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ABSTRACT

Redesigning Teams and Incentives in a Merger: An Experiment with Managers and Students*

After a merger, company officials face the challenge of making compensation schemes uniform and of redesigning teams with managers from companies with different incentives, work habits and recruiting methods. In this paper, we investigate the relationship between executive pay and performance after a merger by dissociating the respective influence of shifts, which occur in both compensation incentives and team composition. The results of a real effort experiment conducted with managers within a large pharmaceutical company not only show that changes in compensation incentives affect performance but also suggest that the sorting effect of incentives in the previous companies impact cooperation and efficiency after the merger. Replicating this experiment with students showed differences in strategy rather than in substance between the two groups of subjects with managers appearing performance driven while students are more cost driven.

JEL Classification: C81, C92, J33, M52

Keywords: executive and team-based compensation, subject pool effects, real effort experiment, incentives, sorting, mergers

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1. Introduction

There is strong evidence of the existence of extensive heterogeneity among the compensation packages applied by firms within the same industry (Hermalin and Wallace, 2001). It is not surprising to find that after a merger, difficulties can arise because of the different compensation policies of the newly merged firms and that new consolidated policies need to be designed. Furthermore, downsizing and the reorganization of production entail a reshuffling of teams and headquarters, which affect executives from the companies involved in the merger. In order to promote internal social cohesion and enhance the performance of groups within the new entity, mergers usually lead to the harmonization of company statutes so that all executives are paid according to the same compensation schemes. But within new teams comprised of executives of the merged companies, performance also depends on the willingness of individuals to cooperate with other teams members. This willingness to cooperate may be affected by the heterogeneity of past compensation practices, work habits and non-market interactions.

There are many pitfalls, which can hamper an empirical analysis of the relationship between new executive pay packages and executive performance after a merger. The lingering importance of past compensation schemes is a case in point (see Nalbantian and Schotter, 1997). The impact of new compensation packages may differ from one employee to another depending on the short, medium and long-term influence of preceding modes of compensation. Thus, assessing the impact of new compensation schemes on executive performance after a merger requires controlling for the possibility of the long-term impacts of the compensation packages used before the merger. Furthermore, unbiased estimates of

the relationship between pay and performance require disentangling the effects of shifts in direct incentives from the effects of the emergence of a new group culture founded on a variety of previous corporate cultures (Kreps, 1990). Individuals coming from a variety of previous corporate cultures, with different norms of fairness and social comparison, could be expected to behave differently in the new company. Previous corporate cultures can affect the efficiency of a new unified compensation policy particularly in the short run. Experimental methods can help in circumventing part of these potential difficulties through the comparison of various treatments in a controlled environment. This point has been successfully made in the context of a merger by Weber and Camerer (2003). In their laboratory with students, these authors have allowed firms to develop a culture (here associated with language) before they merge. They showed that performance decreases following the merger of two laboratory firms because failure in coordination.

In this paper, we design an experiment to analyze the relationship between executive compensation schemes and performance after a merger. A novel feature of the study is to investigate an incentive scheme that combine individual and team incentives. Our laboratory experiment was conducted with 36 managers in the headquarters of a large pharmaceutical company created by the recent merger of two companies, one French and one German. It was replicated with 72 students of ITECH (Institut Textile Chimique) - Lyon (France) and HEC (Hautes Études Commerciales) - Montreal (Canada). Thus, our paper will also contribute to the growing literature on subject pool effects by comparing decisions made by student-subjects and manager-subjects. Previous studies by Dyer, Kagel and Levin (1989), and Carpenter, Burks and Verhoogen (2003) have underlined differences

(risk attitudes, fairness) and similarities (winner's curse) across subject pools. Hannan, Kagel and Moser (2002) show that MBA effort levels are significantly greater than those of undergraduates students and Fehr and List (2002) observe that CEO's exhibit more trustful behavior. How can one explain that in some games expertise seems to influence behavior whereas in others it has no significant influence? Analyzing the ratchet effect, Cooper, Kagel, Lo and Gu (1999) emphasize the relationship between context and expertise. Their findings show that expertise can improve the relative efficiency of manager-subjects in experiments, only when managers are able to recognize the similarity between the laboratory context and their field experience. Hannan et al. (2002) also attribute differences in results to context effects in conjunction with past work experience. Carpenter et al (2003) emphasize the framing interactions in Dictator Games. In our experiment, we could expect that conducting the experiment within the company context and performing an abstract task, which reproduces important characteristics of executive teamwork, should induce a greater level of performance from managers than from student-subjects. Our paper is also innovative since it examines potential subject-pool effects in the context of team effort with individual and team rewards.

The task required of participants consisted of searching for the highest value of a multiple-peaked function in a two-dimensional space. This task has a cognitive component since, intense concentration is required because of uncertainty and time pressure and there is a monetary cost linked to the chosen speed of progression. This real-effort experiment conducted with managers and students adds to the limited number of experimental papers (Dickinson, 1999, Sillamaa, 1999, van Dijk, Sonnemans and van Winden, 2001, Falk and

Ichino, 2003, Gneezy, Niederle and Rustichini, 2003)), which study rewards and team cooperation in a real work setting. Many experiments, which require subjects to choose an effort level or a contribution level, are not related to the production of a real effort (Bull, Schotter and Weigelt, 1987; Fehr, Gächter and Kirchsteiger, 1997; Güth, Königstein, Kovacs and Zala-Meso, 2001; Nalbantian and Schotter, 1997, Schotter 1998). These studies confirm that monetary incentives do matter, but lack postulates concerning the equivalence between intention of contribution and effort, and between disutility of effort and money. Real task experiments allow the direct measurement of the impact of incentives on actual effort level in a controlled environment.

Our experiment on incentives differs from naturally occurring experiments (for example, Lazear, 2000) or field experiments (Erev, Bornstein and Galili, 1993; Shearer, 2001) in which subjects have to perform a task in a real work environment. It is original in that it is a laboratory experiment encompassing some the characteristics of a field experiment. In our study, manager-subjects undertake tasks, which reproduce aspects of a manager's job under a familiar structure of incentives. Managers make their decisions in an artificial environment of anonymous interactions, according to instructions using neutral wording and without field referents. This work falls into the "synthetic field experiment" category according to the Harrison and List (2003)'s taxonomy. Our experimental design involves two parts: in the first part, teams are homogeneous and are paid according to the rules in effect before the merger of the pharmaceutical firms. In the second part, the teams remain homogenous or are formed randomly with participants originating from each of the two merged companies or from both schools; all are paid according to the rules in use after the

merger. These treatments are aimed at disentangling the effect of the shift in team composition and the impact of the shift in incentive schemes.

Our main results indicate that there is a pure effect on performance of the shift in incentives after the merger. They show that the past matters in as much as some managers reduce their effort when they are potentially mixed with managers from the other incoming firm. This may be the result of sorting effect of previous incentives schemes: paying executives under different rules has probably contributed to the creation of attitudes towards cooperation in teams. Lastly, we find evidence that manager-subjects and student-subjects differ more in strategy than in substance, with managers being more to the maximization of performance oriented while students focus more on cost minimization.

The remainder of the paper is organized as follows: In Section 2, the design of the real effort experiment is outlined. In Section 3, we present the experimental procedures. The econometric estimations and the empirical results are presented and discussed in Section 4. In Section 5, we summarize and conclude.

2. Experimental Design

The experiment consists of two parts. In the first part, it reconstitutes the pay structure of firms X and Y before they merge. In the second part, the pay structure prevailing in the merger is replicated. The nature of the task to be performed during the experiment remains the same, thus allowing an analysis of the consequences on performance of both changes in the payment structure and of team composition. In this section, we present the design of the task performed by the participants, the structure of payment schemes, the experimental

treatments that were applied and the information made available to subjects during the experiment.

2.1. Task Design and Behavioral Heuristics

One original aspect of this experiment lies in the design of the task. Effort must be elicited by means of a task, which mimics some aspects of the content of a manager's job (concentration, variability, adjustment of means to targets and ability to cope with uncertainty under time pressure). The task requires cost-based effort, with more effort entailing extra cost. While the task must avoid boredom, it must be neither too complex nor so ludic to limit the uncontrolled differences in abilities between subjects. The challenge is to be able to discriminate the impact of effort on the outcome from that of ability. For example, if subjects have been asked to solve games or puzzles, a high score may derive less from effort than from expertise for those who are used to playing videogames; if the experimenter cannot control for that difference in ability, the evaluation of effort is biased. In addition, the outcome itself and the related cost of effort have to be directly measurable by the subjects themselves.

The task consists in searching for the highest value of an increasing function built from successive cubic Bezier curves in a two-dimensional space defined vertically by height (H) and horizontally by distance (D) from the origin, with $H \in [0,100], D \in [0,300]$ and with $H^{Max} = f(D)$. It is common knowledge that the curve can have single or multiple peaks. When the period starts, the box in which the curve will appear is fully black. During a one-minute period, the subject progressively uncovers the curve on his computer screen starting at the origin, by clicking a button repeatedly or continuously (see Fig.1). The subject

discovers the curve by discrete steps on the horizontal axis. Subjects can stop their progression at any moment. The curve and its surface become visible as the subject progresses. The outcome achieved by a subject in a period is given by the maximum height reached on the curve, which depends notably on the number of moves.

