Relative Performance Feedback Information and Happiness[*]

Ghazala Azmat[+]   Nagore Iriberri[**]

Universitat Pompeu Fabra and Barcelona GSE

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Abstract

This paper studies the effect of providing relative performance feedback information, when agents are rewarded according to their absolute performance, on individual performance, as well as on individual affective response. In a laboratory set-up, agents perform a real effort task and are asked to rate their *happiness*, *arousal* and feeling of *dominance*. Control subjects learn only their absolute performance, while the treated subjects additionally learn whether they are performing above or below the average subject in the group. Performance is 17 percent higher when relative performance feedback is provided. Furthermore, although the feedback increases the performance independent of the content of the information (i.e. performing above or below the average), the content is determinant for the affective response. When subjects are treated, the inequality in happiness and feelings of dominance between those subjects performing above and below the average increases by 11 and 6 percentage points, respectively.

Keywords: relative performance, piece-rate, feedback, social comparison, happiness.

JEL classification: I21, M52, C30.

[+] Ghazala Azmat. Departament d'Economia i Empresa. Universitat Pompeu Fabra, Ramón Trías Fargas 25-27, 08005 Barcelona (Spain). Tel: (+34) 935421757. E-mail: ghazala.azmat@upf.edu.
[**] Nagore Iriberri. Departament d'Economia i Empresa. Universitat Pompeu Fabra, Ramón Trías Fargas 25-27, 08005 Barcelona (Spain). Tel: (+34) 935422690. E-mail: nagore.iriberri@upf.edu.

1. Introduction

Performance appraisals have become standard practice in organizations. As of the early 1980's, between seventy four and eighty nine per cent of American businesses used them, see Murphy and Cleveland (1991). Informing agents about how well they are performing relative to their peers, in other words, by providing relative performance feedback information is a common way in which performance appraisals are implemented. 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, both to the theory and practice (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. Two issues have caught economists' attention. First, from a theoretical point of view the optimal provision of relative performance feedback information has been studied.[1] Second, empirical research has also focused on the effect of its provision on individual performance or productivity, which depends on the underlying incentive scheme.[2] In particular, under piece-rate incentives, when agents are rewarded according to their absolute performance, Azmat and Iriberri (2009), Hannan et al. (2008) and Blanes i Vidal and Nossol (2009) find a positive effect on performance. Eriksson et al. (2009) find that although performance is not affected it does increase the mistake rate of the worst performing agent.[3]

The papers mentioned above focus their studies on how agents' *performance* or *productivity* is affected when relative performance feedback information is provided. They do not put any attention on how agents themselves *feel* when given relative performance feedback, despite its importance for practitioners and organizations. Bowles (1998) argues that "economic institutions structure the tasks people face and

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[1] This has been studied mostly in the tournament literature such as in Gershkov and Perry (2009), Kräkel (2007) and Lai and Matros (2007). Hansen (2009) studies the provision of performance appraisals when agents have career concerns, providing a rationale for the common finding that the provided feedback is less informative than it could be (mostly top-medium ratings and little negative feedback).

[2] Under flat rate incentives, being observed and observing others' work brings positive effects on performance (Falk and Ichino, 2006, Mas and Moretti, 2009, and Kuhnen and Tymula, 2008). In tournaments, Casas-Arce and 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.

[3] Recently, Bandiera et al. (2009) and Delfgaauw et al. (2009) have also considered the impact of relative performance feedback at the team level.

hence influence not only their capacities but their values and psychological functioning as well". In recent years, economists have started to give more weight to individuals' happiness and well-being as an important outcome variable of interest, along with more traditional outcome variables. 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).

This paper studies the provision of relative performance feedback information under piece-rate incentives on two important measures: on agents' *performance* and on agents' *affective response*. Affective response includes measures of agents' emotional state, such as happiness (subjective well-being or experienced utility), but also arousal (or motivation) and dominance (or self-confidence).

We propose a controlled laboratory set-up, where subjects perform a real effort task and are rewarded according to piece-rate incentives. There are four working periods. In between periods, the control subjects are provided with their absolute performance while the treated subjects are provided with their absolute performance, as well as with the average performance of the session. Right after the feedback, both control and treated subjects are asked about their affective response, that is, they are asked to rate their happiness, arousal and dominance levels. See Figure 1 for a graphical description of the experiment.

With respect to performance, 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. Those subjects who received relative performance feedback information increased their performance by 17 percent compared to those who did not. We are also able to study the dynamic effects of providing relative performance feedback information, which has not been studied before. We find that in each period, the treated subjects outperform the untreated, although the effect becomes weaker over time. In addition, the actual content of the feedback information (i.e., whether agents receive positive or negative feedback) does not affect subjects' subsequent performance differently, such that all subjects increased their performance. Finally, we find a strong gender difference in the reaction to the treatment. The overall effect is driven solely by boys.

With respect to the affective response, we find that the provision of relative performance feedback information had strong effects both on happiness and dominance levels, but not on arousal levels. Contrary to the findings on performance, we show that

the treatment has 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 11 percentage points. With respect to the dominance levels, the treatment leads to an increase in the gap of subjects' 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, we find no gender differences in the affective response to the feedback treatment.

