of points that you and Person A start the experiment with?

Q3: If you want to reduce Person A's payoff by 80 points as a reaction to his/her feedback, how many points does this cost you?

Q4: What is your final payoff in points (including the initial endowment of 200 points), if Person A's feedback is 20-40% and you choose to reduce Person A's payoff by 80 points?

Q5: What is Person A's final payoff in points (including the initial endowment of 200 points), if your performance is 80-100%, Person A's feedback to you is 20-40% and you reduce Person A's payoff by 80 points in reaction to his/her feedback?

After answering the questions, please wait for Person A to finish. As soon as he has answered all questions, a button "Next" will appear at the bottom of your screen. When it appears and you are ready, please press it to move on.

Q1
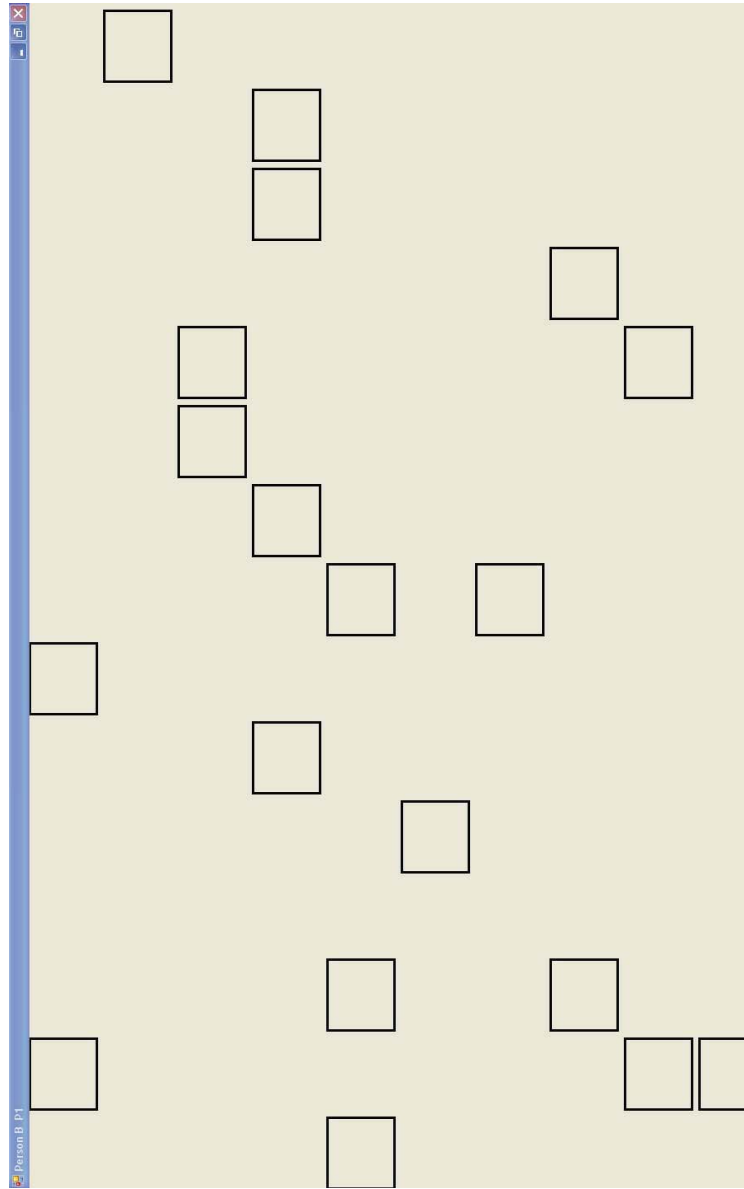
Q2

Q3

Q4

Q5

Figure 4: Control Questions: Person B

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Figure 5: Clicking Task: Person B

Figure 6: Evaluation: Person B

Person A_01

Please evaluate Person B's performance during the task.

Note, the answer to this question will NOT be communicated to Person B. Only on the next screen you will be asked to give feedback which is subsequently communicated to Person B.

What do you think is the percentage of boxes that Person B clicked away?

0-20%   20-40%   40-60%   60-80%   80-100%

Next

Figure 7: Evaluation: Person A

Figure 8: Feedback: Person A

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Subjective performance evaluations and reciprocity in principal-agent relations

Abstract
We conduct a laboratory experiment with agents working on and principals benefitting from a real effort task in which the agents' performance can only be evaluated subjectively. Principals give subjective performance feedback to agents and agents have an opportunity to sanction principals. In contrast to existing models of reciprocity we find that agents tend to sanction whenever the feedback of principals is below their subjective self-evaluations even if agents' payoffs are independent of it. In turn, principals provide more positive feedback (relative to their actual performance assessment of the agent) if this does not affect their payoffs.