[Insert figure 1 about here]

The monetary cost associated with the effort is represented by the choice of the speed of progression, i.e. the work pace. Parameters are chosen so that it is impossible to reach maximum height during the one-minute period allowed by using the regular speed only, with the exception of one of the 13 randomly occurring curves. The subjects do not know this information. Two buttons are available to the subject: a "1-step button" used to uncover the curves at one step (regular) speed and is cost free in terms of points; a "2-step button" that doubles the steps (speed) but which costs 0.4 points. The subject can switch speeds at will. This design allows a control over the subject's effort cost and makes possible an analysis of efficiency.

A subject's outcome depends on the use of two-step moves and on chance since there is uncertainty about the distances from the origins to the peaks. Therefore, the cognitive dimension of the task partly relates to the uncertainty about the shape of the curve, partly to time pressure and partly to the subject's decision to use the 1-step or 2-step button.

Unlike other real-effort experiment such as van Dijk, Sonnemans and van Winden's (2001), in which the subject can discover a single peak of a three-dimension convex by using the gradient method successively following two dimensions, our experiment involves no algorithm enabling the discovery of a peak at minimum cost while under time constrains. In our experiment no one benefits from previous learning. Each participant must develop and

try a heuristic in order to reach the highest peak. As a consequence, the task has a cognitive component since the subject cannot discover one single algorithm but must build heuristic grounded on a continuous trade-off between the speed to choose and the time left to reach the highest peak on the curve. For example, if a subject has already used many extra cost moves to hasten progression and the curve remains flat, paying each additional two-step move requires a continuous trade-off between its marginal cost and its expected marginal revenue.

Compared to a traditional experiment where effort values are chosen from a payoff table with a unique trade-off between cost and outcome per period, our task involves an unknown optimal way of reaching the maximum height at a minimum cost since subjects do not know the locations of peaks on the curves. As a technical consequence, the optimal behavior does not exist, in particular because the property of duality is not checked: the minimization of cost of effort does not correspond to the maximization of the objective. The multiplicity of heuristics is at the origin of the impossibility of characterizing an equilibrium behavior in the subjects. Uncertainty concerning the distances from the origins to the local peaks prevents any theoretical prediction.

2.2. Payment schemes

Another point of originality with this experiment is in the design of compensation schemes that combine fixed pay and performance-pay, the latter involving both individual and team incentives. Most experiments consider either one or the other payment schemes.

The game involves teams consisting of three subjects who have to uncover the same curve. Subjects are not allowed to communicate with teammates and are not informed of the

simultaneous progression of their teammates. Each subject has to perform the task on her own but payoffs depend on both individual and collective outcomes. Individual earnings from a task in a given period are calculated from the sum of three elements whose amount and relative proportion depend on the stage of the game and on the treatment. Specifically, earnings are defined as: $\pi_{\alpha i} = F_\alpha + I_\alpha + T_\alpha$, with $\alpha = \{X, Y\}$. X and Y correspond to the two firms before they merge, and for simplicity X and Y subjects keep their respective labels after the merger in order to track their origin.

- F_α is a fixed-wage earned by subject *i* when her individual outcome reaches a first threshold, $H_1^{\min}$, defined by the height reached. This threshold can always be achieved with no cost steps in the time allowed, but this information is not given to subjects. An employer would consider an effort level below this benchmark as professional misconduct.
- I_α is an individual bonus earned if *i*'s outcome reaches a second threshold, $H_2^{\min}$ with $H_2^{\min} > H_1^{\min}$.
- T_α is a team reward obtained when the sum of individual outcomes by the team of 3 subjects reaches a third threshold $H_3^{\min}$ with $H_3^{\min} > 3H_2^{\min} > 3H_1^{\min}$. In contrast with the two former elements, a subject may earn this reward even though she does not contribute an effort greater than the effort giving her the fixed wage or the individual bonus. This situation creates an incentive to free ride by members of the team.

At each repetition of the game, a new curve is randomly drawn, whose shape determines the extent of uncertainty faced by the subjects. The analysis of performance and costs must control for the degree of difficulty of the curves. Because of the structure of the compensation package, the difficulty of a curve depends on the location of the various thresholds. An index of difficulty is calculated as : $d = (D_1)^2 + (D_2 - D_1)^2 + (D_3 - D_2)$ with D_1 being the abscissa at the origin of the first threshold, D_2 the abscissa of the second threshold and D_3 the abscissa of the maximum height. The more distant the first threshold is from the origin and the greater the distance between the first and the second thresholds, the more difficult it becomes to reach additional rewards.

2.3. Experimental Treatments and Information Conditions

The experiment aims at identifying the separate influences of changes in incentives and in team composition. To measure the impact of changes in payment schemes after the merger, an experimental session was designed having two parts of 10 periods each, with a random order of presentation of 13 payoff curves. In the first part, used as a benchmark, we reproduce initial payment schemes that were used before the merger; in the second part the payment scheme in use after the merger is applied. In the first part, we team X and Y subjects separately, each playing under the payment scheme used in their initial company. Members of X teams may receive a fixed wage, an individual bonus and a team reward. Earnings for members of Y teams are derived from a fixed wage and a team reward only (see Table 1). The proportion of potential total earnings from the fixed wage is higher for Y subjects than for X subjects, but the same performance is required from all subjects to

trigger their fixed payment and team reward. In the second part of the session, the payment scheme is the one actually used after the merger and is the same for all subjects. It includes a fixed wage, an individual bonus and a team reward. Compared to the first part, Y subjects may now receive an individual bonus and X subjects have seen an increase in the value of their fixed wage. In avoiding a decrease in the absolute level of any pay component of earnings between the two parts of the session, the maximum earnings all subjects can obtain is now 120 ECU (Experimental Currency Units) instead of 100. The comparison of the performance achieved in the two parts of the experimental session enables us to identify the influence of changes in monetary incentives.

To measure the impact of team composition on performance, a new matching treatment was introduced in two experimental sessions. This new treatment is referred as the mixed-treatment, where teams of 3 randomly associated subjects are formed potentially involving both X and Y subjects. The fixed-treatment used in the first part of all sessions, where X and Y subjects are teamed exclusively with X and Y subjects, respectively, is maintained in the second part in one session. The fixed-treatment serves as a benchmark against which the effect of team composition after the merger can be tested. In all sessions, a strangers matching protocol is used. It should be noted that in the second part of the session, only team composition is changed and not the size of the teams (the negative impact on efficiency of the increasing size of teams in a merger has already been documented by Camerer and Knez, 1994).

[Insert Table 1 about here]

All subjects, except those playing the fixed treatment, knew of the existence of two categories of subjects in equal numbers in the room, but they were kept unaware of the

meaning of labels X and Y in order to avoid bias. Subjects learned their own identity by reading the instruction sheet. They were notified that they would keep the same identity throughout the session. The instruction sheet for the first 10 periods also mentioned that they were matched with two other subjects belonging to the same category as themselves and that the composition of groups would within the same category change with each new period. They were informed that they would never know the identity and the payoff of their successive teammates.

Subjects knew the description of the task to be performed and the payoff structure applicable to their category. They were not given information about the payoff structure of the other category of subjects. They were aware that the same task was to be achieved by the three members of their group, but they had no current information about the progression of their teammates on the curve. They were also informed that during play, their screen would indicate the time currently left, the cumulated cost of their 2-step decisions and the height of the different thresholds reached. At the end of each period, a historic table would give each subject feedback on their own outcome, the outcome (cumulative height) achieved by their group, total cost, amount of compensation obtained, by source, and total payoff net of costs.

In the second part of the session, periods 11 to 20, subjects were informed about the payoff structure of the first part for each of the two categories. The new payoff structure common to all subjects was explained. In one experimental session, on equal number of subjects from both categories continued to play under the fixed treatment for periods 11 to 20 as in the first part. In two experimental sessions, subjects drawn in equal numbers from X and Y

were informed that during the remaining 10 rounds they could be matched randomly with members of the other category[i].

3. Experimental Procedures

The experiment was first conducted with managers of the pharmaceutical company about two years after the merger and it was later replicated with students of ITECH (Institut Textile Chimique)- Lyon (France) and HEC (Hautes Études Commerciales) - Montreal (Canada).

The experiment with manager-subjects was funded by the Human Resources Department of the new company. This Department recruited executives by emailing a message on voluntary participation in a scientific experiment to be conducted by researchers from the National Center for Scientific Research. A sample of 36 volunteer executives with average annual earnings of 69,000 euros was created, consisting of 18 managers from each incoming firm. To limit uncontrolled peer group effects, sessions were designed such that the participants represented a large diversity of departments and came from different geographical locations[ii]. This procedure suggests that most people did not know other session participants.