It is important to understand the mechanism through which individuals react to relative performance feedback information. Given that agents are rewarded according to their (absolute) performance, the feedback informs them about their relative performance as well as their relative payment. The findings regarding the provision of information and the effect on happiness should be therefore connected with the literature 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). Consistent with the relative income and happiness theory, those subjects who are made aware of the differences in performance, and therefore in income, show a higher inequality in happiness than those subjects who are unaware of it.

To our knowledge this is the first paper that looks at the effect of relative performance feedback information on agents' affective response in a controlled environment. There are two related experimental papers. 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 generally inversely related to a preoccupation with relative payoffs.[4] Note that our experimental design is rather different in terms of the underlying incentives. Unlike in their setting, the subjects in our environment can substantially improve their material payoff by putting in higher effort, while their effect on others' material payoffs is negligible. Second, Brandts et al. (2009) study the effect

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[4] The authors mention that this might be due to the fact that they find little concern for social standing and so their test has less power.

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of a competitive environment on happiness and they 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. Note, however, that in our setting the competition is rather symbolic given there is no actual prizes or tournament-like incentives. However, the provision of relative performance feedback information might foster competition through social comparison (Festinger, 1954).

The paper is organized as follows. Section 2 describes the experimental design and procedures in detail. Section 3 contains an overview of the main results, presented through graphical analysis. In Section 4 we proceed to do the econometric analysis, quantifying the main treatment effects. 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 the overall treatment effect, then, we test for gender differences and finally we analyze the effect of the positive/negative content of the feedback. Finally, we conclude in Section 6.

2. Experimental Design and Procedures

Eight experimental sessions were conducted in the Laboratori d'Economia Experimental (LEEX) at Universitat Pompeu Fabra using z-Tree experimental software (Fischbacher, 2007) between April and May of 2009. A total of 160 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. Instructions can be found in the appendix at the end of the paper. Subjects were guaranteed a 3euro 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 voluntary questionnaire while they waited to be paid. 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 consists 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.[5] Subjects 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 answers during the four periods.

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 is the feedback information about performance provided at the end of each period. Half of the subjects (80 subjects), the control group, were provided with information about their correct number of submitted summations. We will refer to this as *absolute performance*. The other half (80 subjects), the treatment group, were provided not only with information about their correct number of submitted 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).

The SAM questionnaire 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 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. Standard 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

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[5] Niederle and Vesterlund (2007) have used summations to measure real effort and productivity.

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extreme happy SAM rating if the reaction was one of feeling "happy, pleased, satisfied, contented, hopeful, relaxed", and to use the other extreme if he felt "unhappy, annoyed, unsatisfied, melancholic, despairing, or bored". Similar instructions accompanied all three scales.[6]

After the four working periods, as well as the four periods of feedback and SAM questions are over, subjects were informed about their total earned money. The treatment group 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, 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.

Finally, while they waited to be paid, they were given a questionnaire that requested demographic details. See the appendix for a specific list of questions they answered.

3. Graphical Analysis

In this section, we provide an overall picture of the main results from the experiment using graphical analysis.

In Figures 3 to 6, we show subjects' *average* behavior for the treatment and control groups for the variables of interest. The variables of interest are the number of summations subjects submit (*Submitted*), the number of correct answers they get (*Correct*), as well as the happiness, arousal and dominance levels subjects reveal during the four periods. We do this in two steps. First, we look at averages over all subjects (Figures 3 and 4). Second, for a given period, we split the subject population between those who perform above the average, to which we will refer to as *above* subjects, and those who perform below the average, to whom we will refer to as *below* subjects (Figures 5 and 6).

Figure 3 shows the average submitted and correct number of summations over all subjects for each of the four periods. The treatment group submits significantly more

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[6] 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".

summations than the control group in all four periods, although the significance declines as the period increases (p-values of 0.00, 0.03, 0.04, and 0.07 for the two-sided mean comparison tests in periods 1 to 4, respectively). The treatment group also correctly solves significantly more summations than the control group in all four periods, although only marginally significant in the fourth period comparison (p-values of 0.00, 0.05, 0.06, and 0.10 for the two-sided mean comparison in periods 1 to 4, respectively).

This shows that the relative performance feedback information is an effective tool to increase performance. In addition, knowing that the relative performance feedback information will be received is an important factor in pushing the individual performance given the difference in the first period. We also observe that there is learning over time for both the control and treatment groups. The average submitted and the average correctly solved summations increase over time, where learning is steeper in the second and third periods.

Figure 4 shows the average emotional reaction using three main variables, happiness, arousal and dominance, respectively. As can be seen in the graphs, the three variables show no significant difference between the treatment and the control groups (p-values for the difference between treatment and control, averaged over all 4 periods, is 0.76 for happiness, 0.40 for arousal and 0.71 for dominance.)

In Figure 5, the number of submitted, as well as correct, is higher in treatment group for both, the above and below subjects, over all periods. The figures suggest that the feedback treatment increased performance for all subjects, independent of whether they were performing above or below the average. The gap between the treatment and control, for both cases, becomes smaller in the final period.

