CENTRE for ECONOMIC PERFORMANCE

CEP Discussion Paper No 1116

January 2012

The Provision of Relative Performance Feedback Information: An Experimental Analysis of Performance and Happiness

Ghazala Azmat and Nagore Iriberri

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
This paper studies the effect of providing relative performance feedback information on individuals' performance and affective response, under both piece-rate and flat-rate incentives. In a laboratory setup, agents perform a real effort task and when receiving feedback, they are asked to rate their *happiness*, *arousal* and feeling of *dominance*. Control subjects learn only their absolute performance, while the treated subjects additionally learn the average performance in the session. Under piece-rate, performance is 17 percent higher when relative performance feedback is provided. Furthermore, although feedback increases the performance independent of the content (i.e., performing above or below the average), the content is determinant for the affective response. When subjects are treated, the inequality in the happiness and the feeling of dominance between those subjects performing above and below the average increases by 8 and 6 percentage points, respectively. Under flat-rate, we do not find any effect on either of the outcome variables.

Keywords: Relative performance, feedback, piece-rate, flat-rate, happiness
JEL Classifications: C91, M52, D03

This paper was produced as part of the Centre's Labour Markets Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements
We thank Manel Baucells, Michael Bashshur, Gary Charness, Ada Ferrer-i-Carbonell, George Loewenstein, and Pedro Rey-Biel for their comments. Ghazala Azmat acknowledges financial support from ECO2008-06395-C05-01, Fundación Ramon Areces and the support of the Barcelona GSE Research Network and the Government of Catalonia. Nagore Iriberri acknowledges financial support from Fundación Rafael del Pino, Fundación Ramon Areces, Ministerio de Educación y Ciencia (ECO2009-11213 and SEJ2007-64340) and the support of the Barcelona GSE Research Network and the Government of Catalonia.

Ghazala Azmat is an Associate at the Centre for Economic Performance, London School of Economics. She is also with the School of Economics and Finance, Queen Mary College, University of London. Nagore Iriberri is an Assistant Professor with the Departament d'Economia i Empresa, Universitat Pompeu Fabra, Spain.

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

1. Introduction

Performance appraisals have become standard practice in organizations. Since the early 1980's, between seventy-four and eighty-nine percent of American businesses have used them, see Murphy and Cleveland (1991). Informing agents about how well they are performing relative to their peers, in other words, by providing workers with relative performance feedback information, is a common way in which performance appraisals are implemented. Given its widespread use, it is important to understand the consequences of providing relative performance feedback information. Managerial economics and social psychology has devoted quite a lot of attention to the study of performance appraisals (see Bretz et al., 1992, and Levy et al., 2004, for reviews). Research on Economics, however, has paid little attention to relative performance feedback information and to all of its potential effects.

This paper empirically studies the provision of relative performance feedback information under both piece-rate and flat-rate incentives on two important measures: agents' *performance* and agents' *affective response*. Affective response includes measures of agents' emotional state, such as happiness (subjective well-being or experienced utility), arousal (or motivation) and feeling of dominance. In addition, given that in practice the relative performance feedback information is rarely provided just once, we investigate the *dynamic effects* of its provision on both, performance and affective response. Furthermore, to understand if men and women react differently to relative performance information, we analyze the gender differences. By exploring all of these dimensions, we provide a comprehensive empirical analysis of the effects of the provision of relative performance feedback information, which, so far, have not been addressed.

The empirical literature focuses on the effect of relative performance feedback on performance.[1] Under piece-rate incentives, Hannan et al. (2008) in an experimental setup without real effort, Azmat and Iriberri (2010) in an educational setup, and Blanes i Vidal and Nossol (2011) in a firm setting, find that the provision of relative performance feedback information has a positive effect on performance. Eriksson et al.

[1] The theoretical literature investigates the optimal provision of relative performance feedback information and it is mostly focused on the tournament literature, such as in Gershkov and Perry (2009), Kräkel (2007), Lai and Matros (2007) and Ederer (2010). Other papers have analyzed the effect of performance appraisals. Hansen (2009) studies the provision of performance appraisals when agents have career concerns. Crutzen et al. (2010) studies the consequence of pay differentiation on employees' self-perception. Ertac (2006) analyzes the provisional relative feedback when individuals have imperfect knowledge of their ability.

(2009), in an experimental setup with real effort, find that although performance is not affected it does increase the mistake rate of the worst performing agent.[2]

Our study makes two important contributions. First, we go beyond the study of the effect of relative performance feedback information on individual performance by also analyzing the effect on individuals' affective response. Second, we compare the effect of relative performance feedback under two commonly used incentive schemes, piece-rate and flat-rate, allowing us to disentangle between the effect of relative income feedback and the relative performance feedback on both, performance and affective response.

Despite its importance for practitioners and organizations, no attention has been paid to how agents *feel* when they are given relative performance feedback information. Bowles (1998) argues that "economic institutions structure the tasks people face and hence influence not only their capacities but their values and psychological functioning as well". One important measure of how agents feel is their level of happiness or subjective well-being. In recent years, economists and managers have started to give more weight to individuals' happiness as an important outcome variable of interest, along with more traditional outcome variables. Individuals' well-being has shown to have important economic consequences. For example, labor market studies on workers' psyche, which include broader measures than happiness, have shown to be very important in determining their moral and motivation, while at the same time having crucial effects on relevant issues such as firms' retention ability (see Bewley, 1999). According to the American Psychological Association (2006), employers in the US spend an estimated 300 billion dollars a year on stress-related absenteeism, turnover, lowered productivity, and direct medical, legal and insurance costs. They found that companies that invested in employees' health and well-being had a 26% lower turnover

[2] There are other related papers. For example, peer effects, being observed and observing others' work, have positive effects on performance (Falk and Ichino, 2006, Mas and Moretti, 2009). Kuhnen and Tymula (2008) study the effect of feedback in relation to individuals' expectations about relative performance. Charness et al. (2010) investigate the effect of providing the full performance ranking in a group of three subjects, where they also include treatments in which subjects can buy their own performance, as well as destroy other subjects' performance. Finally, in tournaments, Casas-Arce and Asis Martinez-Jerez (2009), Young et al. (1993), Muller and Schotter (2003), Hannan et al. (2008), Fehr and Ederer (2007) and Eriksson et al. (2009) study the effect of relative performance feedback information. The evidence is mixed, while some authors find that the provision of relative performance feedback increases all participants' effort, others find that the leading participants slack off and participants who are lagging behind give up. Ockenfels et al. (2010) study how bonus payments based on performance ratings, affect satisfaction and performance of managers in a large, multinational company. Recently, Bandiera et al. (2009) and Delfgaauw et al. (2009) have also considered the impact of relative performance feedback at the team level.

rate compared to the national average. Recent overviews of research on happiness and its relation to economics are provided by Kahneman et al. (1999), Loewenstein (2000), Frey and Stutzer (2002), Krueger (2005) and McFadden (2005).

Furthermore, the literature that looks at the effect of relative performance feedback information on performance under piece-rate incentives, do not identify whether the effect is driven by relative *performance* or relative *income* feedback. Under piece-rate incentives, given that income is a function of performance; relative performance feedback informs individuals about both relative performance and relative income. In order to disentangle these two channels, we implement both piece-rate and flat-rate incentive schemes. Consistent with analyzing the wider implications of relative performance feedback, we investigate whether the incentive scheme matters for affective response.

We propose a controlled laboratory setup, where subjects perform a real effort task and are rewarded according to piece-rate or flat-rate incentives. There are four working periods. Between periods, the control subjects are provided with their absolute performance, while the treated subjects are provided with their absolute performance *and* with the average performance in the session. Once feedback is provided, both control and treated subjects' affective response is elicited, that is, they are asked to rate their happiness, arousal and dominance levels. See Figure 1 for a graphical description of the experiment.

Our setup offers a number of advantages and extensions over the previous studies for analyzing the effect of relative performance feedback information on performance under piece-rate incentives. In particular, when compared to field studies, the controlled lab environment allows us to attribute the observed treatment effect solely to the treated individuals' reaction and not to any other entity. For example, students who receive relative performance feedback information might be reacting through their parents' response, rather than their own (Azmat and Iriberri, 2010). In addition, the advantage of a control group allows us to isolate the increase in performance that is attributed solely to an increase in subjects' effort, and not to other factors, such as different learning patterns or differences in ability. Moreover, we use a real effort setting and the information provided refers to a group.[3] In many labor settings, the comparison to a group of co-workers might be more informative than the comparison to

[3] Hannan et al. (2008) do not use a real effort setting and Eriksson et al. (2009) provide information based on pair-wise comparison.

one another co-worker. In addition to the setup advantages, we are able to relate the performance findings to a number of new and interesting dimensions, such as gender, which have previously been unexplored.

With respect to performance, under piece-rate incentives, consistent with the mainstream of previous findings, we find that the provision of relative performance feedback information had a strong and positive effect on individual performance, even after controlling for individual characteristics, such as ability. Those subjects who received relative performance feedback information increased their performance by 17 percent compared to those who did not. With regard to the dynamic effects of providing relative performance feedback information, we find that in all periods, the treated subjects outperform the untreated, although the effect becomes weaker over time. In addition, the *content* of the feedback information (i.e., positive (negative) feedback when agents are informed that they are performing above (below) the average) does not affect subjects' subsequent performance differently, since all subjects increase their performance. This is consistent with a theoretical framework in which individuals get extra utility when performing better than others and get disutility when performing worse than others, i.e. individuals have competitive preferences. Finally, we find a strong gender difference in the reaction to the treatment, such that solely male subjects drive the overall treatment effect. This is a new and interesting result that adds to the recent literature on gender differences in relevant economic environments. In particular, this finding shows that gender differences are important not only in competitive or tournament-like environments, but also when competition is rather symbolic.

With respect to the affective response, under piece-rate incentives, we find that the provision of relative performance feedback information had strong effects on both happiness and dominance levels. Contrary to the findings on performance, we show that the treatment had very different effects on those who are receiving positive versus negative feedback. We find that receiving positive (negative) feedback affects subjects' happiness and dominance levels positively (negatively), such that when we only consider the overall treatment effect, the opposite signs cancel out. With respect to the happiness, the relative feedback leads to an increase in the gap (or inequality) of subjects' happiness, between those performing above and below the group average, by 8 percentage points. With respect to the dominance levels, the treatment leads to an increase in the inequality of subjects' feeling of dominance between those performing above and below the group average, by 6 percentage points. Moreover, the inequality in

both happiness and dominance increases over time with the cumulative information. Finally, unlike the effect on performance, we find no gender differences in the affective response to the feedback treatment.[4]

The finding related to the inequality in happiness is consistent with the finding on relative income and happiness, which has been studied in Economics since Duesenberry (1949) and Easterlin (1974) (see Clark et al., 2008, for a comprehensive and recent review). Treated subjects, who are made aware of differences in income, show a higher inequality in both performance and happiness than those subjects who are unaware of it.[5] In this paper, we explore whether the effect we observe, both on performance and on affective response, when providing relative performance feedback information under piece-rate incentives are due to relative *performance* or relative *income* information. Our paper is the first to connect relative performance feedback information to relative income feedback information.

To disentangle the relative performance from the relative income effect, we replicate our experiment under flat-rate incentives. Regarding individual performance, we find that individuals react when relative performance information has consequences in terms of relative income (i.e. strong effect under piece-rate but insignificant effect under flat-rate incentives). Interestingly, we still find large gender difference in performance; while men continue to react positively to the relative performance feedback, where the magnitudes are much smaller than under piece-rate, women react negatively to it. In addition, we do not see any effect of relative performance feedback information on affective response under flat-rate incentives. These findings are important in two ways. First, relative performance feedback affects individuals' emotional state (increasing inequality in happiness and in the feeling of dominance) only when this information has consequences in terms of relative income (i.e., under piece-rate). Second, it also rules out the concern for potential experimental "demand" effects in the elicitation of subjects' affective response (i.e., subjects react to the

[4] Two papers study happiness as an outcome variable in two different experimental settings. First, Charness and Grosskopf (2001) test in a dictator-type setting whether there is a relationship between a person's happiness and the weight she attaches to relative payoffs. They do not find support for the hypothesis that happiness levels are inversely related to a preoccupation with relative payoffs. Second, Brandts et al. (2009) study the effect of a competitive environment on happiness and find that competition leads to an increase in inequality in happiness between those subjects who are chosen to participate and those who are excluded during the competition. This increase in inequality is consistent with our findings.

[5] Recent laboratory studies provide evidence for a detrimental effect of disadvantageous relative income positions (see Burchett and Willoughby, 2004; Clark et al., 2010, and Gächter and Thöni, 2010, Greiner et al., 2011).

information because they feel they are expected to by the experimentalist). Given the inequality in happiness and feeling of dominance is only found under piece-rate incentives and not under flat-rate incentives, this effect is less likely to be driven purely by experimental demand effects.

The findings from this paper have important implications for understanding whether or not an organization would choose to provide relative performance feedback information. We have shown that there are very strong effects on performance, when performance is rewarded, and this implies strong incentives for an organization to employ this mechanism, especially because its implementation has a negligible cost. However, we have gone beyond conventional thinking on this issue and we have highlighted that this mechanism, while being very effective on increasing performance, has important consequences on individuals' affective state.

In reality, it is not clear whether performance or affective response is more crucial for an organization. Both outcomes have important economic consequences. The emphasis on one or the other will highly depend on the nature of the organization. For example, an educational institution might care equally for their students' performance, as for their students' satisfaction or well-being. Firms, on the other hand, might care primarily about their employees' performance and at a secondary level about their employees' well-being. However, when workers' psychological aspects affect their morale and motivation levels, or even firms' retention ability, then it justifies why firms would care about these aspects (Bewley, 1999). In recent years, a number of companies have shown a special interest in their workers' satisfaction or well-being and have directly invested in initiatives, such as relaxation/nap rooms and by offering yoga classes. Overall, any organization, only after understanding *all* the consequences of providing agents with relative performance feedback information can evaluate the appropriateness of such a policy.