The experiment was conducted at company headquarters in Paris. All sessions were held on the same day to limit the dissemination of information. Managers left the premises rapidly after completion of a session, and thus did not meet participants of subsequent experimental sessions. In the first two sessions, 12 participants (6X, 6Y) were subjected to the mixed-treatment protocol (non homogeneous teams for periods 11-20). In a third session, 12 participants played under the fixed-treatment protocol (homogeneous teams for all 20

periods). On average, a session lasted 75 minutes including initial instructions and practice periods. The experiment was computerized using the REGATE program.

Running the experiment with managers required higher payoffs than with traditional student pools. Transactions were conducted in Experimental Currency Units, with ECU convertible to Euros at the rate 150 ECU = 4.5 €. A show-up fee of 8 € was added. On average, a subject earned 51.45 € (S.D.=3.75). Subjects were paid a few days later with vouchers.

Upon arrival, each manager had to register and was invited to draw a ticket from an envelope to assign him or her a computer. In fact, company specific envelopes were presented to subjects according to their originating company, but subjects were unaware of this allocation rule. At the beginning of the experiment, subjects discovered a set of written instructions for the first part of the session under their keyboard. As the payment schemes differed among X and Y participants, the experimenter did not read the instructions aloud (available upon request)[iii]. Instructions were phrased in neutral terms (we spoke about a curve, a group, a payoff, an outcome, and we avoided loaded terms such as effort, contribution and wage). Participants were allowed to ask questions, which were answered in private. Three practice rounds were then run before the first part of the experiment began. At the end of the first part, the game stopped and further instructions for the second part were distributed, without any questions allowed.

This experiment was replicated with 72 student subjects, in the experimental laboratories of Groupe d'Analyse et de Théorie Economique (GATE, Lyon, France) and at the laboratory (LUBC3E) of the Center for Interuniversity Research and ANalysis on Organizations (CIRANO, Montreal, Canada). Three sessions were organized over two days. The two

mixed-treatment sessions were played on-line, the REGATE software enabling the on-line reshuffling of groups between Montreal and Lyon subjects with all computers linked to a server located at GATE. During each mixed-treatment session, 12 French subjects and 12 Canadian subjects interacted as subjects X and Y without being informed that they were playing with subjects abroad. The third session, (fixed-treatment) was conducted independently in France and in Canada, involving 12 students at each location.

Sessions were conducted under the same conditions as sessions with manager-subjects, except that the ECU were convertible at the rate 150 ECU = 1 Euro for the French subjects and at the rate 150 ECU = 1.5 Canadian Dollars for the Canadian subjects. A show-up fee of 4 Euros or 6 Canadian Dollars was added. On average, a subject earned 12.89 € (S.D.=0.80 €). Subjects were immediately paid in cash in a separate room.

4. Experimental results

4.1. Overall statistics

In Figures 2, 3 and 4, we present histograms of average effort level, average rate of free-riders and average return to effort, plotted against treatment, subject pool and the group of periods of the experiment (1-10 or 11-20). Figure 2 shows that the reaction to incentives differs according to the subject pools: the average effort level is higher for managers than for students throughout the experiment. For the managers, level of effort increases in the second part of the experiment under the merged company's compensation package. This increase in effort levels is particularly noticeable in the fixed treatment sessions, where the only change introduced relates to the increase in monetary incentives; when both incentives

and team composition are changed, the increase in managers' average level of effort is not significant.

[Insert Figures 2, 3 and 4 about here]

These different levels of effort may be related to differences in the proportion of free riders in the two pools. Because of the team reward in the payment scheme, our experiment can be connected with the Voluntary Contributions Mechanism (VCM). It is interesting to verify whether the co-existence of a fixed wage, an individual bonus and a team reward in the same compensation scheme changes the behavior towards cooperation within a group as typically observed in public good games. In both cases, we can measure the extent of group-interested behavior in identifying the proportion of free riders. Transposing the strict definition of a free rider in the VCM to our experiment means that a free rider is here defined in the following way. In part 1 (i.e. periods 1 to 10), X is qualified as a free rider in period t when a subject's level of effort is ≤ 60, i.e. when the subject does not contribute to the team outcome beyond the level that triggers her individual bonus. The same condition applies for part 2 (i.e. periods 11 to 20). In part 1, Y is qualified as a free-rider when her effort in period t is ≤ 40, i.e. when she does not contribute to the team outcome beyond the level that secures her fixed wage, and in part 2 when her effort in period t is ≤ 60. In a typical public goods game, whereas each subject has a dominant strategy not to contribute to the group account, the level of contribution is initially positive and declines with repetition (see Ledyard, 1995, for a survey of previous studies). Figure 3 shows the rate of free riders by subject-pool and by treatment for parts 1 and 2 of the experiment. It indicates that there is a low proportion of free-riders compared to traditional results of public good

games (see Keser and van Winden, 2000), probably because of both the coexistence of individual and collective payments and the impossibility of calculating the marginal per capita return of investing in the team outcome. The proportion of free riders is lower among managers than among students in both part 1 and part 2. This proportion is lower when the threshold that triggers the greater individual reward is low. It increases in part 2 in both subject pools, particularly in the mixed sessions, and this cannot be explained by a restart effect at the 11^{th} period of the game as will be shown later. This is in line with the declining cooperation over time usually found in public goods experiments and could be compared with the differences observed between stranger- and partner-matching protocols (see Croson, 1996, and Keser and van Winden, 2000).

Figure 4 displays the average return to effort, i.e. the average effort level divided by the average cost level. On average, managers achieve a lower level of efficiency than students. The former perform a greater effort but at a higher cost. In part 2, the average level of efficiency rises slightly in both subject pools.

However, overall statistics are uncontrolled for time, difficulty of the curves and individual effects. Regression analyses controlling for these dimensions are thus required to identify the determinants of two endogenous variables: effort levels and costs. In Table 2, we present the definition and descriptive statistics of variables used in these regressions.

[Insert Table2 about here]

Exogenous variables are the period, the category of subjects, the mode of compensation, the composition of groups (either fixed or mixed) and an index of difficulty for each curve. The "lagged effort level of the other group members" variable assesses whether subjects modulate their efforts to what their teammates did in the previous period.

Interaction variables involving the Y subjects are created to test whether X and Y subjects behave differently during the two parts of the experiment. They reflect many situations captured in forthcoming regressions. Coefficient estimates of the variable "mode of compensation in part 1" report the decisions of the X subjects in part 1 relative to their decisions under the mode of compensation in part 2 (element of the constant term). With the coefficients of the "mixed session" variable, we further distinguish the decisions of the X subjects in the mixed sessions of part 2 relative to the fixed sessions of part 2. The decisions of the Y subjects in part 1 are the sum of the coefficients of the variables "Y subject", "mode of compensation in part 1" and "Y subject and mode of compensation in part 1". This last variable is needed as the modes of compensation differ in part 1 between X and Y subjects. Summing-up, coefficient estimates of variables "Y subject", "mixed session" and "Y subject and mixed session" give the decisions of Y subjects in the mixed sessions in part 2. The coefficient of the "Y subject" variable shows the decisions of "Y subjects" in the fixed sessions in part 2.

The index of difficulty and the period variables enter regressions with interacting variables and nonlinear forms. Instead of including a dummy for each period to control for the time effect, we distinguish the variable "logarithm of the period" from the "periods 1 to 20" variable in order to separate two potentially adverse effects. While the former may account for elements such as boredom that could push effort down over time, the latter may account for learning of the task that could increase effort over time. Lastly, demographic variables such as gender and age were entered to control for their potential impact but since none proved to be significant, they were subsequently removed.

4.2 Econometric results

Column 1 of Tables 3 and 3a display the results for the students and managers, respectively, from a linear one-way random effects model on the subjects' effort levels[iv].Column 2 of both tables report the results on the determinants of cost levels decided by the subjects. The cost incurred corresponds to the number of occasion the 2-steps button was used to perform the task. The econometric estimates are also obtained with a linear one-way random effects model.

[Insert Tables 3 and 3a about here]

For the students considered as a benchmark, few variables significantly influence effort levels, except periods and the difficulty of the task. In contrast, the cost levels are influenced by more elements. A change in monetary incentives in the second part of the experiment (a higher maximum pay and a new structure of compensation) makes students react by increasing their cost levels but not their effort. An increase in the effort levels of their teammates during the preceding period incites them to increase their costs, particularly for the X subjects. Lastly, costs decline over time and the relationship between the difficulty of the curves and the costs indicates a reverse U-shape.

In contrast, we observe for managers a significant and substantial increase in effort levels by both X and Y subjects in part 2 relative to part 1. The change in incentives after the merger increases effort levels by almost 12 points. The change in the composition of teams exerts no significant influence on effort. Note however the negative but statistically insignificant coefficient of the interaction variable "Y subject and Mixed": Y subjects, knowing that they may be interacting with X subjects, have a tendency to lower their effort

levels. Despite the stranger-matching protocol, Y subjects are also influenced by the behavior of their teammates in the preceding period: an increase (decrease) in teammate effort levels in the preceding period motivates subjects to increase (decrease) their own level of effort, whereas X subjects are not influenced by their teammates' previous decisions. It should also be noted that, if we observe a negative first period effect on effort levels, there is no restart effect at the 11^{th} period. The difficulty of the curves and the number of periods affect effort levels in a nonlinear way.