When we look at affective response separately for the above and below subjects, interesting patterns emerge. Regarding happiness, we can see from Figure 6 that above subjects are always happier than those below. This is the case for both the treatment and control groups. However, the inequality or gap in happiness between subjects performing above and below increases when subjects are provided with relative performance feedback information. This is an important finding because we observe that the provision of relative performance feedback information affects, not only subjects' performance, but also their happiness.

With respect to arousal, again we observe that in both, the control and treatment group, subjects performing below the average show to be less aroused than subjects

performing above average. In addition, the relative performance feedback information seems to increase the level of arousal of those who are performing above.

Finally, regarding dominance, in both the control and treatment groups, subjects performing above feel overall more dominant than subjects performing below the average. As in the case for happiness, the relative performance feedback information increases the gap in dominance between those subjects performing above and below, compared to the control group.

To sum up, the treatment group shows higher performance than the control group. In addition, subjects performing above the average are overall happier, more motivated and more dominant than those subjects performing below the average. Furthermore, the provision of the relative performance feedback information increases the difference in happiness, arousal and the feeling of dominance between those subjects who are performing above the average and those who are performing below the average, compared to the control group. We now proceed to quantify these effects in the following section.

4. Econometric Analysis

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 affective response. For both, performance and affective response, we start by measuring the overall effect of feedback, we then look for gender differences and finally, we analyze the effect that the actual content of the feedback 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*) and the number of correct answers they get (*Correct*). Figure 7 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. This result is in line with those found in Azmat and Iriberri (2009), who study the impact of the provision of relative performance feedback information using field data on school performance.

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

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

The dependent variable, Y_{it}, refers to the performance measure, *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 this experiment is run four times we also control for the different time periods and we weight the estimates using the individual 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. 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. Subjects become accustomed to the computer application and the task.[7] We can also see that this learning is steeper in the beginning and it slows down in the last period. More interestingly, treated subjects outperform the control subjects in each period, although the effect is strongest in the initial period, suggesting an anticipation effect.[8] This can be seen more clearly in Figure 3. The anticipation effect is in line with those found by Blanes i Vidal and Nossol (2009) and Kuhnen and Tymula (2008), 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 would measure the quality of

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[7] 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 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.
[8] We observed the strong first period effect in all four sessions for the treated subjects.

performance. Eriksson et al. (2009) have subject pairs performing under piece-rate incentives and each is informed about the performance of the other. They find that while the information had no effect per se on performance it did increase the mistake rate of the worst performing subject. In order to test for the quality of performance, we estimate equation (1) using this 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. We use 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.[9] 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 lab experiment. As for controls, only the *Math_Test* variable has a positive and significant but small effect in the number of submitted summations, although not in the number of correct summations.[10] 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 coefficient in periods 2, 3 and 4 are statistically insignificant from one another.[11]

4.1.2. Gender Analysis

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[9] 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.

[10] 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.

[11] When we combine all periods and compare pairwise 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.

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 girls react differently from boys to the relative performance feedback information.

We estimate the following equation:

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

where our variable of interest is the interaction between girls and treatment. The results are shown in Table 3. Treated girls do not react differently from the non-treated girls, while treated boys do react positively from the non-treated boys. Notice that from our estimates in column 6, on average, a boy in the control group correctly solves 10.03 summations (α), while a treated boy solves 15.94 ($\alpha + \chi$). However, on average, a girl in the control group correctly solves 13.52 ($\alpha + \beta$), while a treated girl correctly solves 13.45 ($\alpha + \beta + \chi + \delta$). These results are striking since they imply that all of the observed effect on performance is attributed solely to boys.

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). However, in a natural experiment on schooling, Azmat and Iriberri (2009) find 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 actual content of the information. In other words, if a subject learns in a period that she is performing above (below) the average, the actual 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 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).[12] 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.

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 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 it can be seen in the coefficient *Positive*. Interestingly, the interaction between the treatment and positive is not significant. This suggests that the actual feedback content is irrelevant for subsequent performances. In other words, what matters is the provision of feedback but regardless of whether the subject is given

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[12] 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.

positive (negative) feedback, performance will increase. Estimations for the different 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.

Since we found such a strong gender effect to the treatment, it is interesting to understand if boys and girls also react differently to the content of the information. In Panel B, we show the estimates for equation (4) for boys only, while in Panel C we show the estimates for girls only.

From Panel B, we see that boys 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 girls 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 girls do not react to the informational treatment. Columns 2-3 and 5-6 give the estimates for the cumulative information. For boys, the estimates suggest the same findings but they become less significant due to fewer observations. Interestingly, for girls, although not significant, there are some differential effects depending on the content of the information. When girls receive negative feedback, the positive coefficients on the treatment variable, suggest that they work harder. However, when girls receive positive feedback the sign of the coefficient is negative, suggesting that they relax. This, to some extent, provides an explanation for why we found that on average girls did not react to the treatment. Since, the sign of the coefficients suggests an unequal response to positive and negative feedback, on average, they cancel out.

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. Third, we find a strong gender difference in the reaction to the treatment. The overall effect is driven solely by boys.