The paper is organized as follows. Section 2 describes the experimental design and procedures in detail. Section 3 presents the hypotheses regarding the effects on performance and emotional response. In Section 4 we proceed to do the econometric analysis, quantifying the main treatment effects under piece-rate incentives. This section contains two main parts. First, we start by analyzing the effect of the treatment on individual performance. Second, we analyze the effect of the treatment on the individuals' affective response. Both subsections follow the same order: first we analyze the overall treatment effect, then, we test for gender differences and finally we

analyze the effect of the positive/negative content of the feedback. Section 5 contains the analysis under a flat-rate incentive scheme. Finally, we conclude in Section 6.

2. Experimental Design and Procedures

Sixteen experimental sessions were conducted in the Laboratori d'Economia Experimental (LEEX) at Universitat Pompeu Fabra using z-Tree experimental software (Fischbacher, 2007). A total of 320 subjects, 20 per session, were recruited using the ORSEE recruiting system (Greiner, 2004), ensuring that subjects had not participated in similar experiments in our laboratory in the past. After arrival, a sheet with general and identical instructions was distributed and read aloud to all subjects. The instructions can be found in the appendix at the end of the paper. Subjects were guaranteed a 3 euro show-up fee. Throughout the experiment, we ensured effective separation between subjects, since they were seated at cubicles, so that they could not observe other subjects' screen. Once the experiment had concluded, subjects filled in a questionnaire that requested demographic details, while they waited to be paid.[6] We use these details as control variables in the econometric analysis. The questionnaire can be found in the appendix at the end of the paper. Subjects were paid individually and in private using a closed envelope. Each experimental session lasted one hour.

Figure 1 shows the timeline of the experiment. It consisted of four working periods of five minutes each. During each period, subjects were presented with the same summations of four randomly generated numbers of two digits each, for which subjects were asked to submit an answer.[7]

Half of the subjects, 160, were rewarded according to their performance, that is, the number of correctly solved summations. More specifically, subjects were paid 0.15 euros for each correctly submitted answer (piece-rate incentives). All four working periods counted equally and the total payment depended on the correctly solved summations during the four periods. See Section 4 for the results under piece-rate. The other half, 160 subjects, were rewarded according to a fixed wage of 15 euros, which was independent of their performance (flat-rate incentives). See Section 4 for the results under flat-rate.

[6] All sessions, treated and control, were mixed in terms of gender. Consistent with the gender composition of the subject pool in Universitat Pompeu Fabra, there were slightly more female than male subjects (41% men and 59% women).

[7] Many experimental papers have used summations, as a real-effort task, since it combines both ability and effort. See for example, Niederle and Vesterlund (2007) and Eriksson et al. (2009).

At the end of each working period, four times during the experiment, subjects could rest for two minutes while they were given feedback. After the two minutes with the feedback information, they were asked to answer three questions included in the *Self-Assessment Manikin* (SAM) by Lang (1980). We will proceed to explain the feedback information, as well as the SAM questionnaire.

The treatment variable of interest is the feedback information about performance, which was provided at the end of each period. Half of the subjects (80 subjects under piece-rate and 80 subjects under flat-rate), the control group, were provided with information about their correct number of summations. We will refer to this as *absolute performance*. The other half (80 subjects under piece-rate and 80 subjects under flat-rate), the treatment group, were provided not only with information about their correct number of summations, but they were also provided with the average correct number of summations within the experimental session. Therefore, subjects in the treatment group could observe whether they performed better or worse than the average, as well as the distance from this average. We will refer to this feedback information as the *relative performance* feedback information. It is important to note that all subjects, both in the treatment and control groups, were explained in the instructions the type of information they would receive (see instructions in the appendix at the end of the paper).[8]

The SAM questionnaire, which is commonly used in social psychology, measures the affective response to a task. It consists of three sets of five pictures each, as shown in Figure 2. The top set measures happiness in a numerical scale between 1 and 9, where 1 represents *happy* and 9 represents *unhappy*. The second set measures arousal in a scale between 1 and 9, where 1 represents *aroused* and 9 represents *unaroused*. The third set measures dominance in a scale between 1 and 9, where 1 represents *dominated* and 9 represents *dominant*. In all administrations involving SAM, the subjects were instructed to rate their personal affective response using the pictures provided. The SAM instructions included the list of words from the pertinent end of each semantic differential scales in order to identify the anchors of each dimension to the subject. Thus, the subject was instructed, for example, to use the extreme happy SAM rating if the reaction was one of feeling "happy, pleased, satisfied, contented,

[8] Eight sessions were provided with relative performance feedback information and other eight sessions were provided with absolute performance. We had control and treated sessions run in the same weekdays and times.

hopeful, relaxed", and to use the other extreme if she felt "unhappy, annoyed, unsatisfied, melancholic, despairing, or bored". Similar instructions accompanied all three scales.[9]

Given that the SAM questionnaire was administered straight after providing subjects with feedback, we may be concerned that experimental demand effects drive any effect found on individuals' affective response. This means that subjects react to the feedback treatment because they think that the experimentalist expects them to react. That is a pervasive concern without a clean solution in any study that elicits subjects' affective response. We address this in two ways. First, we follow a between-subject design methodology instead of a within-subject design, which is regarded as the safer methodology in order to avoid demand effects. Second, we conduct our experiment under both, piece-rate and flat-rate incentives, and find radically different results depending on the incentives. These differences, which are discussed at length in Section 4, rule-out this concern.

After the four working periods and the four periods of feedback and SAM questions are over, subjects were informed about their total earned money. The treatment group under piece-rate were also informed about the average earnings in the experiment, such that, again they could observe whether they would get higher or lower earnings than the average subject within the experimental session. The total average earnings in the experiment under piece-rate, including the show-up fee, were 14.69 euros, where the average was 14.55 euros in the control group and 14.84 euros in the treatment group. The earnings in the experiment under flat-rate, including the show-up fee, were 15 euros, for both the control and treatment groups.[10]

3. Hypotheses

This section presents the hypotheses for the consequences of relative performance feedback information, for both performance and affective response, which we will test with the proposed experimental design.

---

[9] The subject was instructed to use the extreme aroused SAM rating if the reaction was one of feeling "stimulated, excited, frenzied, jittery, wide awake, aroused" and to use the other extreme if she felt "relaxed, calm, sluggish, dull, sleepy, unaroused". The subject was instructed to use the extreme dominated SAM rating if the reaction was one of feeling "controlled, influenced, cared for, awed, submissive", and to use the other extreme if she felt "controlling, influential, in control, important, dominant".

[10] We chose the 15 euro flat-rate as it was close the average earnings under piece-rate.

Regarding the effect on performance, the null hypothesis is that we should expect no effect on performance under piece-rate incentives, given agents should choose their effort in a way that marginal benefit is equal to the marginal cost of effort. However, as discussed in Azmat and Iriberri (2010), alternative hypotheses can be considered. First, agents may have inherently competitive preferences in a way that they get utility (disutility) from performing above (below) other agents.[11] If agents have competitive preferences, they should put in higher effort regardless of the content of the feedback when relative performance feedback information is provided, compared to the situation in which this information is not provided.[12]

Second, if we consider a standard selfish preferences set-up, agents may also react to the relative performance feedback information because they have an imperfect knowledge of their own ability, and the relative performance feedback is informative of one's ability. We will refer to this as the self-perception ability hypothesis.[13] In this case, agents who learn they are performing above (below) the average would be encouraged (discouraged) when relative performance feedback information is provided compared to the situation in which this information is not provided.[14]

The two alternative hypotheses predict different reactions; while competitive preferences hypothesis predicts an increase in effort regardless of the feedback content, the self-perception of ability hypothesis predicts that agents learning they are performing above (below) the average will increase (decrease) their effort.

Regarding the effect on emotional response, again the null hypothesis is that we should expect no effect on the emotional response under piece-rate incentives, given that agents' utility depends on the monetary reward from their own choice of effort. However, the competitive preferences and the self-perception ability hypotheses, may

[11] Many models that incorporate competitiveness have been proposed. Kandel and Lazear (1992) propose a model where *peer pressure* enters additively into the utility function. A specific form of peer pressure mentioned by the authors is the difference between the average effort and one's effort. Charness and Rabin (2002) propose a simple piece-wise linear utility in which others' payoffs affect one's utility. One type of interdependent preferences their utility model includes is that of *competitive* preferences, where others' payoffs enter negatively in one's utility. Dubey and Geanakoplos (2004, 2005) and Moldovanu et al. (2005) assume individuals have knowledge of the complete ranking and they assume individuals get positive utility from the number of individuals below them and negative utility from the number of individuals above them. Hopkins and Kornienko (2004) propose a utility in which "status" or position in the ranking enters multiplying the absolute income.

[12] Proof can be found in Azmat and Iriberri (2010), Section 3.1.

[13] Ertac (2006) proposes a model in which ability and effort are complements in performance, predicting that individuals who learn to be performing above (below) average will exert more (less) effort than when they did not know. In the psychology literature the role of self-assessment has also been studied (see for example Sedikides, 1993).

[14] Proof can be found in Azmat and Iriberri (2010), Section 3.2.

rationalize an emotional reaction to the provision of relative performance feedback information. Agents who learn that they are performing above (below) the average would have a positive (negative) emotional reaction, that is, they would reveal themselves to be happier, more aroused and more dominating (unhappier, less aroused and more dominated) compared to the situation in which this information is not provided. In which case, the provision of relative performance feedback information would increase the inequality in emotional response compared to the situation in which this information is not provided.

In addition, other possibilities also exist given individuals' reaction to the symbolic competition, which is offered by that the provision of relative performance feedback information. On the one hand, if individuals dislike the symbolic competitive environment, then the provision of relative performance feedback information will make those performing below the average unambiguously unhappier but can have an ambiguous effect on those individuals performing above the average. If, on the other hand, individuals enjoy the symbolic competitive environment, we could expect an unambiguous increase in happiness for those performing above the average but an ambiguous effect on those performing below the average.

In the following section, we will compare control (no relative performance feedback information) and treatment groups (relative performance feedback information) in order to test the hypotheses and to study the effect of providing relative performance feedback information.

4. Analysis under Piece-Rate Incentives

This section consists of two main parts. First, we will focus on the effect of relative performance feedback on individual performance. Second, we will study the effect on the affective response. For both, performance and affective response, we start by measuring the overall effect of the feedback, we then look for gender differences and finally, we analyze the effect that the feedback content has on each of the outcomes.

4.1. The Effect of Relative Performance Feedback Information on Performance

4.1.1. The Overall Effect

The performance measures of interest are the number of summations subjects submit (*Submitted*), which should be interpreted as effort, and the number of correct answers they give (*Correct*), which should be interpreted as performance. Figure 3

shows the kernel distributions for these two variables. The distributions clearly show that for both, submitted and correct summations, the treated subjects outperform the control subjects. This difference is shown in all parts of the distribution, suggesting that the treatment had a positive effect on the treated subjects, independent of the information they were receiving, that is, whether they were performing above or below the average (and the distance from the average), which is in-line with the competitive preferences hypothesis.[15] In section 4.1.3, we will discuss the importance of informational content is more detail.

To quantify the average treatment effect, we estimate the following linear regression.

(1) $Y_{it} = \alpha + \beta Treatment_i + \lambda Period_t + \varepsilon_{it}$

where the dependent variable, Y_{it}, refers to the performance measures, *Submitted* or *Correct*, for individual *i* at period *t*. The variable *Treatment* identifies those who received the relative performance feedback information. We also include a time trend, *Period*.

Column 1 in Tables 1 and 2 show the estimates for equation (1) for submitted and correct summations, respectively. Since there are four working periods for each subject, we also weight the observations by the individual fixed effects (random effects model). On average, individuals submit 14.80 summations, of which 12.34 are correct. In both instances, we see that the treated subjects significantly perform better. The treated subjects submit 13.82 percent (treatment coefficient 2.05) more summations and correctly answer 17.34 percent (treatment coefficient 2.14) more summations than the control subjects. It is interesting to note that the information, not only makes the subjects work harder but they also get better results. Time also matters and the estimates suggest that the subjects perform better over time. We further investigate the treatment effect separately for each period.

In columns 2 to 5 of Tables 1 and 2 we estimate by OLS the equation (1) for periods 1 to 4 for submitted and correct summations, respectively. Over time, subjects improve in their performance, which implies there is learning. Both control and treated subjects become accustomed to the computer application and the task.[16] We can also see

[15] In Figure 2 of Azmat and Iriberri (2010) we can see similar kernel distributions.

[16] Subjects were not allowed to use paper and pencil for summations. However, we observed that many subjects did the summations column by column. In the beginning, they were memorizing rather than

that this learning is steeper in the beginning and it slows down in the last period. This is the case for both control and treated subjects. More interestingly, treated subjects outperform the control subjects in each period. The effect is strongest in the initial period, suggesting an anticipation effect.[17] This is interesting as it resembles what happens in tournament competitions. Here competition is only symbolic and yet the treated subjects react to knowing that they will receive relative performance feedback. The anticipation effect is also in-line with those found by Blanes i Vidal and Nossol (2011) and Kuhnen and Tymula (2011), under piece-rate and flat-rate incentives, respectively.

An alternative performance variable of interest is the number of mistakes that subjects make during the task, i.e., the difference between the number of submitted summations and the number of correct summations. This measures the quality of performance. We also estimated equation (1) using the mistake rate as outcome variable, but we find that the treatment had no effect on the quality of performance.