The change in composition of the teams in part 2 has no significant impact on decisions relating to effort, however, it exerts a determinant impact on the cost levels chosen by the subjects. Ceteris paribus, X subjects increase their costs in a mixed session by 6.23 units relative to a fixed session, while Y subjects substantially reduce theirs by 8.38 units[v] when they know they may be teamed with X subjects. The relationship between the difficulty of the curves and the costs supported by the subjects indicates a reverse U-shape as with the students. Lastly, there is a positive first period effect on cost levels, but costs decline more linearly as the experiment evolves.

4.3 Discussion

This section will focus on the reactions to the shifts in incentives, in team composition and in the difficulty of the task. Our results provide clear evidence of differences in reactions to a change in monetary incentives between the subject-pools. The new compensation scheme in the second part of the experiment does increase the effort levels of X and Y managers. In contrast, the same monetary incentives, controlling for other variables, incite students to increase not their effort but their costs to accomplish the different tasks imposed on them.

Among managers, Y participants substantially decrease their costs in part 2. Another difference is the reaction to lagged effort levels of the other group members. Y managers increase (decrease) their effort if the effort levels of their previous teammates increase (decrease). Student participants do not adjust their effort levels to that of others but modify their cost levels to the previous effort levels of their group members.

These results show that the change in incentives influences both subject-pools, with managers appearing to be objective driven while students are cost driven. This is not that surprising as managers in their professional life are evaluated, remunerated and promoted by meeting their objectives whatever the cost they must incur to do so (long working hours for example). For most students, a large part of the return of their academic effort is from lowering their cost (time devoted to studying a specific matter) in order to obtain good grades. Note that we were able to observe this kind of results because we used a real cost task with time constraints. If the student-subjects appear to be more money maximizing than managers in the laboratory, this cannot be attributed to the differences in the opportunity costs to participate, since this was taken into account in the conversion rates.

The changing composition of teams also influences the behavior of subjects. Within the same category (X or Y), most subjects are influenced by the behavior of their preceding teammates although teams are reshuffled each period. This might suggest that the subjects refer to their category as a whole. However, the linear one-way effects models used to explain effort and cost levels recognized that subjects are heterogeneous; our results suggest that subject-pools and categories are also heterogeneous. Both X and Y student-subjects are influenced by the effort of the subjects they were previously teamed with but they are not influenced by the merging between categories in the second part of the

experiment; thus, they do not refer to a specific category but to a whole set of subjects in the laboratory. By contrast, after the merger, the decisions of the category of managers who are more sensitive to the efforts of previous teammates (the Y managers) change behavior knowing that they may be interacting with subjects from the other category; they become less cooperative and they substantially reduce their costs and to a lesser degree their effort. On the contrary, X managers who are not influenced by the behavior of previous teammates react positively to the merging of the categories in the same teams. Groups of reference are not the same across subject-pools.

In traditional experimental economics literature, reaction to others' decision is usually characterized by a reciprocity concept (see Fehr and Falk, 2002). Since our experiment is run with randomly re-matched subjects at each period, this can also be explained by learning and conditional cooperation: subjects learn the behavior of other subjects in the same category or in the same room and constantly update their evaluation of the behavior of their potential teammates. But more puzzling is the reaction to the mixing of categories after the merger. Three explanations could be evoked. A first explanation might be that the merger changes the preferences of the subjects by introducing new incentives. This explanation cannot help since we measure the impact of a shift in team composition other things equal, i.e. we control for changes in incentives. The psychological concept of "in-group/out-group" might affect the cooperative behavior of participants (see Tajfel, Flament, Billig and Bundy, 1971). This explanation cannot directly help here since students and managers do not react in the same way. If managers were able to transfer their experience of the merger into the laboratory whereas the students were not able to do so (Canadian students were not aware of interacting with French subjects and vice versa), this

psychological effect might play a role for the managers. But it does not explain why X and Y managers did not react similarly. The last and most convincing explanation refers to a sorting or a selection effect. The incoming companies that merged might differ in recruiting different profiles of managers, then developing different cultures, because of their various incentive schemes. The pre-existence of an individual bonus may contribute to focusing on one's own performance instead on the other's effort. This sorting effect of incentives has been documented by Lazear (2000) in the context of a natural experiment.

The reaction to the difficulty of the task is similar for managers and students. The observed U-shape curve suggests that across all compensation schemes, more difficult tasks may actually elicit, to some extent, more effort by all types of participants. This job challenge effect is present even in the later stages of the experiment (see the "index of difficulty and period" crossed variable). This result is consistent with the psychological literature showing that challenging goals lead to higher performance than easy goals (Locke, Saari, Shaw and Latham, 1981). The job challenge may even be at the initiative of the subject herself (for example if she uses targets like reaching the second peak). These relationships also suggest that the production of effort as a function of the degree of difficulty changes over time: while the logarithm of period (that could be interpreted as boredom or tiredness) exerts a negative effect on the production of effort, the agent reacts more and more to job challenge over time.

The relationship between the difficulty of the curves and the costs supported by all participants indicates a reverse U-shape. If the task is too difficult, subjects increase their efforts but without resorting to costly 2-step moves. This result reinforces our preceding

analysis: an increased difficulty does not discourage effort under the condition that subjects can save on their costs. Lastly, there is a positive first period effect on the cost levels (significant for the managers), but costs decline more linearly as the experiment evolves. This is possibly due to a learning effect on the task, on the other's behavior, and on the best moment to use the costly 2-step moves. Students appear to learn more than managers as they play the game since they not only decrease their costs but also increase their efforts (see variable "Period 1 to 20"). Overall, along with their cost driven strategy, they realize a better average return to effort than managers, as shown earlier.

5. Summary and conclusions

Executive behavior with respect to performance, motivation and cooperation is a major element in the success or failure of a merger between companies. Traditionally, economists have suggested looking for an adapted compensation policy to facilitate cooperation and renewed effort from groups of individuals coming from different corporate cultures. The aim of this paper is to check whether a harmonization of compensation packages is sufficient to motivate all managers to cooperate to the same extent. A laboratory experiment has been run involving managers of two large pharmaceutical companies that recently went through a merger. The experimental design has introduced various compensation schemes, including an incentive scheme combining individual and team incentives that were implemented in the context of a real effort. As in most mergers, these manager-subjects have experienced the redesigning of both compensation schemes and team composition in their newly merged company. The experimental protocol reproduced the pre- and post-merger situation both in terms of compensation and in terms of team

composition. To complement this experiment with managers, a replication with a subject pool consisting of French and Canadian students was conducted that can serve as a benchmark.

The results show that financial incentives do work in improving effort among managers, in accordance with standard results (Prendergast, 1999). However, the unified incentives are not entirely sufficient to create cooperation among heterogeneous groups, as already experimentally observed (Meidinger, Rulliere and Villeval, 2003). The past matters. In contrast with Nalbantian and Schotter (1997), it matters more in terms of shifting team composition than in terms of incentives, since the change from the two pre-merger incentive schemes to the unified one increases effort in the same proportion for both categories of managers. Individuals coming from different corporate cultures, likely with different fairness norms and social comparison behavior, tend to react differently in the mixed treatment part of our experiment. This may result notably from a sorting effect, attributable to various manager selection policies in the originating firms: companies with different incentive policies will probably attract different types of managers. This suggests that shifting team composition may limit, at least in the short run, the efficiency of a new unified compensation policy, if not taken into account. Merging cultures requires more time than merging incentives and deserves special attention. This is probably more accurate in the case of mergers than in the case of other kinds of restructuring policies.

Results from the student-subject pool differ in strategy more than in substance, allowing confirmation of the external validity of laboratory experiments. In contrast to the managers, students react to an increase in monetary incentives by accepting more costs to complete a given task rather than increasing their effort levels. They are cost driven whereas managers

appear to be objective-driven. Being objective-driven means that the managers are also more cooperative and free ride less than the student-subjects. Our results corroborate the interpretation of Cooper et al. (1999) in that when they are able to recognize the similarity between the laboratory context and their field experience, manager-subjects may choose different strategic options than inexperienced subjects. Moreover, it may indicate that if students are more inclined to minimize costs than experts in the laboratory, when one observes the existence of other-regarding preferences in traditional experiments involving student-subjects, one may deduce that this deviation from the equilibrium is likely even more developed in real settings.

Lastly, our experiment shows that introducing a complex task is not necessarily detrimental to more effort and cooperation. The concept of job challenge is perhaps more important to soliciting greater effort among employees than is usually suggested in current literature.