4.2. Affective Responses: Happiness, Arousal and Dominance.
4.2.1. The Overall Effect

Relative performance feedback information potentially has an effect on other aspects other than performance. In particular, a subject's affective response may be

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influenced. Organizations care about the affective state of the employees since it has been found that this affects productivity (see for example Iaffaldano et al. and Muchinsky, 1985, Warr, 1999, and Oswald et al., 2009). We measure three aspects of affective response: happiness (or subjective well-being), arousal (or motivation) and dominance (or self-confidence).

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} 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*. It is reasonable to assume that performance will have a direct effect on the affective response (see Frey and Stutzer, 2002).[13] 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. 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, motivation or self-confidence. Another noticeable finding is that the number of correct summations has a positive impact on all three affective response measures. The better the subjects perform, the happier, the more motivated and self-confident they feel. The coefficient on *Correct* is negative and significant for happiness and arousal and positive and significant for dominance. Note that the happiness and arousal variables are such that the happier or more motivated the subject, the lower the number. However, for the dominance variable is such that the more self-confident, the higher the number. Finally, with respect to the arousal measure, as one would expect subjects find the task less motivating over time. As for the performance analysis, since the control variables do not change the treatment coefficient, the subsequent analysis does not include control variables.

4.2.2. Gender

In section 4.1.2 we found that the provision of relative performance feedback information affected the performance of boys very differently from girls'. In particular, we found that the effect on performance was driven solely by the boys' reaction to the

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[13] We also estimated (1) and (2) without the variable Correct and the main results remain the same.

treatment. 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 girl and the treatment implies that the provision of relative performance feedback information does not affect boys' affective response differently from girls'.

4.2.3. Feedback Content

As with performance, we now turn to study the actual content of the information 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. 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 3.74 (α), while a control subject performing above the average reports a happiness of 3.34 ($\alpha + \delta$). However, a treated subject who is informed that she has performed below the average reports a happiness level of 4.03 ($\alpha + \chi$), while a treated subject who is informed that she has performed above the average reports an average happiness of 3.15 ($\alpha + \beta + \chi + \delta$). This implies that control subjects performing above the average are 11 percent happier than those performing below the average. For the treated subjects, those

who are given positive feedback reveal to be 22 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 11 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, we see that 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 11 to 18 percent), for the treatment group, the gap increases substantially with the cumulative feedback (from 22 to 32 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 motivated than those performing below the average. Also, over time, subjects' motivation goes down.

Columns 9 to 12 show the results for 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 feeling dominant between those 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 (α), while a control subject performing above the average reports a dominance level of 6.31 ($\alpha + \delta$). However, a treated subject who is informed that she has performed below the average reports a dominance level of 5.94 ($\alpha + \chi$), while a treated subject who is informed that she has performed above the average reports an average dominance of 6.45 ($\alpha + \beta + \chi + \delta$). 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).

This section shows that the treatment has very different effects on 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. Furthermore, the treatment increases the inequality in both happiness and dominance levels.

5. Conclusions

In this study we have shown that relative performance feedback information is an important tool to increase the productivity and 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 trade-off to a policy maker who is deciding whether or not to provide relative performance feedback information. Although it is agreed that enhancing productivity is a positive result, the increase in inequality in affective response of individuals might be debatable.

The results of this paper open new research questions. In particular, long-run effects of the provision of relative performance feedback information need to be studied further. In addition, it would be interesting to study the effect of relative performance feedback information on individuals' affective response in environments with different incentive schemes.

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Figures and Tables

Figure 1. Timeline of the Experiment
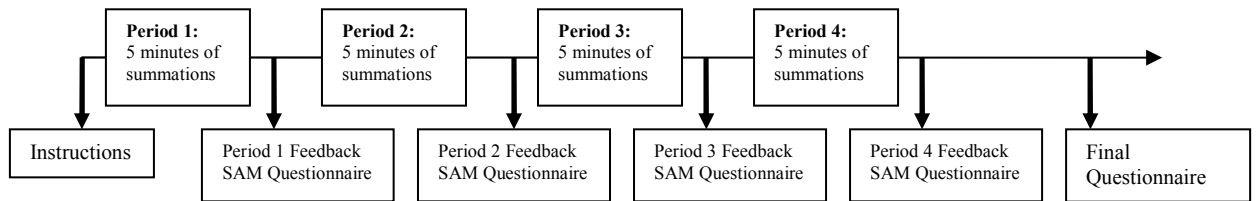
Figure 2. Self-Assessment Manikin (SAM)

Panel A: Happiness

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
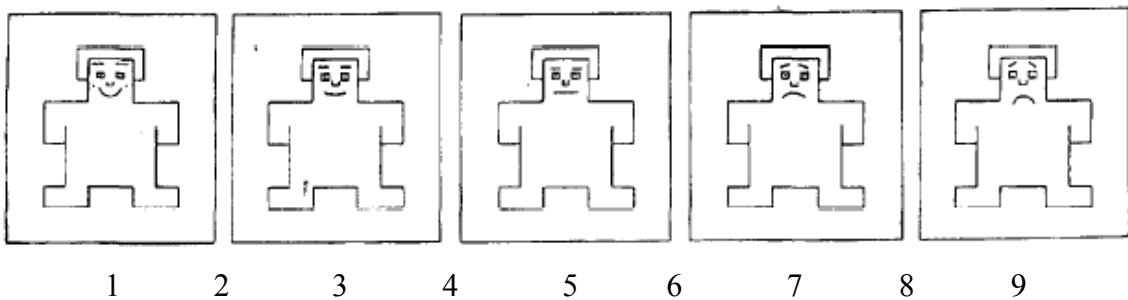
Note: 1 represents feeling "happy, pleased, satisfied, contented, hopeful, relaxed" and 9 represents feeling "unhappy, annoyed, unsatisfied, melancholic, despairing, or bored".