Finally, we repeat the analysis adding control variables.

(2) $Y_{it} = \alpha + \beta Treatment_i + \lambda Period_t + \delta X_i + \varepsilon_{it}$

where X_i is a vector of control variables, including gender, foreign, age and controls for ability. One concern may be that the treated group is of higher ability than the control group. Although this is highly unlikely given the large number of subjects in each group, we rule-out this concern by using different measures of ability. First, we include a dummy for whether subjects' degree of study was science oriented or not (*Science_Degree*). Second, a dummy variable for whether the subject took the math test in the national level university entry test Selectividad (*Math_Test*).[18] From columns 6-10 in Tables 1 and 2 we can see that the point estimates of the treatment effect overall, as well as period by period, are very similar to those without controls, as one would expect in a randomized experiment. In principle, we would expect the ability distribution to be the same in each group, as these results show. As for controls, only the *Math_Test* variable has a small positive and significant effect in the number of

putting into the computer the summation of the first column. By not having to memorize the summation for the first column, improved their performance substantially.

[17] We observed the strong first period effect in all four sessions for the treated subjects.

[18] Selectividad is similar to the Scholastic Aptitude Tests (SAT) used in the United States taken at the end of the fourth year of high school. Selectividad differs from SAT in that it tests the knowledge on the topics covered during the last year of high school. If the student wants to do a science oriented degree she must take Math test in Selectividad. Otherwise, a student taking the Math test but pursuing an arts oriented degree is likely to be of high ability. The correlation coefficient between *Science_Degree* and *Math_Test* is 0.27.

submitted summations, although not in the number of correct summations.[19] Given that the estimates do not change when we include the control variables, in the analysis that follows we will estimate equation (1).

In summary, the provision of relative performance feedback information has a positive and significant effect on subjects' performance. This effect is strongest in the initial period. Furthermore, subjects continue to react to this information in all subsequent periods although the magnitude of the effect is lower than in the first period. The coefficients in periods 2, 3 and 4 are not significantly different from one another.[20] It is important to point out that the increase in effort is explaining the difference in performance between the treated and control subjects. Since the learning over time is the same for both treatment and control groups and since we have also controlled for ability, neither of these components can explain the results.

4.1.2. Gender Analysis

Many studies have shown gender to be an important variable when looking at competitive environments (see Croson and Gneezy, 2009). Given that the provision of relative performance feedback information facilitates social comparison and that this might foster competition, we investigate whether women react differently from men to the relative performance feedback information. What differs, however, is that here competition is only symbolic.

We estimate the following equation:

$$(3)\ Y_{it} = \alpha + \beta Female_i + \chi Treatment_i + \delta Female_i * Treatment_i + \lambda Period_t + \varepsilon_{it}$$

where our variable of interest is the interaction between women and the treatment. The results are shown in Table 3. We find very strong gender effects. Treated women do not react differently from the non-treated women, while treated men do react positively compared to the non-treated men. Notice that from our estimates in column 6, on average, a male in the control group correctly solves 10.03 summations ($\hat{\alpha}$), while a treated male solves 15.94 ($\hat{\alpha} + \hat{\chi}$) summations. However, on average, a women in the control group correctly solves 13.52 ($\hat{\alpha} + \hat{\beta}$), while a treated female correctly solves

[19] We estimated the same regression with an alternative measure of ability which consists of the grade obtained in the Math test in Selectividad. We find quantitatively the same results. The sample size using the grade measure in Math test is reduced substantially since many subjects did not take this exam.

[20] When we combine all periods and compare pair-wise the treatment effect for each period, we find that they are not significantly different. The *p*-values for periods 2 and 3, periods 2 and 4, and periods 3 and 4 are 0.9830, 0.7700 and 0.7537, respectively.

13.45 ($\hat{\alpha}+\hat{\beta}+\hat{\chi}+\hat{\delta}$) summations. These results are striking since they imply that all of the observed effect on performance is attributed solely to men. While treated men increase their performance by 59%, treated women do not change their performance at all.

Figure 4 shows the kernel distributions for the correct number of summations for men and women separately. These figures, again, clearly show that the effect is coming from men reacting to the relative performance feedback information increasing their performance while women do not react at all.

The strong gender effect in performance, when the relative performance feedback information is provided, is consistent with the empirical findings, mostly experimental, on both participation in competitions and on performance under competitive environments. Women are found to shy away from competition, showing a preference for non-competitive environments (Deaner, 2006a and 2006b, Niederle and Vesterlund, 2007, and Niederle and Yestrumskas, 2008), although this is reversed when we switch to matrilineal societies (Gneezy et al., 2007). Also, women show to under-perform in competitive environments compared to men, mostly because men's performance increases when competing against women (Gneezy et al., 2003, Gneezy and Rustichini, 2004, and Antonovics et al., 2009, Hogarth et al., 2009).

We show that the provision of relative performance feedback information, which fosters competition among individuals but where competition is rather symbolic, is enough to have gender differences in performance. However, in a natural experiment on schooling, Azmat and Iriberri (2010) found that there is no gender differential effect to the provision of relative performance feedback information. Further research is needed to address the question of why gender differences might depend on the environment.

4.1.3. Feedback Content

We now consider the importance of the content of the feedback information. From period 2 until 4, subjects can react, not only to the provision of information, but also to the informational content in the previous periods. In other words, if a subject learns in a period that she is performing above (below) the average, the content might influence her performance in the subsequent period.

We distinguish between positive and negative feedback. From periods 2 to 4, positive (negative) feedback would imply that a subject performed above (below) the

average in the previous period. We also look at the accumulation of feedback information. In periods 3 and 4, positive (negative) feedback would be a situation in which the subject either performed above (below) the average in the previous two periods, or that she has improved (worsened) - i.e., she was initially below (above) the average and is now performing above (below). Finally, in period 4, positive (negative) feedback would be a situation in which the subject has performed above (below) the average in the previous three periods, or that she has improved (worsened).[21] Note that, for the treated subjects this information is revealed, i.e. it becomes feedback, while for the control subjects it is not. For example, a control subjects who has performed above the average will not be informed that she is performing above. For simplicity, we refer to being above the average as positive feedback, irrespective of whether or not this information has been revealed.[22]

We estimate the following regression:

(4) $$Y_{it} = \alpha + \beta Positive_{(t-1)i} + \chi Treatment_i + \delta Positive_{(t-1)i} * Treatment_i + \lambda Period_t + \varepsilon_{it}$$

where $Positive_{(t-1)}$ is an indicator that takes the value of 1 if the subject performed above the average, or improved over time (as explained above), and 0 otherwise. Y_{it} measures performance (i.e., submitted and correct number summations, respectively). We cluster the standard errors at the subject level.

Panel A in Table 4 shows the estimates for equation (4) for the different periods. In columns 1 and 4, consistent with our previous analysis, all treated subjects outperform (both in terms of submitted (column 1) and correct number of summations (column 4), respectively) the untreated subjects. In addition, subjects' performance is correlated from period to period, as shown in the coefficient *Positive*. Interestingly, the interaction between the treatment and positive is not significant. This suggests that the feedback content is irrelevant for subsequent performances. In other words, what matters is the provision of feedback and regardless of whether the subject is given positive (negative) feedback, performance will increase. Estimations for the different

[21] Improving includes the following two cases: (1) below the average in period 1, above the average in periods 2 and 3 and (2) below the average in periods1 and 2, above the average in period 3. The reverse is true for worsening.

[22] There are other ways of specifying positive and negative feedback. For example, one could use the *within* individual improvement (decline) over time, with respect to the average. In other words, although an individual may be consistently performing below the average (i.e., negative feedback in our specification), if over time she is getting closer to the average, then this may be perceived as positive feedback. We replicate our analysis using this specification and the results are in-line with those found using our specification.

levels of cumulative feedback, columns 2-3 and 5-6, imply similar results. The results are however, somehow weaker given the limited number of observations as we approach the final period.

Given the important gender differences we found in the previous section, it is interesting to understand if men and women also react differently to the content of the information. In Panel B, we show the estimates for equation (4) for men only, while in Panel C we show the estimates for women only.

From Panel B, we see that men react to the informational treatment, irrespective of whether they receive positive or negative feedback. This is consistent with the overall result. In Panel C, when we look at women we find that the treatment, as well as the interaction of the content with treatment are not significant. This is consistent with our previous finding that women do not react to either the informational treatment or the content of the feedback. Columns 2-3 and 5-6 give the estimates for the cumulative information. For men, the estimates suggest the same findings but they become less significant due to fewer observations. Interestingly, for women, although not significant, there are some differential effects depending on the content of the information. The negative interaction term suggests that the response to positive feedback is smaller than the response to negative feedback.

We extend our analysis using a continuous measure of feedback content. Instead of positive (negative) feedback, we use the difference between own performance, measured by *Correct*, and the average performance. We proceeded in the same way and define the interaction between the treatment and the difference between own performance and the average performance. We find qualitatively the same results, that is, the interaction between this difference and the treatment is insignificant.[23]

Overall, we find three important results. First, the provision of relative performance feedback information has a positive and significant effect on subjects' performance. In each period the treated subjects outperform the untreated, although the effect gets weaker over time. Second, the actual content of the feedback information (positive or negative) does not affect subjects' subsequent performance differently. This is consistent with the competitive preferences hypothesis and it is not consistent with

[23] These results are available upon request.

the self-perception of ability hypothesis. Third, we find a strong gender difference in the reaction to the treatment. The overall effect is driven solely by men.

4.2. Affective Responses: Happiness, Arousal and Dominance.

4.2.1. The Overall Effect

Relative performance feedback information potentially has an effect on aspects other than performance. In particular, a subject's affective response may be influenced. Organizations care about the affective state of their employees, since it has been found that this affects relevant issues, such as workers' morale and firms' retention ability (Bewley, 1999), or even productivity (see for example Iaffaldano and Muchinsky, 1985, Warr, 1999, and Oswald et al., 2009). We measure three aspects of affective response: happiness (or subjective well-being), feelings of arousal and dominance.

We start by looking at the overall treatment effect on these measures. Equations (1) and (2) of section 4.1 are estimated, where the dependent variable, Y_{it} now refers to happiness, arousal and dominance, respectively. The control variables, X_i, are the same as before. We also include an additional control that measures the number of correct summations, *Correct*.[24] It is reasonable to assume that performance and the affective response measures are positively correlated (see Frey and Stutzer, 2002). The results for the three variables of interest are shown in Table 5. The first column for each panel refers to the overall effect, controlling for time fixed effects and by weighting the observations by the individual fixed effects (random effects model). The other four columns refer to periods 1 to 4, respectively.

The main result is that treatment is insignificant for all measures of affective response, implying that the provision of relative performance feedback information is not affecting the subjects' well-being, arousal and/or feeling of dominance. As expected, the number of correct summations is positively correlated with all three affective response measures. As for the other control variables in Table 5b, the only noteworthy finding is that, as one would expect, subjects find the task less interesting over time (arousal level decreases). As with the performance analysis, since the control variables do not change the treatment coefficient, the subsequent analysis does not include them.

[24] We also estimate (1) and (2) without the variable *Correct* and the main results remain the same.

4.2.2. Gender

In section 4.1.2 we found that the provision of relative performance feedback information affected the performance of men very differently from that of women. It is therefore, natural to investigate whether there are gender differences in the affective response.

We extend the analysis from the previous section, in line with equation (3), to look for gender differences in the treatment effect. Table 6 shows the results. The treatment is insignificant. Additionally, the interaction coefficient of female and the treatment implies that the provision of relative performance feedback information does not affect men' affective response differently from women.

4.2.3. Feedback Content

As with performance, we now turn to study the informational content on the subject's affective response. We will estimate the following equation:

(5) $Y_{it} = \alpha + \beta Positive_{it} + \chi Treatment_i + \delta Positive_{it} * Treatment_i + \lambda Period_t + \varepsilon_{it}$

where Y_{it} refers to the affective response measures and $Positive_{it}$ is a dummy variable if the subject performed above the average or improved over time (as explained in section 4.1.3) and 0 otherwise. Note that unlike equation (4), the feedback content in the current period will affect the dependent variable in the same period (see timeline of the experiment in Figure 1). This information is provided to the treated subjects just before eliciting their affective response. As with the performance analysis, we also consider how the cumulative feedback affects affective response.

Table 7 shows the estimation for the differential effects of the content of the information on the affective response. In the first panel, columns 1 to 4, we consider the effect of the feedback content on happiness. As we saw in the previous estimates, people who are performing well, in this case those who are performing above the average, reveal themselves to be significantly happier. More importantly, the treatment significantly increases the inequality between the happiness of those subjects who are receiving positive and negative feedback. We find that a subject who is in the control group and performing below the average reports a happiness of 6.26 ($\hat{\alpha}$), while a control subject performing above the average reports a happiness of 6.66 ($\hat{\alpha} + \hat{\delta}$). However, a treated subject who is informed that she has performed below the average reports a happiness level of 5.95 ($\hat{\alpha} + \hat{\chi}$), while a treated subject who is informed that

she has performed above the average reports an average happiness of 6.85 ($\hat{\alpha}+\hat{\beta}+\hat{\chi}+\hat{\delta}$). This implies that control subjects performing above the average are 7 percent happier than those performing below the average. For the treated subjects, those who are given positive feedback reveal to be 15 percent happier than those who are given negative feedback. Overall, the informational feedback treatment leads to an increase in the inequality of subjects' happiness by 8 percentage points.

This result is a key finding as it suggests that when we look at the average effect of the treatment on happiness, the effect is canceled out. However, once we control for the content of the information, the treatment increases the difference in happiness between those who received positive and negative feedback.