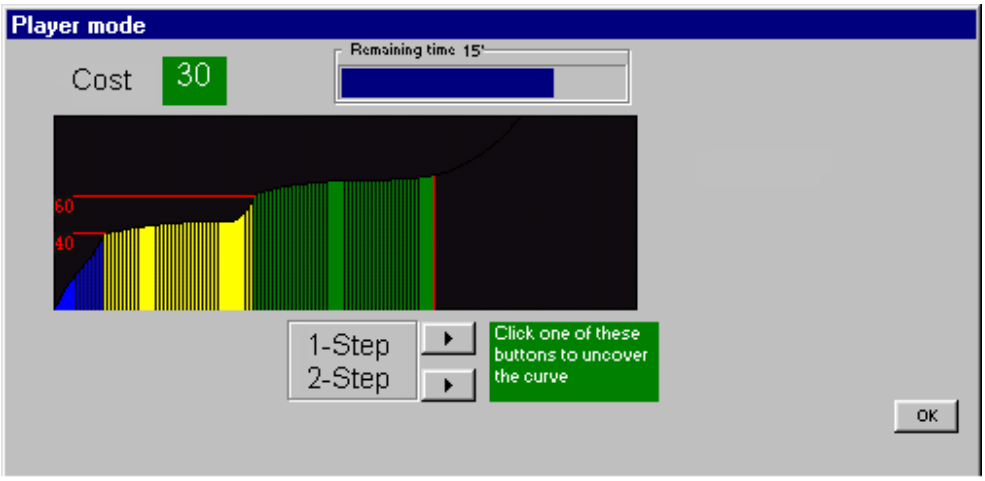

Figure 1. An example of a typical curve

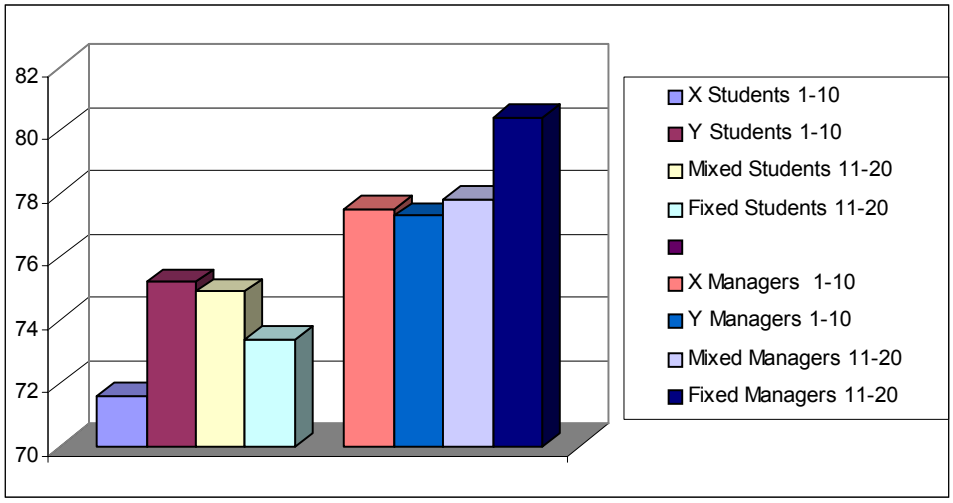

Figure 2. Average effort by subject pool and by treatment

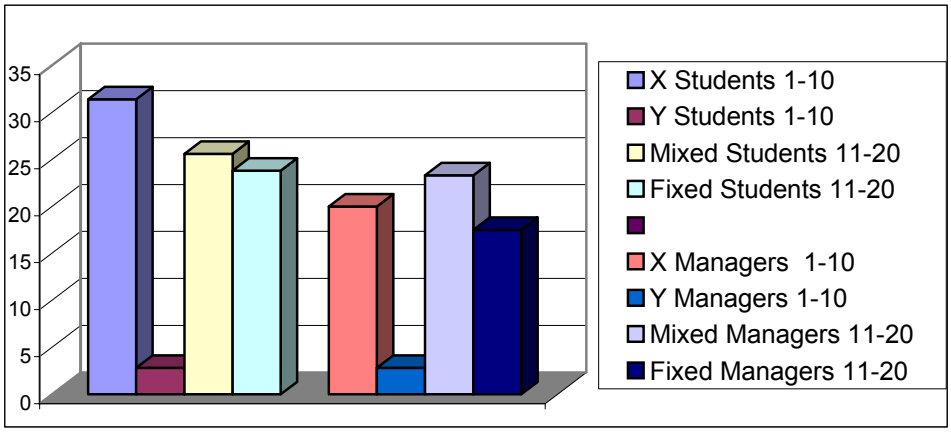

Figure 3. Average proportion of free riders by subject pool and by treatment

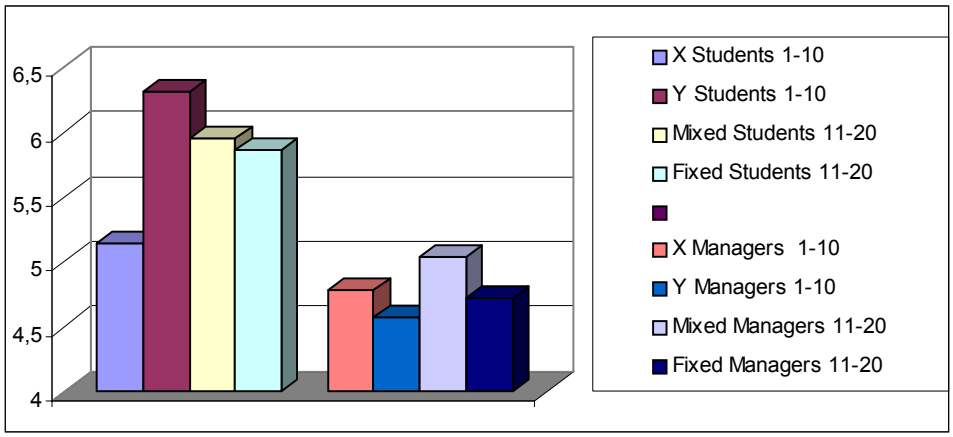

Figure 4. Average return to effort by subject pool and by treatment

Note: The average indices of difficulty of the curves are the following: In the student-sessions, periods 1 to 10: 22 949; periods 11-20 in the mixed treatment: 24 047; periods 11-20 in the fixed sessions: 21 635. In the manager-sessions, periods 1 to 10: 22 949; periods 11-20 in the mixed treatment: 22 339; periods 11-20 in the fixed sessions: 21 635.

Table 1-- Payment schemes in ECU

	Part 1 – All treatments		Part 2 – Fixed treatment		Part 2 – Mixed treatment
Group Composition	Teams of X subjects	Teams of Y subjects	Teams of X subjects	Teams of Y subjects	Teams of X and Y subjects
Height reached					
$H_i < 40$	0	0	0	0	0
$40 \le H_i < 60$	40	60	60	60	60
$60 \le H_i \le 100$	60	60	80	80	80
$\sum_1^3 H_i \ge 240$	100	100	120	120	120

Note: For the teams of X subjects the table should be read as follows. In the first part of the experiment, if a X subject realizes an outcome lower than the first threshold of 40, he receives no payoff. If he reaches a height between the first (40) and the second threshold (60), he receives only a fixed wage of 40 (F_X). If the subject reaches the second threshold, he receives a payoff of 60, consisting of the sum of the fixed wage and the individual bonus ($F_X + I_X$). If the subject's team reaches a cumulated height of 240, the subject receives a payoff of 100, corresponding to the sum of the fixed wage, the individual bonus and the team reward ($F_X + I_X + T_X$). Part 2 and the teams of Y subjects should be interpreted in a similar manner.

Table 2--Variables and descriptive statistics

Variable	Definition	Mean (Standard deviation)	
Endogenous variables		**Managers**	**Students**
Effort level	Effort levels reached by the subjects	78.04 (20.96)	73.9 (20.680)
Cost	Costs of efforts supported by the subjects	16.60 (13.19)	12.75 (11.39)
Exogenous Variables			
1st period effect	1 if the 1st period; 0 otherwise	0.05 0.95	0.05 0.95
11th period effect	1 if the 11th period ; 0 otherwise	0.05 0.95	0.05 0.95
Y subject	1 if the individual is a Y subject; 0 otherwise (X subject)	0.50 0.50	0.50 0.50
Mixed session	1 if X and Y subjects can interact; 0 otherwise	0.33 0.67	0.33 0.67
Mixed session and Y subject	1 if Y is involved in a mixed session; 0 otherwise	0.16 0.84	0.16 0.84
Mode of compensation in part 1	1 if part 1 (periods 1 to 10); 0 if part 2 (periods 11 to 20)	0.50 0.50	0.50 0.50
Mode of compensation in part 1 and Y subject	1 if a Y subject in part 1; 0 otherwise	0.25 0.25	0.25 0.25
Lagged effort levels of the other members of the group	Effort of the other members of the group in the preceding period	154.88* (32.07)	146.49* (34.67)
Lagged effort levels of the other members of the group and Y	Effort of the other members of the group in the preceding period and Y	155.15** (32.37)	147.58** (35.04)
Index of difficulty	Index of difficulty of the curve/100	225.27 (143.10)	230.96 (143.36)
Index of difficulty squared	Index of difficulty squared	71798.18 (72847.8)	73882.02 (72.466.04)
Index of difficulty and period	Interaction of index of difficulty and period	2498.6 (2482.7)	2581.17 (2512.12)
Period	Period number from 1 to 20	10.5	10.5
Logarithm of period	Logarithm of period	2.12	2.12

* 1st and 11th periods excluded. ** For Y subjects only and 1st and 11th periods excluded.