Panel B: Arousal

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
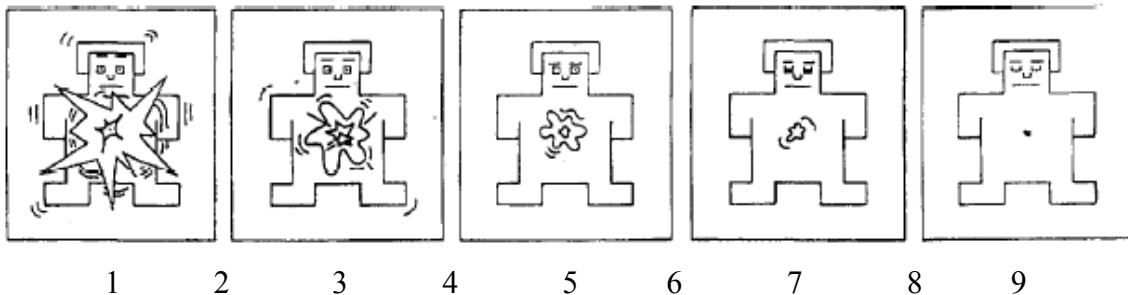
Note: 1 represents feeling "stimulated, excited, frenzied, jittery, wide awake, aroused" and 9 represents feeling "relaxed, calm, sluggish, dull, sleepy, unaroused".

Panel C: Dominance

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
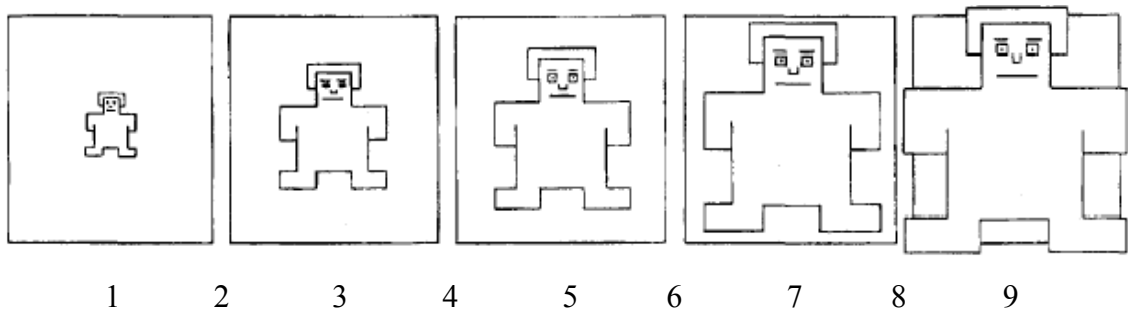
Note: 1 represents feeling "controlled, influenced, cared for, awed, submissive" and 9 represents feeling "controlling, influential, in control, important, dominant".