When we look at the cumulative effect of feedback, in columns 2 to 4, we see very similar results. The magnitude of the gap between the subjects performing above and below the average is increasing over time. In the final period, we find that while for the control group the gap in happiness between the above and below performing subjects remains stable (from 7 to 10 percent), for the treatment group, the gap increases substantially with the cumulative feedback (from 15 to 21 percent).

Columns 5 to 8 show the results for arousal. Overall, we find no significant effect of the interaction between the content and the treatment. What we do see is that the subjects performing above the average, irrespective of the treatment, reveal themselves to be more aroused than those performing below the average. Also, over time, as expected subjects' arousal goes down.

Columns 9 to 12 show the results for the feeling of dominance. Overall, we find a significant effect of the interaction between the content and the treatment. Providing subjects with positive feedback increases the gap in the feeling of dominance between those subjects performing above and below the average. We find that a subject who is in the control group and performing below the average reports a dominance level of 6.13 ($\hat{\alpha}$), while a control subject performing above the average reports a dominance level of 6.31 ($\hat{\alpha}+\hat{\delta}$). However, a treated subject who is informed that she has performed below the average reports a dominance level of 5.94 ($\hat{\alpha}+\hat{\chi}$), while a treated subject who is informed that she has performed above the average reports an average dominance of 6.45 ($\hat{\alpha}+\hat{\beta}+\hat{\chi}+\hat{\delta}$). This implies that control subjects performing above the average feel 3 percent more dominant than those performing below the average. For the treated subjects on the other hand, those who are given positive feedback reveal to be 9 percent

more dominant than those who are given negative feedback. Overall, the feedback treatment leads to an increase in the gap of subjects' dominance by 6 percentage points. More importantly, when we look at the cumulative effects, we also find some interesting results. From columns 10-12, we see that consistently receiving positive (negative) feedback has a significantly positive (negative) effect on the treated subjects' feeling of dominance. In particular, in period 4, the feedback treatment leads to an increase in the gap of subjects' dominance by 25 percentage points. We find that while for the control group the gap in dominance between the above and below performing subjects remains stable (from 3 to 4 percent), for the treatment group, the gap increases substantially with the cumulative feedback (from 9 to 29 percent).

As in section 4.1.3, we also extended our analysis using a continuous measure of feedback content. Instead of positive (negative) feedback, we use the difference between own performance and the average performance. We proceeded in the same way and defined the interaction between the treatment and the difference between own performance and the average performance. We find qualitatively the same results, that is, the interaction between this difference and the treatment is positive and significant.[25]

We also check for gender differences in the reaction to the feedback content and we do not find significant differences between men and women. This is in-line with the results found in section 4.2.2.

This section shows that the treatment has very different effects on the affective response of those who are receiving positive versus negative feedback. We found that receiving positive (negative) feedback affects subjects' happiness and dominance levels positively (negatively), such that when we only consider the overall treatment effect, the opposite signs cancel out. This also suggests that the increase in happiness (dominance) for those subjects performing above average and the decrease in happiness (dominance) for those subjects performing below average is of equal magnitude. Furthermore, the treatment increases the inequality in both happiness and dominance levels. Given that we elicit subjects' affective response after the feedback treatment, there is the concern that there may be experimental demand effects. We are able to rule out this concern in the following section.

[25] These results are available upon request.

5. Analysis under Flat-Rate Incentives

There are two important concerns that we may have with regard to the analysis so far. First, under piece-rate, we cannot disentangle whether the effects we observe are a consequence of relative *performance* or relative *income* feedback. Second, with respect to the findings on affective response, we may be concerned that the treatment effects found are driven by experimental demand effects. In this section, we address both of these issues by replicating our analysis under flat-rate incentives.

Under piece-rate incentives, given that the agents are rewarded according to their absolute performance, the feedback informs them about their relative *performance*, as well as their relative *income*. It is important to understand whether individuals are reacting to either the relative performance or the relative income, or to both. A good way to separate the two effects is by changing the underlying incentive scheme from piece-rate to flat-rate. Since under piece-rate what we observe is the net effect, the analysis under flat-rate allows us to disentangle the performance from the income effect. We run experiments using exactly the same procedures and design, except for the fact that now all subjects were paid 15 euros, irrespective of their performance (flat-rate incentives).[26]

From Table 8, looking at the constant term, we see that subjects continue to work, as we observed under piece-rate, however, there is no longer a difference in the treatment and control subjects. We find no effect of providing relative performance feedback on any of the two measures of performance, as shown in Table 8 and Figure 5.[27] There is, however, an interesting gender difference, as observed under piece-rate incentives. From Table 9 we can see that men react positively to the treatment, although the magnitudes are much smaller than under piece-rate incentives. The overall effects are significant for the number of submitted summations but not for the number of correctly submitted summations.

To quantify the gender differences under the different incentive schemes, recall that under piece-rate, treated men improve their performance by 59%, while under flat-rate incentives they improve by 19%. Although in the same direction, the effect is much smaller. Furthermore, we find that the interaction between treatment and female is negative and significant, such that women react negatively to the relative performance

[26] We had two sessions where we had 18 subjects instead of 20, yielding a total of 156 subjects instead of 160.

[27] When we compare the differential treatment effect under piece-rate and flat-rate incentives, we find that the interaction between the treatment and the incentive scheme is significantly different from zero.

information. Recall that under piece-rate, women did not increase their performance, while under flat-rate incentives their performance is *reduced* by 16%. Figure 6 shows the kernel distributions for the correct number of summations for men and women separately. We can, again, clearly see that while treated men increase their performance, treated women reduce their performance. This explains why, when we pool men and women together, the overall effect under flat-rate is canceled out.

The observed effects under piece-rate incentives measure the net effect of providing both relative income and relative performance feedback, while the observed effect under flat-rate incentives measures only the effect of providing relative performance feedback. From this comparison we can conclude that, while both men and women react *positively* to the relative income information, women and men react in *opposite directions* to the purely relative performance information.

Regarding affective response, we find that the relative performance feedback information has no effect on the three variables of interest. Contrary to what we found under piece-rate incentives, even when we control for the feedback content (learning that one is performing above or below the average), as shown in Table 10, we find that treatment is not significant.[28] The results suggests that the effects on both happiness and feeling of dominance are a real response to *relevant* information and not driven by experimental demand effect. This is reassuring as it strengthens the validity of our findings under piece-rate. We refer to it as relevant information because the relative performance feedback information under piece-rate has consequences in terms of relative income, while relative performance feedback information under flat-rate incentives does not. These differences in the responses help us to also rule out that the effects on affective response found under piece-rate incentives were due to purely experimental demand effects.

We conclude that the provision of relative performance feedback information is most effective under piece-rate incentives, as it pushes subjects to work harder and increase their productivity. Moreover, it has important effects for the subjects' emotional state, increasing the inequality in happiness and feeling of dominance between those subjects performing above and below the average, only under piece-rate incentives. In other words, when this information has consequences in terms of relative

[28] As under piece-rate, we also check for gender differences in the reaction to the feedback content and we do not find significant differences between men and women.

income, subjects react by being happier (unhappier) if they are above (below) the average because this translates into more (less) earnings than the average.

6. Conclusions

In this study we have shown that relative performance feedback information under piece-rate incentives is an important tool in increasing the performance of individuals, independent of the feedback content. Given the provision of this information is easy to implement and almost cost-free, it is an attractive policy to improve performance. However, we have also shown that the relative performance feedback information increases the inequality in individuals' happiness and feeling of dominance. This may imply a possible trade-off to a policy maker who is deciding whether or not to provide relative performance feedback information. Although it is agreed that enhancing performance is a positive result, the increase in inequality in affective response might be debatable and therefore, its evaluation is subject to the institution type, as well as to the culture of the organization. However, even if an organization places more weight on affective response than performance per se, it is not entirely clear that it *would not* use relative performance feedback information. For example, firms that care about the well-being of their workers may also choose to provide feedback information, since by doing so they may accelerate the match quality of their workers. On the one hand, the worst performers may feel burdened by the feedback information but on the other hand, the feedback may encourage them to find a better matched position within the firm or to move to another firm.

Further analysis suggests that individuals react when relative performance information has consequences in terms of relative income (i.e., under piece-rate but not under flat-rate incentives). In practice, we mostly observe that relative performance feedback information is linked to relative income information. Even without a formal piece-rate scheme in place, performing above or below the average usually has consequences in terms of income, such as the possibility of promotions/demotions or even the possibility of being fired. Thus, we believe that the relevant findings are those seen under piece-rate incentives.

A striking finding of the paper is the large gender difference in the effect on performance from the provision of relative performance feedback. We find that, under piece-rate, men and women react very differently to the information. While men react positively, such that their performance increases by 59%, women do not react at all.

This will have important policy implications, as it suggests that the effectiveness of the policy will largely depend on *who* is being treated. The findings from the flat-rate incentives also add to the interest on the gender-difference issue. We find that treated men react, even when there are no relative income consequences, but they react much less (19%) than under piece-rate. Women, on the other hand, react negatively when this information is provided under a flat-rate scheme. These gender differences can be reconciled. Under piece-rate incentives, relative performance feedback includes both relative income and purely relative performance information. From the differences between flat and piece-rate incentives, we can infer that while men react positively to both elements, women react positively to the relative income information but negatively to purely relative performance information. Hence, under piece-rate, the effect on men is larger than under flat-rate and the effect on women is cancelled out. In terms of the affective response, we find that both men' and women' happiness is affected by the relative income information (i.e., under piece-rate but not flat-rate), which is consistent with the relative income and happiness literature.

The results of this paper open new research questions. For example, long-run effects of the provision of relative performance feedback information need to be studied further, in particular using field studies. Another important aspect would be to analyze other behavioral responses to feedback, such as the option of quitting or taking actions that go against organizations' interests.

References

Antonovics, K., Arcidiacono, P. and R. Walsh (2009) "The Effects of Gender Interactions in the Lab and in the Field," Review of Economics and Statistics, February 2009, 91(1), pp. 152-163.

Azmat, G. and N. Iriberri (2010) "The Importance of Relative Performance Feedback Information: Evidence from a Natural Experiment using High School Students", Journal of Public Economics, volume 94 (7-8), pp. 435-452.

Bandiera, O., Barankay, I. and I. Rasul (2009) "Team incentives: Evidence from a Field Experiment", Mimeo.

Bewley, T. F. (1999) "Why wages don't fall during a recession", Harvard University Press, Cambridge .

Blanes i Vidal, J. and M. Nossol (2011) "Tournaments without Prizes: Evidence from Personnel Records", Forthcoming in Management Science,

Bowles, S. (1998) “Endogenous Preferences: The Cultural Consequences of Markets and other Economic Institutions”, Journal of Economic Literature, 36, 75-111.

Brandts, J., Riedl, A. and F. van Winden (2009) “Competitive Rivalry, Social Disposition, and Subjective Well-Being: An Experiment”, Journal of Public Economics, 93, 11/12, 1158-1167.

Bretz, R. D., Milkovich, G. T. and W. Read (1992) “The Current State of Performance Appraisal Research and Practice: Concerns, Directions, and Implications”, Journal of Management (18), 312-352.

Burchett, R., Willoughby, J., (2004) “Work productivity when knowledge of different reward systems varies: report from an economic experiment”, Journal of Economic Psychology 25, 591–600.

Casas-Arce, P., and F. Asis Martinez-Jerez (2009) “Relative Performance Compensation, Contests, and Dynamic Incentives”, Management Science, 55, pp. 1306-1320.

Charness, G. and B. Grosskopf (2001) "Happiness and Relative Payoffs - An Experimental Study", Journal of Economic Behavior and Organization, 45-3, pp. 301-328.

Charness, G., Masclet, D., and M.C. Villeval (2010) “Competitive Preferences and Status as an Incentive: Experimental Evidence”. Mimeo.

Charness, G. and M. Rabin. (2002). “Understanding Social Preferences with Simple Tests.” The Quarterly Journal of Economics, 117(3), 817-869.

Clark, A., Frijters, P. and M. Shields (2008) “Relative Income, Happiness and Utility: An Explanation for the Easterlin Paradox and Other Puzzles”, Journal of Economic Literature, 46-1, pp.95-144.

Clark, A. E., Masclet, D., and M.C. Villeval (2010) “Effort and Comparison Income: Experimental and Survey Evidence”, Industrial and Labor Relations Review, Vol.63, no.3, pp.407-426.

Croson, R. and U. Gneezy (2009) “Gender Differences in Preferences”, Journal of Economic Literature 47(2), 1-27.

Crutzen, S. Y. B, Swank, O. H. and B. Visser (2010) “Confidence Management: on Interpersonal Comparisons in Teams”, Mimeo.

Deaner, R. O. (2006a) “More males run relatively fast in U.S. road races: Further evidence of a sex difference in competitiveness”, Evolutionary Psychology, 4: 303-314.

Deaner, R. O. (2006b) “More males run fast: a stable sex difference in competitiveness in U.S. distance runners”, Evolution and Human Behavior, 27: 63-84.

Delfgaauw, J., Dur, R., Sol J. and W. Verbeke (2009) “Tournament Incentives in the field: Gender Differences in the Workplace”, Mimeo.

Dubey, P. and J. Geanakoplos. (2004). “Grading Exams: 100, 99, ..., 1 or A, B, C? Incentives in Games of Status.” Cowles Foundation Discussion Paper No. 1467, Yale University.

Dubey, P. and J. Geanakoplos. (2005). “Grading in Games of Status: Marking Exams and Setting Wages.” Cowles Foundation Discussion Paper No. 1544, Yale University.

Duesenberry, J.S. (1949) “Income, Saving and the Theory of Consumer Behaviour”, Harvard University Press, Cambridge.

Ertac, S. (2006). “Social Comparisons and Optimal Information Revelation: Theory and Experiments.” Mimeo.