Table 3--Students: determinants of effort levels and costs

Variable	Effort Panel Random*		Cost Panel Random**	
	Coefficient	*t-ratio*	*Coefficient*	*t-ratio*
Constant	**135.9**[a]	**26.5**	**11.3**[a]	**4.21**
1st period	**- 43.09**[a]	**-10.9**	0.671	0.362
11th period	-4.858	-1.46	0.387	0.303
Y subject	3.045	0.858	-1.9608	-0.831
Mixed	-0.7015	-0.324	-1.322	-1.24
Y and Mixed	1.908	0.625	1.912	1.27
Mode of compensation in part 1	-2.740	-1.02	**-5.27**[a]	**-4.10**
Y and mode of compensation in part 1	2.896	1.14	1.410	1.14
Lagged effort levels of other group members	-0.01724	-1.17	**0.02892**[a]	**4.18**
Y and lagged effort levels of other group members	-0.01738	-1.23	**-0.01186**[b]	**-1.79**
Index of difficulty	**-0.3076**[a]	**-24.2**	**0.03958**[a]	**6.63**
Index of difficulty squared	**0.0004981**[a]	**21.6**	**-0.00003859**[a]	**-3.57**
Index of difficulty and period	**0.001846**[a]	**2.73**	**0.0007233**[a]	**2.28**
Periods 1 to 20	**1.0409**[a]	**2.50**	**-0.6201**[a]	**-3.17**
Logarithm of period	**-18.20**[a]	**-7.35**	0.4660	0.968
Adjusted R^2	0.3569		0.163	
Number of observations	1440		1440	

* Linear one-way random effects model. Lagrange multiplier test versus OLS = 433.71 (1 df, prob value = 0.00000).** Linear one-way random effects model. Lagrange multiplier test versus OLS = 2761.10
(1 df, prob value = .000000)
a) significant at 5% level; b) significant at 10% level.

Table 3a--Managers: determinants of effort levels and costs

Variable	Effort Panel Random*		Cost Panel Random**	
	Coefficient	*t-ratio*	*Coefficient*	*t-ratio*
Constant	**125.32**[a]	**13.3**	6.197	1.13
1st period	- 11.80	-1.59	**10.25**[a]	**2.42**
11th period	-1.539	-0.289	0.967	0.318
Y subject	-3.030	-0.526	**8.06**[a]	**2.16**
Mixed	1.500	0.414	**6.23**[a]	**2.83**
Y and Mixed	-7.194	-1.41	**-14.61**[a]	**-4.69**
Mode of compensation in part 1	**-11.791**[a]	**-2.47**	-1.805	-0.653
Y and mode of compensation in part 1	-4.559	-1.04	**-10.09**[a]	**-3.88**
Lagged effort levels of other group members	0.03469	1.251	0.02427	1.53
Y and lagged effort levels of other group members	**0.05420**[a]	**2.33**	0.0195	1.37
Index of difficulty	**-0.2132**[a]	**-9.41**	**0.05503**[a]	**4.27**
Index of difficulty squared	**0.0003381**[a]	**8.37**	**-0.00007559**[a]	**-3.29**
Index of difficulty and period	**0.003394**[a]	**2.82**	**0.001122**[b]	**1.64**
Periods 1 to 20	**-1.354**[b]	**-1.83**	**-1.037**[a]	**-2.47**
Logarithm of period	**-7.768**[b]	**-1.76**	2.799	1.11
Adjusted R^2	0.1562		0.1792	
Number of observations	720		720	

* Linear one-way random effects model. Lagrange multiplier test versus OLS = 12.06 (1 df, prob value = .000515).

** Linear one-way random effects model. Lagrange multiplier test versus OLS = 114.41 (1 df, prob value = .000000).

a) significant at 5% level; b) significant at 10% level.

Notes

[i] It would have been interesting to test whether belonging to the majority category or the minority category of a team would influence individual behavior within teams. However, this would have required collecting a far greater number of observations. For this reason we did not inform subjects about the detailed composition of their teams.

[ii] Overall, participants came from 4 different sites and 22 departments.

[iii] Reading instructions aloud guarantees that rules are common knowledge. However the section of instructions related to different payment schemes of the X and Y subjects must remain unknown until the end of the first part of the session. Reading aloud only other sections of the instructions would have focused undue attention on the question of compensation.

[iv] Let E_{it} measure individual *i*'s level of effort in period *t*, explained by a vector of observable variables z_{it}, the corresponding parameter vector δ, a random individual component η_i and a random variable ε_{it}:

$E_{it} = z_{it}\delta + \varepsilon_{it} + \eta_i, \quad i = 1,\ldots,n, \quad t = 1,\ldots,T$ with the usual assumptions, $\varepsilon_{it} \sim N(0,1), \eta_{it} \sim N(0,\sigma^2), \sigma_{\varepsilon\eta} = 0.$

[v] This result derives from the following calculation: [8.06 – (8.06 + 6.23 – 14.61)]. The first term corresponds to the coefficient of the variable for Y participants in part 2 when groups are fixed. The second term represents the value of the coefficients for Y participants in part 2 when groups are mixed.

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Instructions for Redesigning Teams and Incentives: A Real Effort Experiment with Managers of a Merged Company

Instructions for X participants in the mixed-treatment – Part 1

You are going to participate in an experiment about incentives in work organization, which is part of a scientific program supported by your company and by the CNRS (French National Center for Scientific Research).

During this experimental session, you can earn money. The amount of your earnings depends not only on your decisions, but also on the decisions of the other participants with whom you will interact.

This session consists in 2 parts of 10 periods each. The session should last about one hour.
During this session, transactions are conducted in ECU (Experimental Currency Units). Your final earnings are equal to the sum of the ECU you will earn in each of the 20 periods. At the end of the session, the total amount of ECU you have earned will be converted to Euros at the following rate:

10 ECU = 0.30 €

In addition, you will receive a show-up fee of 7,60 €. Your entire earnings from the experiment will be paid in vouchers that will be given to you in a few days.

At the beginning of the session, the group of participants is subdivided into two categories: X and Y participants. **You are an X participant**. X or Y, you keep the same role throughout this session.

Periods 1-10

What does occur in each period?

In each period, which lasts **1 minute**, each participant has to perform a task on his or her computer.

The task consists in uncovering a curve where a line has been plotted beforehand.

This curve is increasing and/or flat but it never decreases. It can have single or multiple peaks, with a maximum of 3 peaks that are ranked from the lowest to the highest. The highest altitude that can be reached by this curve is 100.

You uncover the line of this curve as you move along. Starting from point 0, you are make progress at the same time in terms of distance (you go along the horizontal axis) and in terms of altitude (you go up on the vertical axis).
Time starts running as soon as you click the "OK" button.
You can move by clicking one of the two buttons offered on your computer screen. These two buttons correspond to two available speeds.

- A first button enables you to take steps of 1. Steps of 1 do not cost money.
- A second button enables you to take steps of 2. These steps are twice as rapid as steps of 1, but each step of 2 costs 0.4 ECU.

You may switch speed whenever you want and as many times as you like. As long as you do not want to change your speed, you can hold the mouse down and the progression along the curve automatically proceeds at the chosen speed.
You can stop your progression whenever you like, even before the one-minute time is over.

When a new period starts, you have to uncover a different curve.

With whom do you interact?

In each period, you are a member of a team made-up of three people who belong to the same category. In other words, an X participant is necessarily matched with two X participants and a Y participant is necessarily matched with two Y participants.
The other two members of your group have to uncover **the same curve** as you do on their computer screen but none of you knows the current position or the progression of the two other members of the group.
For each new period, **the composition of the group is changed**. However, if you are an X participant, you are still teamed up with X participants, and if you are a Y participant, you are still teamed up with Y participants.

How are your earnings determined?

Your earnings for each period depend on the following elements:

- **your own result**, which corresponds to the altitude reached on the curve when you stop your progression or when the time is over; this means that only altitude matters; distance does not matter;
- **the result of your group**, i.e. the sum of the altitudes reached by the three members of your group;
- **the number of steps of 2** that you made, since these steps cost money.

You are an X participant. The earnings of an X participant are determined as follows:

Conditions	Earnings of X participant
❑ If your own outcome reaches: • an altitude lower than 40 • an altitude between 40 and 59 • an altitude between 60 and 100	❑ your gross payoff is: • **0 ECU** • **40 ECU** • a first complement of 20 ECU is added, i.e. your gross total payoff is **60 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a second complement of **40 ECU**. Your total gross payoff is then **100 ECU**.

Beware: the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff.