Figure 3. Average Submitted and Correct Solutions
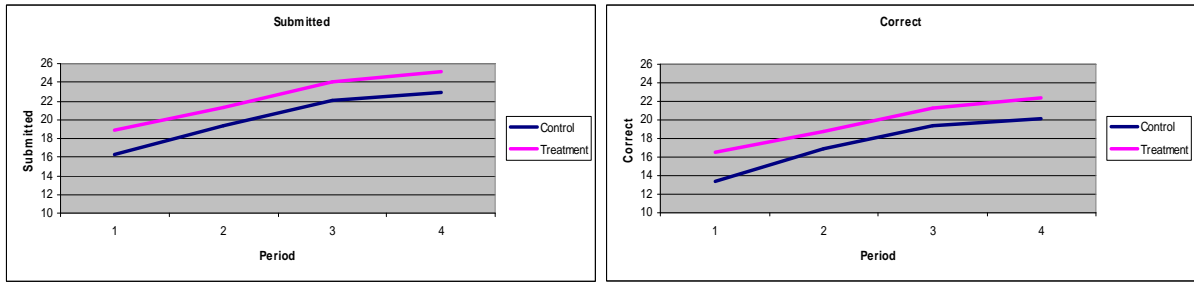
Figure 4. Average Happiness, Arousal and Dominance
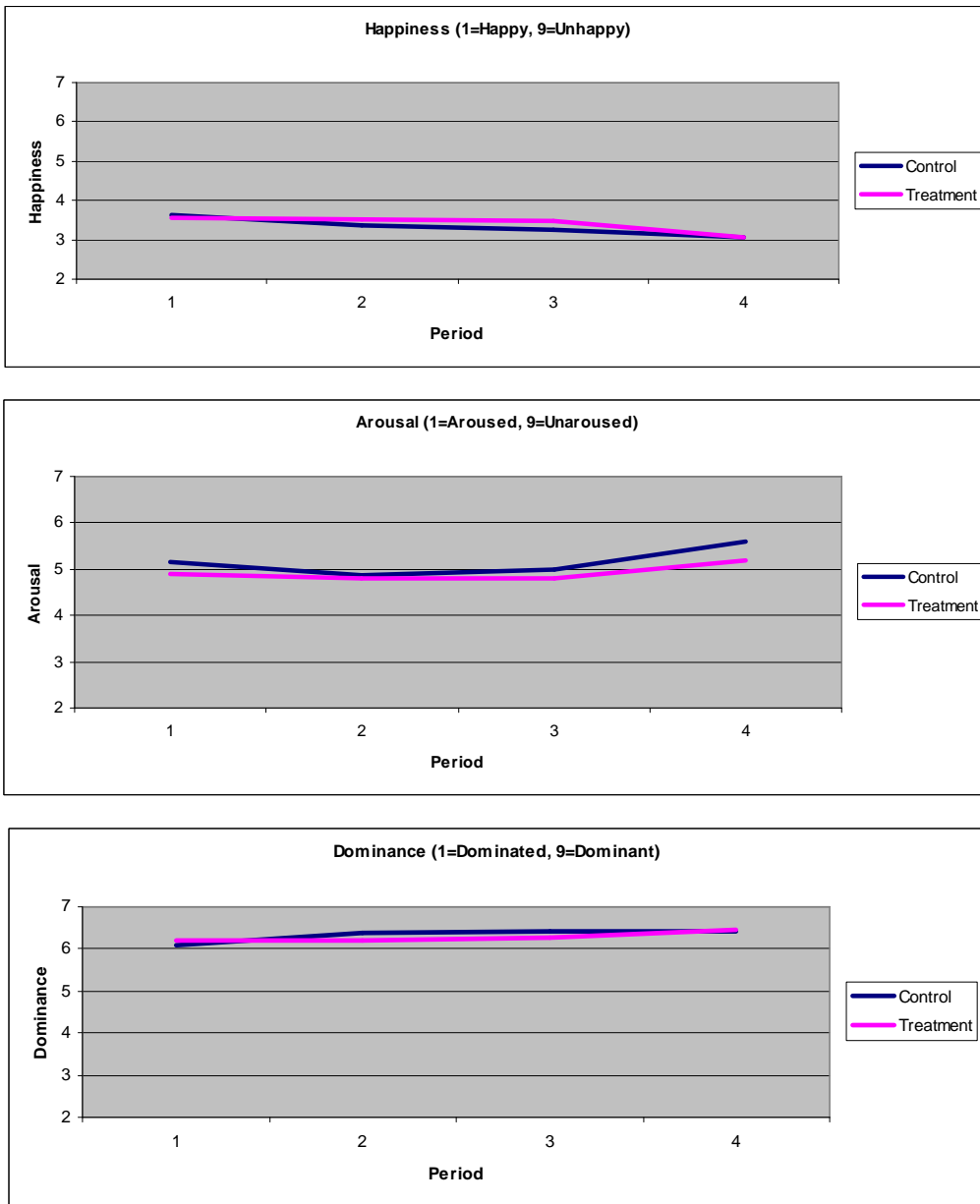
Figure 5. Average Submitted and Correct Solutions for Above and Below
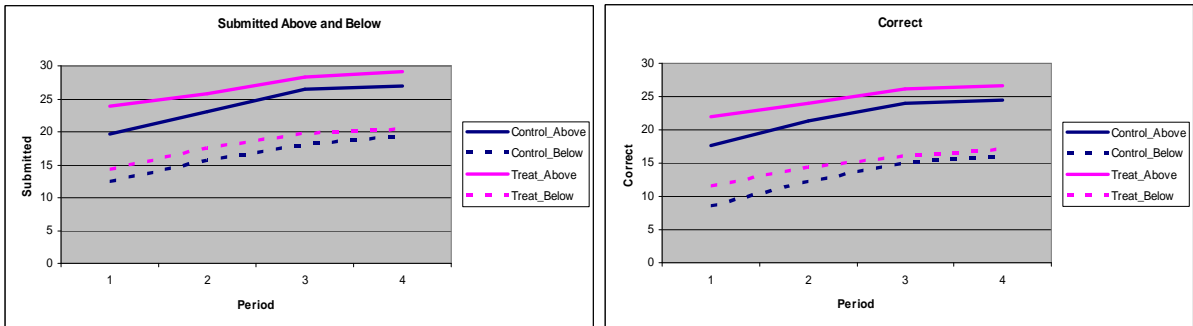
Figure 6. Average Happiness, Arousal and Dominance for Above and Below
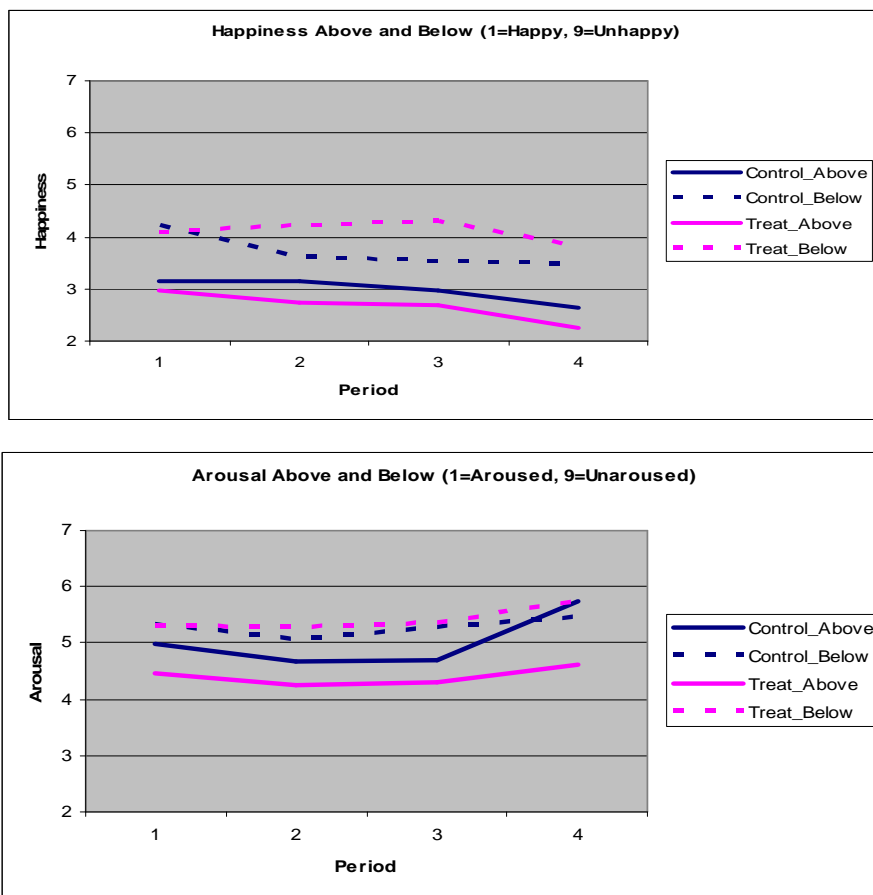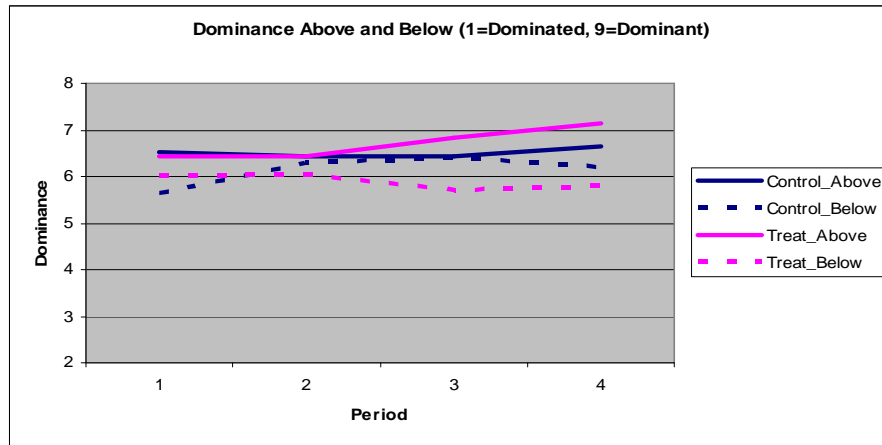
Figure 7: Kernel Distributions
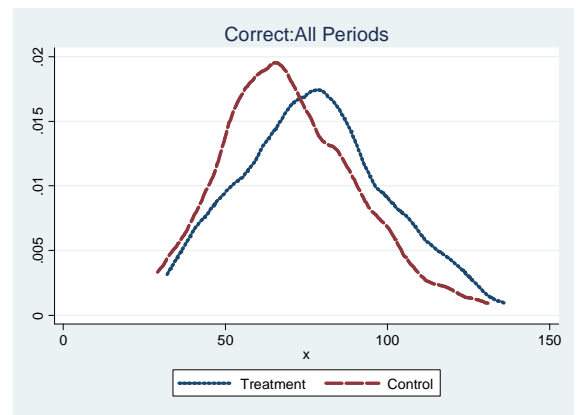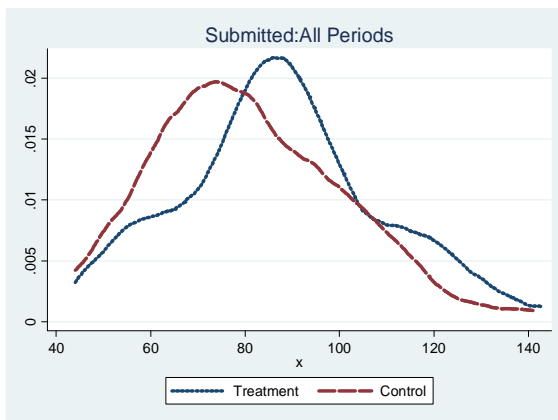
Table 1: Treatment Effect on Performance: Number of Submitted Summations										
	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	ALL	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4
Constant	14.8047*** [0.6487]	16.2375*** [0.6321]	19.4125*** [0.6530]	22.0875*** [0.6505]	22.9375*** [0.6723]	14.1366*** [4.9005]	16.6414*** [4.9700]	19.2984*** [5.1468]	22.9889*** [5.1619]	18.8939*** [5.3940]
Treatment	**2.0469** [0.8711]**	**2.6250*** [0.8939]**	**1.8750** [0.9235]**	**1.9750** [0.9200]**	**1.7125* [0.9508]**	**2.0143** [0.9222]**	**2.5503*** [0.9361]**	**1.8141* [0.9694]**	**1.9538** [0.9722]**	**1.7391* [1.0159]**
Period	2.1456*** [0.0815]					2.1276*** [0.0833]				
Girl						0.3718 [0.9569]	0.4096 [0.9714]	1.054 [1.0059]	0.0454 [1.0089]	-0.0218 [1.0542]
Foreign						-0.148 [2.0569]	-0.0811 [2.0880]	0.0169 [2.1623]	0.2709 [2.1686]	-0.7988 [2.2661]
Age						-0.0503 [0.2180]	-0.1112 [0.2213]	-0.1128 [0.2292]	-0.1135 [0.2299]	0.1364 [0.2402]
Science_Degree						0.1751 [0.9785]	0.0073 [0.9932]	0.4377 [1.0286]	-0.1891 [1.0316]	0.4444 [1.0780]