Ederer, F. (2010) “Feedback and Motivation in Dynamic Tournaments”, Journal of Economics and Management Strategy.

Easterlin, R. A. (1974) “Does economic growth improve the human lot? Some empirical evidence”, David PA, Reder MW (eds.) Nations and households in economic growth.

Eriksson, T., Poulsen, A. and M. Villeval (2009) “Feedback and Incentives: Experimental Evidence”, Labour Economics, 16, pp. 679-688.

Falk, A. and A. Ichino (2006) “Clean Evidence on Peer Pressure”, Journal of Labor Economics, 24 (1), pp 39-57.

Fehr, E. and F. Ederer (2007) “Deception and Incentives: How Dishonesty Undermines Effort Provision”, IZA Discussion Paper 3200.

Festinger, L. (1954) “A theory of social comparison processes”, Human Relations 7: 117-140.

Fischbacher, U. (2007) "z-Tree: Zurich Toolbox for Ready-made Economic Experiments", Experimental Economics 10(2), 171-178.

Frey, B. S. and A. Stutzer (2002a) “What Economists Can Learn from Happiness Research”, Journal of Economic Literature, vol. XL, 402-435.

Frey, B. S. and A. Stutzer (2002b) “Happiness and Economics”, Princeton and Oxford: Princeton University Press. 220 pp. $24.95. ISBN O-69 1-06998-O.

Gächter, S., Thöni, C. (2010) “Social comparison and performance: experimental evidence on the fair wage-effort hypothesis”, Journal of Economic Behavior and Organization 76 (3), 531–543.

Gershkov, A. and M. Perry (2009) “Tournaments with Midterm Reviews”, Games and Economic Behavior, 66: 162-190.

Gneezy, U., Niederle M., and A. Rustichini (2003) “Performance in Competitive Environments: Gender differences”, Quarterly Journal of Economics, pp. 1049-1074.

Gneezy, U. and A. Rustichini (2004) “Gender and Competition at a Young Age”, American Economic Review Papers and Proceedings, pp 377-381.

Gneezy, U, Leonard, K. L. and J. A. List (2008) “Gender Differences in Competition: Evidence from a Matrilineal and a Patriarchal Society”, Econometrica 77-3, pp 909-931.

Greiner, B. (2004) "The Online Recruitment System ORSEE 2.0 - A Guide for the Organization of Experiments in Economics". University of Cologne WP Series in Economics 10.

Greiner, B., Ockenfels A., Werner, P. (2011) “Wage transparency and performance: A real-effort experiment”, Economics Letters 111, pp 236–238.

Hannan, R. L., R. Krishnan and D. Newman (2008) “The Effects of disseminating Relative Performance Feedback in Tournament Versus Individual Performance Compensation Plans”, The Accounting Review, 83-4.

Hansen, S. (2009) “What They Don’t Know Can’t Hurt You: The Benefits of Limited Feedback in Organizations”, Mimeo.

Hogarth, R. M., Karelaia, N. and C. A. Trujillo (2009) “Under-achievement and the glass ceiling: Evidence from a TV game show”, Mimeo.

Hopkins, E. and T. Kornienko. (2004). “Running to Keep the Same Place: Consumer Choice as a Game of Status”. American Economic Review 94(4): 1085-1107.

Iaffaldano, M. T. and P. M. Muchinsky (1985) “Job Satisfaction and Job Performance: A Meta-Analysis”, Psychological Bulletin 97-2, pp. 251-73.

Kahneman, D., Diener, E. and N. Schwartz (Eds.) (1999) “Well-Being. The Foundations of Hedonic Psychology”, Russell Sage Foundation, New York.

Kandel, E. and E.P. Lazear. (1992). “Peer Pressure and Partnerships”. Journal of Political Economy, 100(4), p.801-17.

Kräkel, M. (2007) “Emotions in Tournaments”, Journal of Economic Behavior and Organization 67, 204-214.

Krueger, A. B. (2005) “Well-Being and Policy Evaluation”, Presentation at the Econometric Society World Congress 2005, London, August 20, 2005.

Kuhnen, C. M. and A. Tymula (2011) “Rank Expectations, Feedback and Social Hierarchies”, Forthcoming in Management Science

Lai, E. K. and A. Matros (2007) “Sequential Contests with Ability Revelation”, Mimeo.

Lang, P. J. (1980) “Behavioral treatment and bio-behavioral assessment: computer applications”, In J. B. Sidowski, J. H. Johnson, & T. A. Williams (Eds.), Technology in mental health care delivery systems (pp. 119-l 37). Norwood, NJ: Ablex.

Levy, P. E. and J. R. Williams (2004) “The Social Context of Performance Appraisal: A Review and Framework for the Future”, Journal of Management (30), 881-905.

Loewenstein, G. (2000) “Emotions in Economic Theory and Economic Behavior”, American Economic Review, Papers and Proceedings, 90, pp 426-432.

Mas, A. and E. Moretti (2009) “Peers at Work”, American Economic Review 99-1, pp. 112-145.

Moldovanu, B., A. Sela and X. Shi. (2007). “Contests for Status.” Journal of Political Economy 115.

Müller, W. and A. Schotter (2003) “Workaholics and Drop Outs in Optimal Organizations”, Mimeo, New York University.

Murphy, K. R., and J. N. Cleveland (1991) “Performance appraisal: An organizational perspective”, Boston: Allyn and Bacoon.

McFadden, D. (2005) “The New Science of Pleasure”, Frisch Lecture, Econometric Society World Congress 2005, London, August 20, 2005.

Niederle, M. and L. Vesterlund (2007) “Do Women Shy away from Competition? Do Men Compete too Much?”, Quarterly Journal of Economics, 122-3, pp 1067-1101.

Niederle, M. and A. H. Yestrumskas (2008) “Gender Differences in Seeking Challenges: The Role of Institutions”, Working Paper 13922 http://www.nber.org/papers/w13922.

Ockenfels, A., Sliwka, D., and P. Werner (2010) “Bonus Payments and Reference Point Violations”, IZA DP No. 4795.

Oswald A., Proto, E. and D. Sgroi (2009) “Happiness and Productivity”, IZA Discussion Paper No. 4645.

Sedikides, C. (1993) “Assessment, Enhancement, and Verification Determinants of the Self-evaluation Process”, Journal of Personality and Social Psychology, vol. 65(2), pp. 317-338.

Warr, P (1999) “Well-being and the Workplace” in Kahneman, Diener and Schwarz, pp. 392-412.

Young, S. M., Fisher, J. and T. M. Lindquist (1993) “The effect of intergroup competition and intragroup cooperation on slack and output in a manufacturing setting”, The Accounting Review 68 (3): 466-483.

Figures and Tables

Figure 1. Timeline of the Experiment

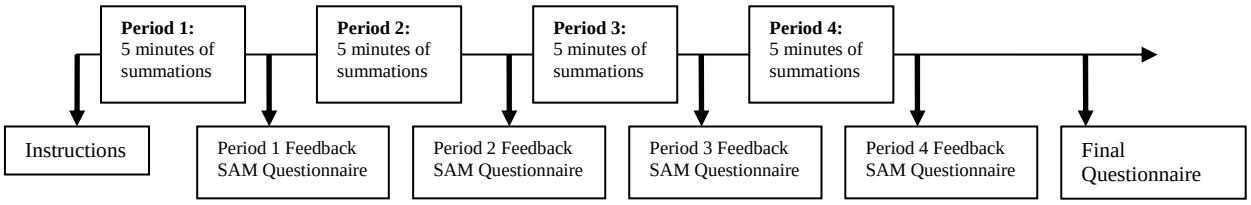
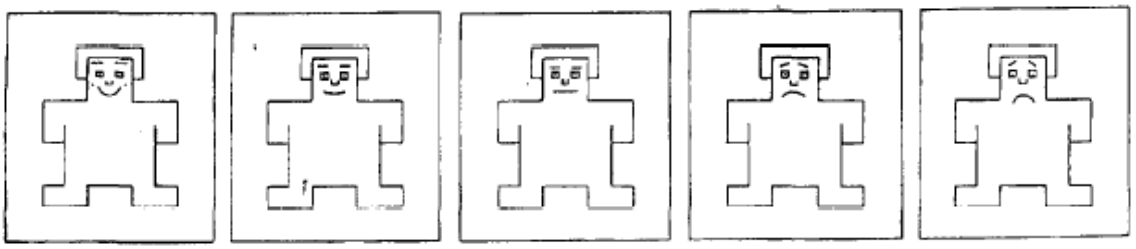


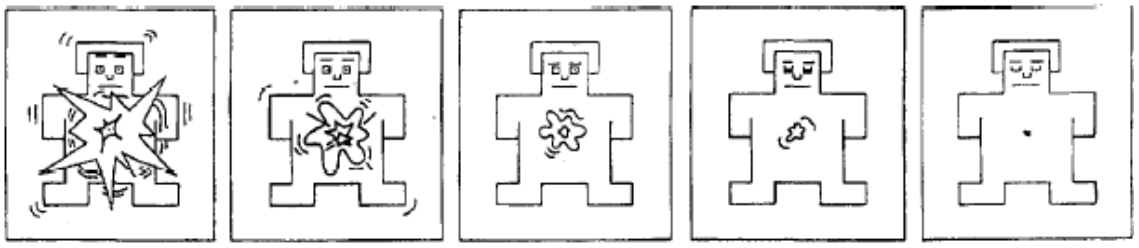
Figure 2. Self-Assessment Manikin (SAM)

Panel A: Happiness



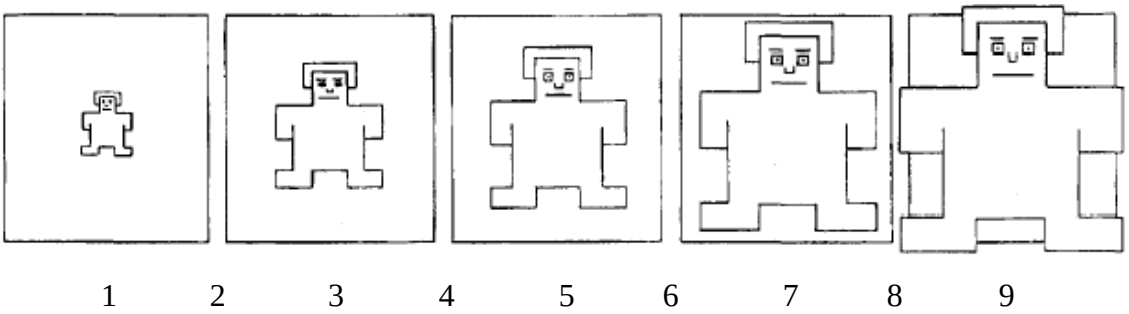
Note: 1 represents feeling "happy, pleased, satisfied, contented, hopeful, relaxed" and 9 represents feeling "unhappy, annoyed, unsatisfied, melancholic, despairing, or bored".

Panel B: Arousal



Note: 1 represents feeling "stimulated, excited, frenzied, jittery, wide awake, aroused" and 9 represents feeling "relaxed, calm, sluggish, dull, sleepy, unaroused".

Panel C: Dominance



Note: 1 represents feeling "controlled, influenced, cared for, awed, submissive" and 9 represents feeling "controlling, influential, in control, important, dominant".