What information do you receive for each period?

During each period, you are informed of the following elements via your computer screen:

- ❑ the moment your result has reached the altitudes of 40, 60 and 100
- ❑ the time remaining
- ❑ the cumulated cost of steps of 2

In addition, as you are moving along the curve:

- ❑ the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- ❑ the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payoff is reached and until the altitude that triggers the first complement is reached (from altitude 40 to altitude 59);
- ❑ beyond that, the surface of the curve is colored in **green** (from altitude 60 to 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). When the curve becomes yellow, your gross payoff amounts to 40. When the curve becomes green, your gross payoff is 60 ECU and,

depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period of whether you have reached the second complement that yields a total gross payoff of 100 ECU or not.

At the end of each period, a summary table indicates for each past period:

- your final altitude
- the cumulated altitude of your group
- the total cost of steps of 2 that you used
- whether you have reached the first payoff of 40 ECU and the first complement of 20 ECU
- whether the cumulated result of your group enables you to get the second complement of 40 ECU
- your total net earnings.

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If you have any questions regarding these instructions, please raise your hand. Someone will answer your questions privately. Throughout the entire session, talking is not allowed.
As soon as everybody is ready, we will begin with 3 practice periods, in order for you to familiarize yourself with the task at hand. The results of these practice periods will not be taken into account in your earnings.

Thank you for your participation.

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Instructions for Y participants in the mixed-treatment – Part 1

You are going to participate in an experiment about incentives in work organization that is part of a scientific program supported by your company and by the CNRS.

During this experimental session, you can earn money. The amount of your earnings depends not only on your decisions, but also on the decisions of the other participants with whom you will interact.

This session consists in 2 parts of 10 periods each. The session should last about one hour.
During this session, transactions are conducted in ECU (Experimental Currency Units). Your final earnings are equal to the sum of the ECU you will earn in each of the 20 periods. At the end of the session, the total amount of ECU you have earned will be converted to Euros at the following rate:

10 ECU = 0.30 €

In addition, you will receive a show-up fee of 7,60 €. Your entire earnings from the experiment will be paid in vouchers that will be given to you in a few days.

At the beginning of the session, the group of participants is subdivided into two categories: X and Y participants. **You are a Y participant.** X or Y, you keep the same role throughout this session.

Periods 1-10

What does occur in each period?

In each period, which lasts **1 minute**, each participant has to perform a task on his or her computer.

The task consists in uncovering a curve, where a line has been plotted beforehand.
This curve is increasing and/or flat but it never decreases. It can have single or multiple peaks, with a maximum of 3, which are ranked from the lowest to the highest. The highest altitude that can be reached by this curve is 100.

You uncover the line of this curve as you move along. Starting from point 0, you make progress at the same time in terms of distance (you go along the horizontal axis) and in terms of altitude (you go up on the vertical axis).
Time starts running as soon as you click the "OK" button.
You can move by clicking one of the two buttons offered on your computer screen. These two buttons correspond to two available speeds.

- A first button enables you to take steps of 1. Steps of 1 do not cost money.
- A second button enables you to take steps of 2. These steps are twice as rapid as steps of 1, but each step of 2 costs 0.4 ECU.

You may switch speed whenever you want and as many times as you like. As long as you do not want to change your speed, you can hold the mouse down and the progression along the curve automatically proceeds at the chosen speed.
You can stop your progression whenever you like, even before the one-minute time is over.
When a new period starts, you have to uncover a different curve.

With whom do you interact?

In each period, you are member of a team made-up of three people who belong to the same category. In other words, an X participant is necessarily matched with two X participants and a Y participant is necessarily matched with two Y participants.

The other two members of your group have to uncover **the same curve** as you do on their computer screen but none of you knows the current position or the progression of the two other members of the group.
For each new period, **the composition of the group is changed**. However, if you are an X participant, you are still teamed up with X participants, and if you are a Y participant, you are still teamed up with Y participants.

How are your earnings determined?

Your earnings for each period depend on the following elements:

- **your own result**, which corresponds to the altitude reached on the curve when you stop your progression or when the time is over; this means that only altitude matters; distance does not matter;
- **the result of your group**, i.e. the sum of the altitudes reached by each of the three members of your group;
- **the number of steps of 2** that you made, since these steps cost money.

You are a Y participant. The earnings of a Y participant are determined as follows:

Conditions	Earnings of Y participant

❑ If your own result reaches: • an altitude lower than 40 • an altitude between 40 and 100	❑ your gross payoff is: • **0 ECU** • **60 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a complement of **40 ECU**. Your total gross payoff is then **100 ECU**.

Beware: the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff.

What information do you receive for each period?

During each period, you are informed of the following elements via your computer screen:

- ❑ the moment your result has reached the altitudes of 40 and 100
- ❑ the time remaining
- ❑ the cumulated cost of steps of 2

In addition, as you are moving along the curve:

- ❑ the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- ❑ the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payoff is reached (from altitude 40 to altitude 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). When the curve becomes yellow, your gross payoff amounts to 60 and, depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period whether you have reached the complement that yields a total gross payoff of 100 ECU.

At the end of each period, a summary table indicates for each past period:

- ❑ your final altitude
- ❑ the cumulated altitude of your group
- ❑ the total cost of steps of 2 that you used
- ❑ whether you have reached the first payoff of 60 ECU
- ❑ whether the cumulated result of your group enables you to get the complement of 40 ECU
- ❑ your total net earnings.

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If you have any questions regarding these instructions, please raise your hand. Someone will answer your questions privately. Throughout the entire session, talking is not allowed.
As soon as everybody is ready, we will begin with 3 practice periods, in order for you to familiarize yourself with the task at hand. The results of these practice periods will not be taken into account in your earnings. Thank you for your participation.

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Instructions for both X and Y participants in the mixed-treatment – Part 2

Periods 11 – 20

We will now start with the second part of the experiment. The task has the same characteristics as it had in the first 10 periods. Information is the same as in part 1. At the start of a new period, the curve and the composition of the group are changed.

What is different from the preceding periods?

Two elements have changed.

1) **The rule guiding the composition of groups has changed**. Now, the groups of three participants can be mixed with X and Y participants. If you are a X participant, you can now belong to a group with 0, 1 or 2 Y participants. If you are a Y participant, you can now belong to a group with 0, 1 or 2 X participants.

2) **The rule guiding the determination of earnings has changed**.

During periods 1-10, for performing the same task, participants have been paid according to the following schemes.

Conditions	Earnings of X participant	Earnings of Y participant
❑ If the individual result reached:	❑ an altitude lower than 40, the gross payoff was **0 ECU** ❑ an altitude between 40 and 59, the gross payoff was **40 ECU** ❑ an altitude between 60 and 100, a first complement of 20 ECU was added, i.e. the total gross payoff was **60 ECU**	❑ an altitude lower than 40, the gross payoff was **0 ECU** ❑ an altitude between 40 and 100, the gross payoff was **60 ECU**
❑ If the sum of the altitudes achieved by the 3 members of the group reached 240:	❑ a second complement of 40 ECU was added, i.e. the total gross payoff was **100 ECU**	❑ a complement of 40 ECU was added, i.e. the total gross payoff was **100 ECU**

Conditions	Earnings of X <u>AND</u> Y participants
❑ If your own result reaches: • an altitude lower than 40 • an altitude between 40 and 59 • an altitude between 60 and 100	❑ your gross payoff is: • **0 ECU** • **60 ECU** • a first complement of 20 ECU is added, i.e. your total gross payoff is **80 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a second complement of 40 ECU, i.e. your total gross payoff is **120 ECU**.

Beware: as previously, the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff. Each step of 2 costs 0.4 ECU.

As you are going along the curve:

- ❑ the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- ❑ then the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payment is reached and until the altitude that triggers the first complement of 20 ECU is reached (from altitude 40 to altitude 59);
- ❑ beyond that, the surface of the curve is colored in **green** (from altitude 60 to 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). As long as the curve is yellow, your gross payoff amounts to 60. When it becomes green, your gross payoff is 80 ECU. And, depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period whether you have reached the second complement that yields a total gross payoff of 120 ECU or not.

Instructions for X participants in the fixed-treatment – Part 1

You are going to participate in an experiment about incentives in work organization that is part of a scientific program supported by your company and by the CNRS.

During this experimental session, you can earn money. The amount of your earnings depends not only on your decisions, but also on the decisions of the other participants with whom you will interact.

This session consists in 2 parts of 10 periods each. The session should last about one hour.
During this session, transactions are conducted in ECU (Experimental Currency Units). Your final earnings are equal to the sum of the ECU you will earn in each of the 20 periods. At the end of the session, the total amount of ECU you have earned will be converted to Euros at the following rate:

10 ECU = 0.30 €

In addition, you will receive a show-up fee of 7,60 €. Your entire earnings from the experiment will be paid in vouchers that will be given to you in a few days.

Periods 1-10

What does occur in each period?

In each period, which lasts **1 minute**, each participant has to perform a task on his or her computer.

The task consists in uncovering a curve where a line has been plotted beforehand.