Math_Test						2.0677* [1.1971]	2.3797* [1.2152]	2.2962* [1.2584]	2.1243* [1.2621]	1.4706 [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: 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*** [0.6853]	13.3875*** [0.6909]	16.8625*** [0.6910]	19.3750*** [0.6867]	20.1000*** [0.6950]	11.5499** [5.1087]	12.1676** [5.4980]	16.3306*** [5.4754]	21.5645*** [5.4741]	16.3278*** [5.6040]
Treatment	**2.1406** [0.9023]**	**3.1250*** [0.9770]**	**1.9500** [0.9772]**	**1.8625* [0.9712]**	**1.625 [0.9829]**	**2.1354** [0.9610]**	**3.1863*** [1.0355]**	**1.8396* [1.0313]**	**1.8368* [1.0310]**	**1.679 [1.0555]**
Period	2.0356*** [0.1000]					2.0191*** [0.1034]				
Girl						0.5525 [0.9972]	0.7837 [1.0745]	1.237 [1.0701]	0.3527 [1.0699]	-0.1634 [1.0953]
Foreign						0.3086 [2.1435]	-0.1819 [2.3098]	0.9881 [2.3003]	0.6244 [2.2998]	-0.1962 [2.3543]
Age						-0.048 [0.2272]	-0.0433 [0.2448]	-0.102 [0.2438]	-0.1801 [0.2438]	0.1335 [0.2496]
Science_Degree						0.236 [1.0196]	0.0655 [1.0987]	0.4852 [1.0942]	0.3875 [1.0940]	0.0056 [1.1199]
Math_Test						1.8632 [1.2475]	2.1648 [1.3443]	2.2689* [1.3387]	1.5963 [1.3384]	1.4226 [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										
	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]**
Girl	**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]**
GirlxTreatment	**-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						
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 (BOYS)**			**Correct (BOYS)**		
	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 (GIRLS)**			**Correct (GIRLS)**		
	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.