Figure 3: Kernel Distributions under Piece-Rate

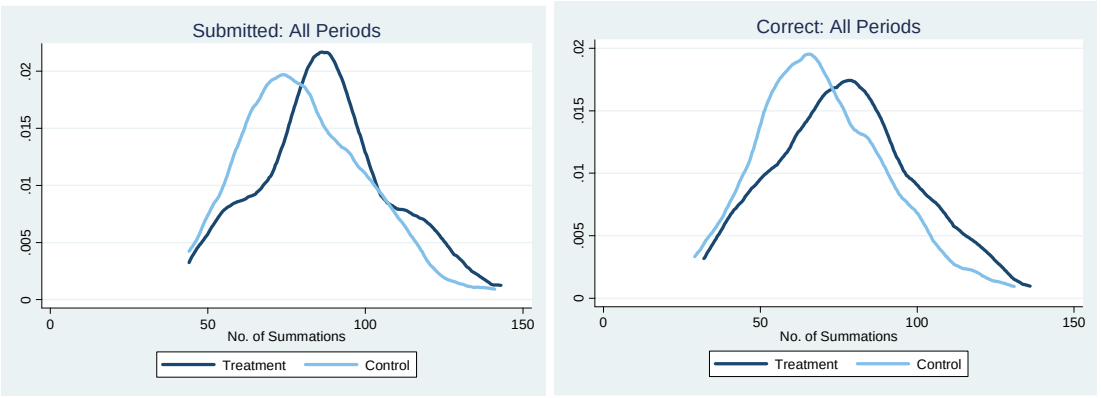


Figure 4: Kernel Distributions under Piece-Rate by Gender

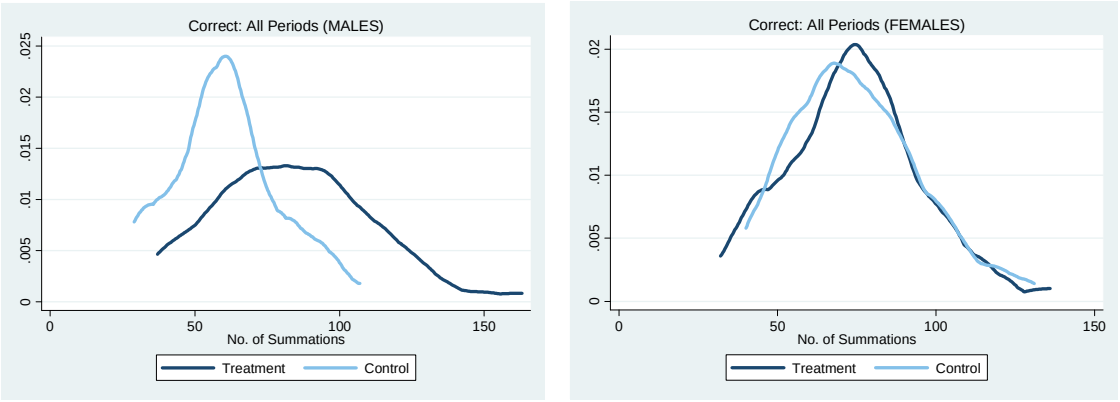


Figure 5: Kernel Distributions under Flat-Rate

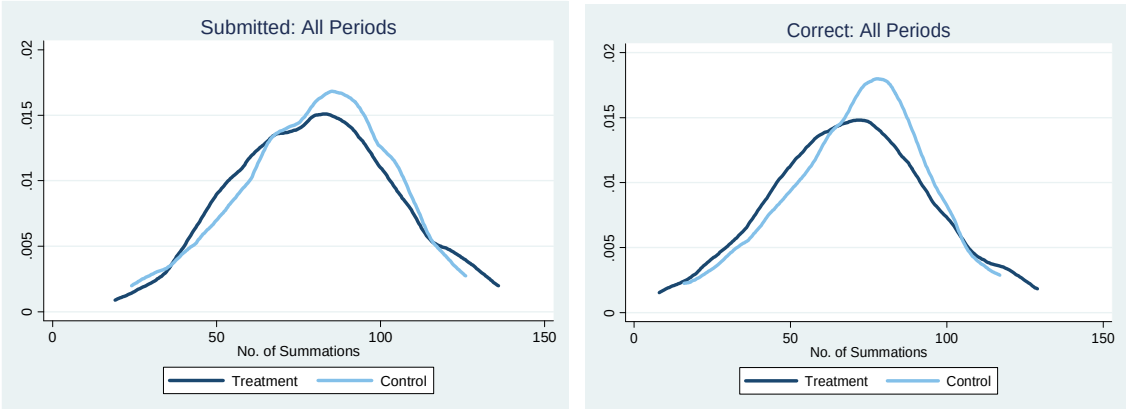


Figure 6: Kernel Distributions under Flat-Rate by Gender

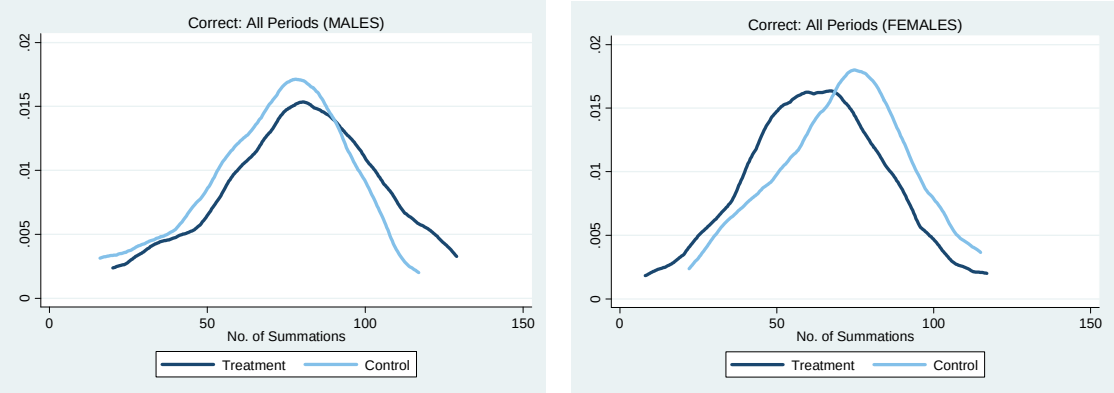


Table 1: Treatment Effect on Performance under Piece-Rate: Number of Submitted Summations										
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	14.8047***	16.2375***	19.4125***	22.0875***	22.9375***	14.1366***	16.6414***	19.2984***	22.9889***	18.8939***
	[0.6487]	[0.6321]	[0.6530]	[0.6505]	[0.6723]	[4.9005]	[4.9700]	[5.1468]	[5.1619]	[5.3940]
Treatment	**2.0469****	**2.6250*****	**1.8750****	**1.9750****	**1.7125***	**2.0143****	**2.5503*****	**1.8141***	**1.9538****	**1.7391***
	[0.8711]	**[0.8939]**	**[0.9235]**	**[0.9200]**	**[0.9508]**	**[0.9222]**	**[0.9361]**	**[0.9694]**	**[0.9722]**	**[1.0159]**
Period	2.1456***					2.1276***				
	[0.0815]					[0.0833]				
Female						0.3718	0.4096	1.054	0.0454	-0.0218
						[0.9569]	[0.9714]	[1.0059]	[1.0089]	[1.0542]
Foreign						-0.148	-0.0811	0.0169	0.2709	-0.7988
						[2.0569]	[2.0880]	[2.1623]	[2.1686]	[2.2661]
Age						-0.0503	-0.1112	-0.1128	-0.1135	0.1364
						[0.2180]	[0.2213]	[0.2292]	[0.2299]	[0.2402]
Science_Degree						0.1751	0.0073	0.4377	-0.1891	0.4444
						[0.9785]	[0.9932]	[1.0286]	[1.0316]	[1.0780]
Math_Test						2.0677*	2.3797*	2.2962*	2.1243*	1.4706
						[1.1971]	[1.2152]	[1.2584]	[1.2621]	[1.3189]
Observations	640	160	160	160	160	608	152	152	152	152
Number of subject	160					152				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. The variable *Science_Degree* takes value 1 if the degree of study is Architecture, Biology, Business, Computer Science, Economics, Engineering or Human Resources and 0 if the degree is Communication, Health, Human Science, Law, Marketing, Photography, Political Science and Translation and Interpretation. The variable *Math_Test* takes value 1 if the subject took the Math test in the national level university entry exam "Selectividad".

Table 2: Treatment Effect on Performance under Piece-Rate: Number of Correct Summations										
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	12.3422***	13.3875***	16.8625***	19.3750***	20.1000***	11.5499**	12.1676**	16.3306***	21.5645***	16.3278***
	[0.6853]	[0.6909]	[0.6910]	[0.6867]	[0.6950]	[5.1087]	[5.4980]	[5.4754]	[5.4741]	[5.6040]
Treatment	**2.1406****	**3.1250*****	**1.9500****	**1.8625***	**1.625**	**2.1354****	**3.1863*****	**1.8396***	**1.8368***	**1.679**
	[0.9023]	**[0.9770]**	**[0.9772]**	**[0.9712]**	**[0.9829]**	**[0.9610]**	**[1.0355]**	**[1.0313]**	**[1.0310]**	**[1.0555]**
Period	2.0356***					2.0191***				
	[0.1000]					[0.1034]				
Female						0.5525	0.7837	1.237	0.3527	-0.1634
						[0.9972]	[1.0745]	[1.0701]	[1.0699]	[1.0953]
Foreign						0.3086	-0.1819	0.9881	0.6244	-0.1962
						[2.1435]	[2.3098]	[2.3003]	[2.2998]	[2.3543]
Age						-0.048	-0.0433	-0.102	-0.1801	0.1335
						[0.2272]	[0.2448]	[0.2438]	[0.2438]	[0.2496]
Science_Degree						0.236	0.0655	0.4852	0.3875	0.0056
						[1.0196]	[1.0987]	[1.0942]	[1.0940]	[1.1199]
Math_Test						1.8632	2.1648	2.2689*	1.5963	1.4226
						[1.2475]	[1.3443]	[1.3387]	[1.3384]	[1.3702]
Observations	640	160	160	160	160	608	152	152	152	152
Number of subject	160					152				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. The variable *Science_Degree* takes value 1 if the degree of study is Architecture, Biology, Business, Computer Science, Economics, Engineering or Human Resources and 0 if the degree is Communication, Health, Human Science, Law, Marketing, Photography, Political Science and Translation and Interpretation. The variable *Math_Test* takes value 1 if the subject took the Math test in the national level university entry exam "Selectividad".

Table 3: Gender Differences in the Treatment Effect on Performance under Piece-Rate										
	Number of Submitted Summations					Number of Correct Summations				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	12.8859***	14.2593***	16.7407***	20.4074***	21.5926***	10.0313***	10.4815***	14.0741***	17.4444***	18.4815***
	[1.0584]	[1.0657]	[1.0897]	[1.1036]	[1.1470]	[1.0973]	[1.1455]	[1.1558]	[1.1647]	[1.1799]
Treatment	**5.3106*** **	**5.9832*** **	**5.8653*** **	**5.0168*** **	**4.3771*** **	**5.9099*** **	**7.7306*** **	**6.0168*** **	**5.1010*** **	**4.7912*** **
	[1.4005]	**[1.4370]**	**[1.4693]**	**[1.4881]**	**[1.5466]**	**[1.4407]**	**[1.5445]**	**[1.5585]**	**[1.5704]**	**[1.5910]**
Female	**2.8962** **	**2.9860** **	**4.0328*** **	**2.5360***	**2.03**	**3.4881*** **	**4.3864*** **	**4.2089*** **	**2.9140** **	**2.4430***
	[1.2760]	**[1.3093]**	**[1.3388]**	**[1.3559]**	**[1.4092]**	**[1.3127]**	**[1.4073]**	**[1.4200]**	**[1.4309]**	**[1.4496]**
FemalexTreatment	**-5.1856*** **	**-5.3348*** **	**-6.2772*** **	**-4.8538** **	**-4.2763** **	**-5.9706*** **	**-7.2794*** **	**-6.3850*** **	**-5.1404** **	**-5.0775** **
	[1.7694]	**[1.8155]**	**[1.8563]**	**[1.8800]**	**[1.9540]**	**[1.8202]**	**[1.9514]**	**[1.9690]**	**[1.9840]**	**[2.0100]**
Period	2.1456***					2.0356***				
	[0.0815]					[0.1000]				
Observations	640	160	160	160	160	640	160	160	160	160
No. of subject	160					160				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level.

Table 4: Feedback Content on the Treatment Effect on Performance under Piece-Rate						
PANEL A	**Submitted**			**Correct**		
	PERIODS 2-4	PERIODS 3-4	PERIOD 4	PERIODS 2-4	PERIODS 3-4	PERIOD 4
Constant	12.5459***	16.6226***	19.1220***	10.2386***	14.0976***	16.1220***
	[0.7131]	[1.3285]	[0.7139]	[0.7381]	[1.5413]	[0.7268]
Treatment	**1.7487****	**1.7596****	**1.4422**	**1.5774****	**1.5832***	**1.1601**
	[0.6737]	**[0.7159]**	**[1.0224]**	**[0.7166]**	**[0.8089]**	**[1.0409]**
Positive	**7.2548*****	**7.4654*****	**8.1508*****	**7.5776*****	**7.8124*****	**8.2114*****
	[0.7835]	**[0.8320]**	**[1.0690]**	**[0.8110]**	**[0.8682]**	**[1.0883]**
PositivexTreatment	**0.656**	**0.364**	**0.2062**	**0.9437**	**0.5296**	**0.796**
	[1.2872]	**[1.3272]**	**[1.4927]**	**[1.2989]**	**[1.3527]**	**[1.5197]**
Period	1.7384***	0.6163*		1.5523***	0.4954	
	[0.1717]	[0.3524]		[0.1907]	[0.4075]	
Observations	480	320	151	480	320	151
PANEL B	**Submitted (MEN)**			**Correct (MEN)**		
	PERIODS 2-4	PERIODS 3-4	PERIOD 4	PERIODS 2-4	PERIODS 3-4	PERIOD 4
Constant	11.5644***	18.0263***	19.0000***	9.1398***	15.1243***	16.1111***
	[1.1121]	[2.0654]	[1.1172]	[1.1628]	[2.6368]	[1.0997]
Treatment	**2.5860****	**2.4603****	**1.4615**	**2.4212****	**2.2524***	**1.5043**
	[0.9996]	**[1.0350]**	**[1.7252]**	**[1.2002]**	**[1.3442]**	**[1.6982]**
Positive	**7.5287*****	**8.3232*****	**7.5714*****	**7.5147*****	**7.8620*****	**6.4603*****
	[1.2600]	**[1.2584]**	**[2.1113]**	**[1.4220]**	**[1.4290]**	**[2.0783]**
PositivexTreatment	**1.4859**	**0.5812**	**1.8618**	**2.1908**	**1.6142**	**3.1348**
	[2.1771]	**[2.1664]**	**[2.7145]**	**[2.2320]**	**[2.2435]**	**[2.6720]**
Period	1.8664***	0.101		1.7049***	0.1039	
	[0.3043]	[0.5903]		[0.3219]	[0.7058]	
Observations	180	120	57	180	120	57
PANEL C	**Submitted (WOMEN)**			**Correct (WOMEN)**		
	PERIODS 2-4	PERIODS 3-4	PERIOD 4	PERIODS 2-4	PERIODS 3-4	PERIOD 4
Constant	13.3570***	16.0972***	19.2174***	11.1313***	13.7413***	16.1304***
	[0.9358]	[1.7649]	[0.9427]	[0.9248]	[1.8771]	[0.9750]
Treatment	**1.0783**	**1.2366**	**1.398**	**0.8889**	**1.0957**	**0.9849**
	[0.9020]	**[0.9744]**	**[1.2941]**	**[0.8729]**	**[0.9973]**	**[1.3385]**
Positive	**6.8018*****	**7.0221*****	**8.2441*****	**7.1864*****	**7.6146*****	**8.6773*****
	[0.9707]	**[1.0417]**	**[1.2941]**	**[0.9505]**	**[1.0277]**	**[1.3385]**
PositivexTreatment	**0.0705**	**-0.154**	**-0.9122**	**0.2366**	**-0.3023**	**-0.4242**
	[1.4590]	**[1.5356]**	**[1.8806]**	**[1.5064]**	**[1.5973]**	**[1.9450]**
Period	1.6467***	0.8607*		1.4466***	0.6784	
	[0.2096]	[0.4420]		[0.2392]	[0.4978]	
Observations	300	200	94	300	200	94

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. The variable *Positive* becomes positive feedback for the treated subjects while this information is never revealed to the control subjects. We cluster the standard errors at the individual level.