This curve is increasing and/or flat but it never decreases. It can have single or multiple peaks, with a maximum of 3 peaks that are ranked from the lowest to the highest. The highest altitude that can be reached by this curve is 100.

You uncover the line of this curve as you move along. Starting from point 0, you are make progress at the same time in terms of distance (you go along the horizontal axis) and in terms of altitude (you go up on the vertical axis).
Time starts running as soon as you click the "OK" button.
You can move by clicking one of the two buttons offered on your computer screen. These two buttons correspond to two available speeds.

- A first button enables you to take steps of 1. Steps of 1 do not cost money.
- A second button enables you to take steps of 2. These steps are twice as rapid as steps of 1, but each step of 2 costs 0.4 ECU.

You may switch speed whenever you want and as many times as you like. As long as you do not want to change your speed, you can hold the mouse down and the progression along the curve automatically proceeds at the chosen speed.
You can stop your progression whenever you like, even before the one-minute time is over.

When a new period starts, you have to uncover a different curve.

With whom do you interact?

In each period, you are a member of a team made-up of three people.
The other two members of your group have to uncover **the same curve** as you do on their computer screen but none of you knows the current position or the progression of the two other members of the group.
For each new period, **the composition of the group is changed**.

How are your earnings determined?

Your earnings for each period depend on the following elements:

- **your own result**, which corresponds to the altitude reached on the curve when you stop your progression or when the time is over; this means that only altitude matters; distance does not matter;
- **the result of your group**, i.e. the sum of the altitudes reached by each of the three members of your group;
- **the number of steps of 2** that you made, since these steps cost money.

Your earnings are determined as follows:

Conditions	Gross payoff
❑ If your own outcome reaches: • an altitude lower than 40 • an altitude between 40 and 59 • an altitude between 60 and 100	❑ your gross payoff is: • **0 ECU** • **40 ECU** • a first complement of 20 ECU is added, i.e. your gross total payoff is **60 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a second complement of **40 ECU**. Your total gross payoff is then **100 ECU**.

Beware : the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff.

What information do you receive for each period?

During each period, you are informed of the following elements via your computer screen:

- ❑ the moment when your result has reached the altitudes of 40, 60 and 100
- ❑ the time remaining
- ❑ the cumulated cost of steps of 2

In addition, as you are going along the curve:

- ❑ the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- ❑ the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payoff is reached and until the altitude that triggers the first complement is reached (from altitude 40 to altitude 59);
- ❑ beyond that, the surface of the curve is colored in **green** (from altitude 60 to 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). When the curve becomes yellow, your gross payoff amounts to 40. When the curve becomes green, your gross payoff is 60 ECU and, depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period whether you have reached the second complement that yields a total gross payoff of 100 ECU or not.

At the end of each period, a summary table indicates for each past period:

- your final altitude
- the cumulated altitude of your group
- the total cost of steps of 2 that you used
- whether you have reached the first payoff of 40 ECU and the first complement of 20 ECU
- whether the cumulated result of your group enables you to get the second complement of 40 ECU
- your total net earnings.

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If you have any questions regarding these instructions, please raise your hand. Someone will answer your questions privately. Throughout the entire session, talking is not allowed.
As soon as everybody is ready, we will begin with 3 practice periods, in order for you to familiarize yourself with the task at hand. The results of these practice periods will not be taken into account in your earnings.

Thank you for your participation.

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Instructions for Y participants in the fixed-treatment – Part 1

You are going to participate in an experiment about incentives in work organization, which is part of a scientific program supported by your company and by the CNRS.

During this experimental session, you can earn money. The amount of your earnings depends not only on your decisions, but also on the decisions of the other participants with whom you will interact.

This session consists in 2 parts of 10 periods each. The session should last about one hour.
During this session, transactions are conducted in ECU (Experimental Currency Units). Your final earnings are equal to the sum of the ECU you will earn in each of the 20 periods. At the end of the session, the total amount of ECU you have earned will be converted to Euros at the following rate:

10 ECU = 0.30 €

In addition, you will receive a show-up fee of 7,60 €. Your entire earnings from the experiment will be paid in vouchers that will be given to you in a few days.

Periods 1-10

What does occur in each period?

In each period, which lasts **1 minute**, each participant has to perform a task on his or her computer.

The task consists in uncovering a curve where a line has been plotted beforehand.
This curve is increasing and/or flat but it never decreases. It can have single or multiple peaks with a maximum of 3 that are ranked from the lowest to the highest. The highest altitude that can be reached by this curve is 100.

You uncover the line of this curve as you move along. Starting from point 0, you make progress at the same time in terms of distance (you go along the horizontal axis) and in terms of altitude (you go up on the vertical axis).
Time starts running as soon as you click the "OK" button.
You can move by clicking one of the two buttons offered on your computer screen. These two buttons correspond to two available speeds.

- A first button enables you to take steps of 1. Steps of 1 do not cost money.
- A second button enables you to take steps of 2. These steps are twice as rapid as steps of 1, but each step of 2 costs 0.4 ECU.

You may switch speed whenever you want and as many times as you like. As long as you do not want to change your speed, you can hold the mouse down and the progression along the curve automatically proceeds at the chosen speed.
You can stop your progression whenever you like, even before the one-minute time is over.
When a new period starts, you have to uncover a different curve.

With whom do you interact?

In each period, you are member of a team made-up of three people.

The other two members of your group have to uncover **the same curve** as you do on their computer screen but none of you knows the current position or the progression rhythm of the two other members of the group.
For each new period, **the composition of the group is changed**.

How are your earnings determined?

Your earnings for each period depend on the following elements:

- **your own result**, which corresponds to the altitude reached on the curve when you stop your progression or when the time is over; this means that only altitude matters; distance does not matter;
- **the result of your group**, i.e. the sum of the altitudes reached by each of the three members of your group;
- **the number of steps of 2** that you made, since these steps cost money.

Your earnings are determined as follows:

Conditions	Gross payoff
❑ If your own result reaches: • an altitude lower than 40 • an altitude between 40 and 100	❑ your gross payoff is: • **0 ECU** • **60 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a complement of **40 ECU**. Your total gross payoff is then **100 ECU**.

Beware: the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff.

Which information do you receive for each period?

During each period, you are informed of the following elements via your computer screen:

- the moment when your result has reached the altitudes of 40 and 100
- the time remaining
- the cumulated cost of steps of 2

In addition, as you are going along the curve:

- the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payoff is reached (from altitude 40 to altitude 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). When the curve becomes yellow, your gross payoff amounts to 60 and, depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period whether you have reached the complement that yields a total gross payoff of 100 ECU or not.

At the end of each period, a summary table indicates for each past period:

- your final altitude
- the cumulated altitude of your group
- the total cost of steps of 2 that you used
- whether you have reached the first payoff of 60 ECU
- whether the cumulated result of your group enables you to get the complement of 40 ECU
- your total net earnings.

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If you have any questions regarding these instructions, please raise your hand. Someone will answer your questions privately. Throughout the entire session, talking is not allowed.
As soon as everybody is ready, we will begin with 3 practice periods, in order for you to familiarize yourself with the task at hand. The results of these practice periods will not be taken into account in your earnings.

Thank you for your participation.

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Instructions for both X and Y participants in the fixed-treatment – Part 2

Periods 11 – 20

We will now start with the second part of the experiment. The task has the same characteristics as it had in the first 10 periods. Information is the same as in part 1. At the start of a new period, the curve and the composition of the group are changed.

What is different from the preceding periods?

Your gross earnings are now determined as follows for each period.

Conditions	Gross payoff
❑ If your own result reaches: • an altitude lower than 40 • an altitude between 40 and 59 • an altitude between 60 and 100	❑ your gross payoff is: • **0 ECU** • **60 ECU** • a first complement of 20 ECU is added, i.e. your total gross payoff is **80 ECU**
❑ If the sum of the altitudes achieved by the 3 members of your group reaches at least 240	❑ you receive a second complement of 40 ECU, i.e. your total gross payoff is **120 ECU**.

Beware: as previously, the total cost linked to the steps of 2 that you have used will be subtracted from this gross payoff. Each step of 2 still costs 0.4 ECU.

As you are going along the curve:

- ❑ the surface of the curve is colored in **blue** until the altitude that triggers the first payoff is reached (from altitude 0 to altitude 39 inclusively);
- ❑ then the surface of the curve is colored in **yellow** as soon as the altitude that triggers the first payment is reached and until the altitude that triggers the first complement of 20 ECU is reached (from altitude 40 to altitude 59);
- ❑ beyond that, the surface of the curve is colored in **green** (from altitude 60 to 100).

In other words, as long as the surface of the curve is blue, your gross payoff is null (you may even loose money if you have used steps of 2). As long as the curve is yellow, your gross payoff amounts to 60. When it becomes green, your gross payoff is 80 ECU. And, depending on the cumulated altitude reached by you and the two other members of your group, you will be informed at the end of the period whether you have reached the second complement that yields a total gross payoff of 120 ECU or not.