	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	5.0025***	4.9131***	4.9200***	5.5340***	5.1113***	5.7119***	6.1653***	5.9647***	6.7070***	6.5070***	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				

Table 5a: Treatment Effect on Affective Response: Happiness, Arousal, Dominance

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 most happy and 9 represents the least happy. *Arousal* takes values 1 to 9, where 1 represents most aroused and 9 represents the least 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: 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	5.2163***	5.8573***	5.0674***	5.0999***	5.2318***	9.3035***	11.1634***	9.0771***	9.7785***	9.8973***	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]				
Girl	-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 most happy and 9 represents the least happy. *Arousal* takes values 1 to 9, where 1 represents most aroused and 9 represents the least 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".

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	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	5.1063***	5.1699***	4.9434***	5.7348***	5.0188***	5.8183***	6.1065***	6.1372***	6.8058***	6.6722***	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]**
Girl	**-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]**
GirlxTreatment	**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
Number of subject	160					160					160				

Table 6: Gender Differences on the Treatment Effect on Affective Response: Happiness, Arousal, Dominance

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 most happy and 9 represents the least happy. *Arousal* takes values 1 to 9, where 1 represents most aroused and 9 represents the least aroused. *Dominance* takes values 1 to 9, where 1 represents least dominant and 9 represents the most dominant.

	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	3.7435***	3.8384***	4.3052***	3.5200***	4.8641***	4.6168***	3.6946***	5.5200***	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	

Table 7: Feedback Content on the Treatment Effect on Affective Response: Happiness, Arousal, Dominance

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 most happy and 9 represents the least happy. *Arousal* takes values 1 to 9, where 1 represents most aroused and 9 represents the least 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.

Appendix

Instructions and the questionnaire were identical for the two 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:

<div align="center">

12
59
40
25

[   ]

OK

</div>

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 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?*