Table 5a: Treatment Effect on Affective Response under Piece-Rate: Happiness, Arousal, Dominance

	HAPPINESS					AROUSAL					DOMINANCE				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	4.9975***	5.0869***	5.0800***	4.4660***	4.8887***	4.2881***	3.8347***	4.0353***	3.2930***	3.4930***	5.3919***	5.5858***	5.6999***	5.0916***	5.0224***
	[0.2224]	[0.3012]	[0.3838]	[0.4260]	[0.4322]	[0.2636]	[0.3506]	[0.4117]	[0.5115]	[0.5616]	[0.2159]	[0.3404]	[0.3659]	[0.4238]	[0.4319]
Treatment	**-0.281**	**-0.2228**	**-0.3287**	**-0.4309***	**-0.1396**	**0.0653**	**-0.0024**	**-0.065**	**0.0097**	**0.3132**	**-0.1609**	**-0.02**	**-0.2266**	**-0.2645**	**-0.0739**
	[0.2021]	**[0.2392]**	**[0.2517]**	**[0.2480]**	**[0.2457]**	**[0.2416]**	**[0.2784]**	**[0.2700]**	**[0.2978]**	**[0.3193]**	**[0.2236]**	**[0.2704]**	**[0.2399]**	**[0.2467]**	**[0.2455]**
Period	-0.0354					-0.2623***					-0.031				
	[0.0428]					[0.0502]					[0.0350]				
Correct	0.1006***	0.0953***	0.0916***	0.1172***	0.1013***	0.0702***	0.0768***	0.0654***	0.0888***	0.0457*	0.0576***	0.0384*	0.0393**	0.0682***	0.0685***
	[0.0119]	[0.0189]	[0.0202]	[0.0201]	[0.0197]	[0.0141]	[0.0220]	[0.0217]	[0.0241]	[0.0256]	[0.0106]	[0.0213]	[0.0193]	[0.0200]	[0.0197]
Observations	640	160	160	160	160	640	160	160	160	160	640	160	160	160	160
No. of subject	160					160					160				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. *Happiness* takes values 1 to 9, where 1 represents the least happy and 9 represents the most happy. *Arousal* takes values 1 to 9, where 1 represents least aroused and 9 represents the most aroused. *Dominance* takes values 1 to 9, where 1 represents least dominant and 9 represents the most dominant.

Table 5b: Treatment Effect on Affective Response under Piece-Rate: Happiness, Arousal, Dominance

	HAPPINESS					AROUSAL					DOMINANCE				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	4.7837***	4.1427***	4.9326***	4.9001***	4.7682***	0.6965	-1.1634	0.9229	0.2215	0.1027	5.6337***	5.3264***	5.9627***	5.5936***	5.4434***
	[1.1384]	[1.3068]	[1.4329]	[1.4432]	[1.4057]	[1.3399]	[1.4918]	[1.5294]	[1.7073]	[1.8276]	[1.2389]	[1.4872]	[1.3576]	[1.4094]	[1.3837]
Treatment	**-0.255**	**-0.166**	**-0.2866**	**-0.3513**	**-0.2186**	**0.0803**	**-0.09**	**-0.0174**	**0.0365**	**0.3764**	**-0.2322**	**-0.0334**	**-0.3184**	**-0.3329**	**-0.1947**
	[0.2137]	**[0.2499]**	**[0.2648]**	**[0.2612]**	**[0.2596]**	**[0.2515]**	**[0.2852]**	**[0.2827]**	**[0.3090]**	**[0.3375]**	**[0.2329]**	**[0.2843]**	**[0.2509]**	**[0.2550]**	**[0.2555]**
Period	-0.0206					-0.2673***					-0.0283				
	[0.0438]					[0.0516]					[0.0360]				
Female	0.2751	0.6550**	0.1563	0.2948	0.0058	0.1486	0.1225	0.3333	-0.0757	0.2	-0.1371	0.0927	-0.1635	-0.1913	-0.2523
	[0.2202]	[0.2517]	[0.2731]	[0.2682]	[0.2670]	[0.2591]	[0.2873]	[0.2915]	[0.3173]	[0.3472]	[0.2406]	[0.2864]	[0.2587]	[0.2619]	[0.2629]
Foreign	-0.0235	-0.3512	0.0939	-0.025	0.1885	0.2727	0.5536	0.5355	0.0028	-0.0122	0.172	0.0215	-0.0197	0.3785	0.3176
	[0.4730]	[0.5400]	[0.5847]	[0.5764]	[0.5740]	[0.5568]	[0.6164]	[0.6241]	[0.6819]	[0.7463]	[0.5169]	[0.6145]	[0.5540]	[0.5629]	[0.5650]
Age	-0.0012	0.0328	-0.0088	-0.0271	-0.0005	0.1483**	0.2138***	0.1160*	0.1331*	0.1374*	-0.0147	0.002	-0.0118	-0.0302	-0.021
	[0.0501]	[0.0572]	[0.0620]	[0.0612]	[0.0609]	[0.0590]	[0.0653]	[0.0661]	[0.0724]	[0.0792]	[0.0548]	[0.0651]	[0.0587]	[0.0598]	[0.0599]
Science	0.1987	0.2961	0.3891	-0.0654	0.174	-0.0501	0.3504	-0.2006	-0.361	0.005	-0.0393	-0.1936	0.103	-0.1795	0.1182
	[0.2250]	[0.2569]	[0.2781]	[0.2742]	[0.2730]	[0.2649]	[0.2932]	[0.2969]	[0.3244]	[0.3550]	[0.2459]	[0.2923]	[0.2635]	[0.2678]	[0.2688]
Math_Test	-0.0141	-0.3297	0.1362	0.0417	0.0972	0.6605**	0.467	0.7800**	0.7419*	0.6472	0.2389	0.294	0.1055	0.409	0.1915
	[0.2762]	[0.3171]	[0.3434]	[0.3370]	[0.3353]	[0.3251]	[0.3619]	[0.3665]	[0.3987]	[0.4359]	[0.3015]	[0.3608]	[0.3254]	[0.3291]	[0.3300]
Correct	0.0985***	0.0937***	0.0885***	0.1139***	0.1031***	0.0653***	0.0759***	0.0614***	0.0839***	0.0385	0.0583***	0.0405*	0.0405**	0.0693***	0.0704***
	[0.0122]	[0.0194]	[0.0211]	[0.0208]	[0.0202]	[0.0144]	[0.0222]	[0.0225]	[0.0246]	[0.0263]	[0.0109]	[0.0221]	[0.0200]	[0.0203]	[0.0199]
Obs.	608	152	152	152	152	608	152	152	152	152	608	152	152	152	152
No. of subject	152					152					152				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. *Happiness* takes values 1 to 9, where 1 represents the least happy and 9 represents the most happy. *Arousal* takes values 1 to 9, where 1 represents least aroused and 9 represents the most aroused. *Dominance* takes values 1 to 9, where 1 represents least dominant and 9 represents the most dominant. The variable *Science_Degree* takes value 1 if the degree of study is Architecture, Biology, Business, Computer Science, Economics, Engineering or Human Resources and 0 if the degree is Communication, Health, Human Science, Law, Marketing, Photography, Political Science and Translation and Interpretation. The variable *Math_Test* takes value 1 if the subject took the Math test in the national level university entry exam "Selectividad".

Table 6: Gender Differences on the Treatment Effect on Affective Response under Piece-Rate: Happiness, Arousal, Dominance

	HAPPINESS					AROUSAL					DOMINANCE				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	4.8937***	4.8301***	5.0566***	4.2652***	4.9812***	4.1817***	3.8935***	3.8628***	3.1942***	3.3278***	5.4350***	5.5046***	5.7919***	5.1789***	5.1576***
	[0.2874]	[0.3456]	[0.4252]	[0.4673]	[0.4782]	[0.3424]	[0.4092]	[0.4537]	[0.5617]	[0.6212]	[0.3002]	[0.3977]	[0.4040]	[0.4649]	[0.4734]
Treatment	**-0.2658**	**-0.4237**	**-0.2731**	**-0.206**	**-0.155**	**0.1103**	**-0.2444**	**-0.1386**	**0.3573**	**0.4574**	**-0.0135**	**0.0701**	**-0.1103**	**-0.0951**	**0.271**
	[0.3381]	**[0.4050]**	**[0.4297]**	**[0.4169]**	**[0.4136]**	**[0.4044]**	**[0.4795]**	**[0.4585]**	**[0.5012]**	**[0.5372]**	**[0.3717]**	**[0.4660]**	**[0.4083]**	**[0.4148]**	**[0.4093]**
Female	**0.1607**	**0.3432**	**0.0584**	**0.3888**	**-0.1369**	**0.1685**	**-0.1708**	**0.2693**	**0.276**	**0.2906**	**-0.0531**	**0.1578**	**-0.1179**	**-0.0733**	**-0.0548**
	[0.3041]	**[0.3531]**	**[0.3845]**	**[0.3725]**	**[0.3696]**	**[0.3638]**	**[0.4180]**	**[0.4102]**	**[0.4478]**	**[0.4801]**	**[0.3358]**	**[0.4062]**	**[0.3653]**	**[0.3706]**	**[0.3659]**
FemalexTreatment	**-0.0045**	**0.374**	**-0.0841**	**-0.3238**	**0.0089**	**-0.0535**	**0.3685**	**0.161**	**-0.5427**	**-0.2046**	**-0.2552**	**-0.1239**	**-0.2104**	**-0.2913**	**-0.5803**
	[0.4237]	**[0.4957]**	**[0.5359]**	**[0.5206]**	**[0.5182]**	**[0.5069]**	**[0.5868]**	**[0.5717]**	**[0.6259]**	**[0.6732]**	**[0.4672]**	**[0.5703]**	**[0.5091]**	**[0.5180]**	**[0.5129]**
Period	-0.035					-0.2614***					-0.0297				
	[0.0430]					[0.0505]					[0.0352]				
Correct	0.1004***	0.0975***	0.0907***	0.1143***	0.1012***	0.0698***	0.0808***	0.0650***	0.0844***	0.0444*	0.0570***	0.0367	0.0385*	0.0662***	0.0636***
	[0.0121]	[0.0195]	[0.0211]	[0.0206]	[0.0202]	[0.0143]	[0.0231]	[0.0225]	[0.0247]	[0.0263]	[0.0107]	[0.0224]	[0.0200]	[0.0205]	[0.0200]
Observations	640	160	160	160	160	640	160	160	160	160	640	160	160	160	160
No. of subject	160					160					160				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. *Happiness* takes values 1 to 9, where 1 represents the least happy and 9 represents the most happy. *Arousal* takes values 1 to 9, where 1 represents least aroused and 9 represents the most aroused. *Dominance* takes values 1 to 9, where 1 represents least dominant and 9 represents the most dominant.

Table 7: Feedback Content on the Treatment Effect on Affective Response under Piece-Rate: Happiness, Arousal, Dominance												
	HAPPINESS				AROUSAL				DOMINANCE			
	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4
Constant	6.2565***	6.1616***	5.6948***	6.4800***	5.1359***	5.3832***	6.3054***	4.4800***	6.1323***	6.1673***	6.2326***	6.2400***
	[0.1798]	[0.2653]	[0.4335]	[0.3200]	[0.2099]	[0.2983]	[0.5031]	[0.4020]	[0.1789]	[0.2194]	[0.3276]	[0.3024]
Treatment	**-0.2831**	**-0.5393***	**-0.6411****	**-0.3689**	**0.1136**	**0.2949**	**0.191**	**-0.2207**	**-0.1941**	**-0.3627**	**-0.6021****	**-0.8326****
	[0.2323]	**[0.2932]**	**[0.3269]**	**[0.4441]**	**[0.2726]**	**[0.3394]**	**[0.3958]**	**[0.5578]**	**[0.2411]**	**[0.2680]**	**[0.2966]**	**[0.4197]**
Positive	**0.4070****	**0.1812**	**0.4696***	**0.6473***	**0.3823****	**0.5942*****	**0.4033**	**-0.0982**	**0.1756**	**0.1475**	**0.0709**	**0.2327**
	[0.1629]	**[0.2062]**	**[0.2501]**	**[0.3860]**	**[0.1869]**	**[0.2274]**	**[0.2948]**	**[0.4848]**	**[0.1304]**	**[0.1520]**	**[0.1962]**	**[0.3647]**
PositivexTreatment	**0.4704****	**0.7154****	**0.8946****	**0.619**	**0.2293**	**-0.0808**	**0.1605**	**0.9144**	**0.3334***	**0.4712****	**0.8861*****	**1.3221****
	[0.2262]	**[0.3033]**	**[0.3661]**	**[0.5405]**	**[0.2596]**	**[0.3368]**	**[0.4341]**	**[0.6788]**	**[0.1815]**	**[0.2288]**	**[0.2943]**	**[0.5108]**
Period	0.0805**	0.1595***	0.2375**		-0.1888***	-0.3100***	-0.5300***		0.0392	0.0416	0.0364	
	[0.0407]	[0.0580]	[0.1092]		[0.0465]	[0.0625]	[0.1249]		[0.0315]	[0.0398]	[0.0763]	
Observations	640	480	320	160	640	480	320	160	640	480	320	160
Number of subject	160	160	160		160	160	160		160	160	160	

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level. *Happiness* takes values 1 to 9, where 1 represents the least happy and 9 represents the most happy. *Arousal* takes values 1 to 9, where 1 represents least aroused and 9 represents the most aroused. *Dominance* takes values 1 to 9, where 1 represents least dominant and 9 represents the most dominant. The variable *Positive* becomes positive feedback for the treated subjects while this information is never revealed to the control subjects.

Table 8: Treatment Effect on Performance under Flat-Rate										
	Submitted					Correct				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	14.7115***	16.4231***	19.2949***	21.4487***	22.6667***	12.7372***	14.1538***	17.0128***	19.3718***	20.0641***
	[0.7095]	[0.6393]	[0.7263]	[0.7333]	[0.7464]	[0.7395]	[0.6714]	[0.7541]	[0.7791]	[0.7661]
Treatment	**-0.0577**	**-0.5897**	**0.6538**	**0.0128**	**-0.3077**	**-0.3333**	**-0.5513**	**0.4615**	**-0.8333**	**-0.4103**
	[0.9556]	**[0.9042]**	**[1.0271]**	**[1.0370]**	**[1.0555]**	**[0.9888]**	**[0.9495]**	**[1.0664]**	**[1.1018]**	**[1.0835]**
Period	2.0987***					1.9654***				
	[0.0865]					[0.0963]				
Observations	624	156	156	156	156	624	156	156	156	156
No. of subject	156					156				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level.

Table 9: Gender Differences in the Treatment Effect on Performance under Flat-Rate										
	Number of Submitted Summations					**Number of Correct Summations**				
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	14.5865***	16.4848***	19.2727***	20.8485***	22.7273***	12.5259***	14.4242***	16.9394***	18.5152***	19.8788***
	[1.0358]	[0.9696]	[1.0910]	[1.0899]	[1.1251]	[1.0799]	[1.0222]	[1.1378]	[1.1671]	[1.1557]
Treatment	**2.6263***	**1.2893**	**3.3402****	**3.6676****	**2.2082**	**2.3348**	**0.9951**	**3.0929***	**2.8719***	**2.3793**
	[1.4555]	**[1.3932]**	**[1.5676]**	**[1.5660]**	**[1.6166]**	**[1.5126]**	**[1.4687]**	**[1.6348]**	**[1.6769]**	**[1.6605]**
Female	0.2167	-0.1071	0.0384	1.0404	-0.1051	0.3662	-0.4687	0.1273	1.4848	0.3212
	[1.3336]	[1.2766]	[1.4364]	[1.4349]	[1.4813]	[1.3860]	[1.3457]	[1.4980]	[1.5365]	[1.5215]
FemalexTreatment	**-4.4636****	**-3.1139***	**-4.4598****	**-6.1097*****	**-4.1709****	**-4.4435****	**-2.5464**	**-4.3723****	**-6.2124*****	**-4.6431****
	[1.8951]	**[1.8140]**	**[2.0411]**	**[2.0389]**	**[2.1049]**	**[1.9695]**	**[1.9123]**	**[2.1286]**	**[2.1834]**	**[2.1621]**
Period	2.0987***					1.9654***				
	[0.0865]					[0.0963]				
Observations	624	156	156	156	156	624	156	156	156	156
No. of subject	156					156				

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level.

Table 10: Feedback Content on the Treatment Effect on Affective Response under Flat-Rate: Happiness, Arousal, Dominance

	HAPPINESS				AROUSAL				DOMINANCE			
	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4	ALL	PERIODS 2-4	PERIODS 3-4	PERIOD 4
Constant	6.5739***	6.7501***	6.6286***	6.3714***	4.8265***	5.0830***	5.2399***	4.4571***	6.3863***	6.5273***	5.9565***	6.2857***
	[0.1950]	[0.2575]	[0.4193]	[0.3005]	[0.2131]	[0.2597]	[0.4171]	[0.2942]	[0.1867]	[0.2214]	[0.3251]	[0.2631]
Treatment	**-0.3173**	**-0.3173**	**-0.339**	**-0.0381**	**-0.2208**	**-0.1612**	**-0.091**	**-0.0762**	**-0.2984**	**-0.5739****	**-0.5731****	**-0.4524**
	[0.2862]	**[0.2862]**	**[0.3237]**	**[0.4068]**	**[0.2798]**	**[0.2988]**	**[0.3320]**	**[0.3983]**	**[0.2539]**	**[0.2666]**	**[0.2855]**	**[0.3562]**
Positive	**0.7021*****	**-0.304**	**-0.0933**	**0.6983***	**0.1778**	**0.1265**	**0.2956**	**0.5196**	**0.3164****	**-0.4067****	**-0.1897**	**0.1794**
	[0.1672]	**[0.2151]**	**[0.2597]**	**[0.4047]**	**[0.1875]**	**[0.2109]**	**[0.2605]**	**[0.3962]**	**[0.1300]**	**[0.1688]**	**[0.2052]**	**[0.3543]**
PositivexTreatment	**-0.1065**	**0.3916**	**0.1708**	**-0.0317**	**-0.0746**	**-0.2804**	**-0.4235**	**-0.4839**	**0.0272**	**0.5504****	**0.3752**	**0.5984**
	[0.2300]	**[0.2981]**	**[0.3685]**	**[0.5716]**	**[0.2579]**	**[0.2916]**	**[0.3697]**	**[0.5596]**	**[0.1786]**	**[0.2328]**	**[0.2914]**	**[0.5005]**
Period	-0.0985***	0.0407	0.0619		-0.0441	-0.1024**	-0.1690*		-0.0615**	0.0203	0.1570**	
	[0.0374]	[0.0544]	[0.1012]		[0.0423]	[0.0516]	[0.0993]		[0.0282]	[0.0397]	[0.0735]	
Observations	624	468	312	156	624	468	312	156	624	468	312	156
No. of subject	156	156	156		156	156	156		156	156	156	

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% and *** denotes significance at the 1% level.

Appendix

Instructions and the questionnaire were identical for the control and treated groups except for the parts shown in bold, which appeared only in the treatment group.

A. Instructions:

THANK YOU FOR PARTICIPATING IN OUR EXPERIMENT!

This is an experiment and thus, no talking, looking-around or walking is allowed. If you have any question or need help please raise your hand and one of the researchers will assist you. If you do not comply with the rules, WE WILL ASK YOU TO LEAVE THE EXPERIMENT AND YOU WILL NOT RECIEVE ANY PAYMENT. Thank you.

This experiment is about individual decisions. Pompeu Fabra University has provided funds to carry it out. You will receive 3euros for having arrived on time. Additionally, if you follow the instructions correctly you may earn more money.

These instructions will inform you about the type of decisions you will be taking, as well as how your decisions will affect your payment. Everything you earn will be for you and paid in cash inside a closed envelope in a strictly private way at the end of the experimental session.

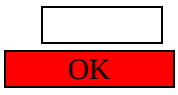
Each participant has been given a "Experiment Code" to guarantee that no participant can identify another one by his/her decisions nor earnings. Researchers will observe each participant's earnings at the end of the experiment but we will not associate your decisions with any participants' names.

Your Experiment Code is:

This experiment consists of four periods. Your final payment will be the sum of a participation fee of 3euros plus whatever you earn in the four periods of the experiment.

Each period lasts 5 minutes. During this type you will be shown summations of four numbers of two digits each.
For example:

12
59
40
25



The right solution is 136.

The summations will appear one by one and you will have to submit an answer in the indicated box. Using a calculator or paper and pencil for doing the summations is totally prohibited. If you do not comply with this rule, we will ask you to leave the experiment and you will not receive any payment. When you have solved a summation, you can submit the solution and click on "OK". The numbers in the summations, as well as the order in which they appear, will be exactly the same for all participants. In each period, you can solve as many summations as you can for the duration of 5 minutes of the period.

You will be paid for each correct solution, exactly 0.15 euros (15 cents) for each correct solution.

Thus, if you solve 1 summation correctly in the four periods, you will earn a total of 3.15euros (3 euros as a show-up fee plus 0.15euros for the correct solution).

Thus, if you solve 25 summations correctly in the four periods, you will earn a total of 6.75euros (3 euros as a show-up fee plus 25*0.15=3.75euros for the correct solutions).

Thus, if you solve 110 summations correctly in the four periods, you will earn a total of 19.5euros (3 euros as a show-up fee plus 110*0.15=16. 5euros for the correct solutions).

Notice that the numbers in the examples are used for illustrative purposes. They DO NOT intend to suggest how many summations anyone should solve correctly.

Between the periods you can rest for two minutes. During this time you will be informed about the number of correctly solved summations during that period**, as well as about the average number of correctly solved summations in the experimental session**. Also, we will ask you to answer a brief questionnaire of three questions.

At the end of the 4 periods you will be shown your total earnings for this experiment**, as well as the average earnings in this experimental session** and we will ask you to fill in a questionnaire, as well as the information for the receipt. Wait for your Experiment Code to be called for you to come to the experimenter's room in order to receive the envelope with your earnings.

Thank you for your participation in our experiment!

B. Questionnaire:

A. Please, fill in the following information:

Gender
First Language
Field of Study
Year of Study
Age
Nationality

B. Questions:

1. ¿Did you participate in similar experiments? If your answer is positive, please explain.

2. I am satisfied with the experience of having participated in this experiment.
    a. In total disagreement
    b. In disagreement
    c. Neither in disagreement nor agreement
    d. In agreement
    e. In total agreement

3. I am satisfied with the payment that I obtained in this experiment.
    a. In total disagreement
    b. In disagreement
    c. Neither in disagreement nor agreement
    d. In agreement
    e. In total agreement

4. I would consider participating again in this experiment.
    a. In total disagreement
    b. In disagreement
    c. Neither in disagreement nor agreement
    d. In agreement
    e. In total agreement

5. I value positively the information I obtained at the end of each period with respect to the number of summations I solved correctly.
    a. In total disagreement
    b. In disagreement
    c. Neither in disagreement nor agreement
    d. In agreement
    e. In total agreement

6. I value positively the information I obtained at the end of each period with respect to the average number of correct summations solved in this experimental session.
    a. In total disagreement
    b. In disagreement
    c. Neither in disagreement nor agreement
    d. In agreement
    e. In total agreement

7. Did you take the Math exam during *Selectividad*?
    a. Yes
    b. No

8. What grade did you obtain in your Math exam during *Selectividad?*

CENTRE FOR ECONOMIC PERFORMANCE
Recent Discussion Papers

1115	Pascal Michaillat	Fiscal Multipliers over the Business Cycle
1114	Dennis Novy	Gravity Redux: Measuring International Trade Costs with Panel Data
1113	Chiara Criscuolo Ralf Martin Henry G. Overman John Van Reenen	The Causal Effects of an Industrial Policy
1112	Alex Bryson Richard Freeman Claudio Lucifora Michele Pellizzari Virginie Perotin	Paying for Performance: Incentive Pay Schemes and Employees' Financial Participation
1111	John Morrow Michael Carter	Left, Right, Left: Income and Political Dynamics in Transition Economies
1110	Javier Ortega Gregory Verdugo	Assimilation in Multilingual Cities
1109	Nicholas Bloom Christos Genakos Rafaella Sadun John Van Reenen	Management Practices Across Firms and Countries
1108	Khristian Behrens Giordano Mion Yasusada Murata Jens Südekum	Spatial Frictions
1107	Andrea Ariu Giordano Mion	Service Trade and Occupational Tasks: An Empirical Investigation
1106	Verónica Amarante Marco Manacorda Edward Miguel Andrea Vigorito	Do Cash Transfers Improve Birth Outcomes? Evidence from Matched Vital Statistics, Social Security and Program Data
1105	Thomas Sampson	Assignment Reversals: Trade, Skill Allocation and Wage Inequality
1104	Brian Bell Stephen Machin	Immigrant Enclaves and Crime
1103	Swati Dhingra	Trading Away Wide Brands for Cheap Brands

1102	Francesco Caselli Antonio Ciccone	A Note on Schooling in Development Accounting
1101	Alan Manning Barbara Petrongolo	How Local Are Labour Markets? Evidence from a Spatial Job Search Model
1100	Fabrice Defever Benedikt Heid Mario Larch	Spatial Exporters
1099	John T. Addison Alex Bryson André Pahnke Paulino Teixeira	Change and Persistence in the German Model of Collective Bargaining and Worker Representation
1098	Joan Costa-Font Mireia Jofre-Bonet	Anorexia, Body Image and Peer Effects: Evidence from a Sample of European Women
1097	Michal White Alex Bryson	HRM and Workplace Motivation: Incremental and Threshold Effects
1096	Dominique Goux Eric Maurin Barbara Petrongolo	Worktime Regulations and Spousal Labor Supply
1095	Petri Böckerman Alex Bryson Pekka Ilmakunnas	Does High Involvement Management Improve Worker Wellbeing?
1094	Olivier Marie Judit Vall Castello	Measuring the (Income) Effect of Disability Insurance Generosity on Labour Market Participation
1093	Claudia Olivetti Barbara Petrongolo	Gender Gaps Across Countries and Skills: Supply, Demand and the Industry Structure
1092	Guy Mayraz	Wishful Thinking
1091	Francesco Caselli Andrea Tesei	Resource Windfalls, Political Regimes, and Political Stability
1090	Keyu Jin Nan Li	Factor Proportions and International Business Cycles
1089	Yu-Hsiang Lei Guy Michaels	Do Giant Oilfield Discoveries Fuel Internal Armed Conflicts?
1088	Brian Bell John Van Reenen	Firm Performance and Wages: Evidence from Across the Corporate Hierarchy

The Centre for Economic Performance Publications Unit
Tel 020 7955 7673 Fax 020 7955 7595
Email info@cep.lse.ac.uk Web site http://cep.lse.ac.uk