CREATIVITY AND CORPORATE CULTURE*

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Abstract: *We investigate which form of corporate culture is most effective in enhancing individual performance in creative tasks conducted in group settings. We combine a series of experiments with a questionnaire on corporate values to test whether performance ranking and incentives succeed in instantiating a creative corporate culture. When groups compete against an out-group and incentives are set at the group level, this serves as a social cue that prompts the formation of a sense of group identity and induces a stronger pro-social attitude amongst the group members. When this is shared, a social norm of high effort emerges, and creative performance is significantly higher.*

Keywords: creativity; corporate culture; group identity; norms; incentives; ranking.

JEL codes: C91, D03, O39

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1. Introduction

There is general agreement that organizational culture is an important driver of firms' financial value. Performance differences across firms, even for those operating in the same industry, may be attributable to corporate culture (Kosfeld and von Siemens, 2011; Chatman *et al*., 2014). Business executives strongly believe that an effective corporate culture affects a wide range of decisions including creativity (Graham *et al*., 2021). Creativity is an important engine of innovation, leading to new businesses, better products, and a stronger competitive position for existing firms (Ko and Butler, 2007). Thus, a relevant issue is how corporate culture can facilitate creativity.

Corporate culture can be described as an informal institution comprised of a strong set of managerial values that define the way to conduct business (see e.g. Barney, 1986) or shared meanings, central values, assumptions and beliefs (Frost *et al*., 1985). Crémer (1993) defines it as the 'stock of knowledge shared by the members of the organization' (p. 1). Similarly, Weber and Camerer (2003) speak of 'shared understanding among organizational members, which usually comes about through shared experience' (p. 403).

When examining the cultural values that influence the degree to which creativity and innovation take place in an organization, the emergence of a congenial and cooperative attitude among workers plays a major role (Arad *et al*. 1997; Covey; 1993; Tushman and O'Reilly, 1997). One of the key cultural dimensions along which firms may differ across each other is whether they encourage individualistic versus collectivistic values. In general, high camaraderie between workers is a key corporate value that companies advertise to attract employees with the same value system (Guiso *et al*., 2015); this has been found to establish effective strategic management (Gartenberg *et al*., 2019).

Although the importance of corporate culture has been increasingly acknowledged, there are still many unanswered research questions regarding how we measure culture, the specific mechanisms that link culture to performance, the relation between stated corporate values and actual outcomes within companies (Graham *et al*., 2021), and the type of corporate culture most conducive to higher creativity. This paper attempts to make some progress on answering these questions. Our first contribution consists of establishing a culture in the laboratory. While we agree that it does not seem feasible to develop a full-blown culture in the lab, we do establish at least a minimal framework and do offer some useful results.

We recruit individuals who are randomly assigned to groups of three people; each person in the group completes a creative task that was either verbal, mathematical, or graphical. Each session included five groups. Creative output was produced at the individual level (although within-group discussion was allowed), with the group completing all three tasks. Our implementation has some similarity to that by Weber and Camerer (2003), who study the role of organizational culture in the success of mergers by introducing a simple experimental paradigm where firms are stylized as pairs of two people sharing a common knowledge. In our experiment, firms are represented as groups of three subjects where each subject completes an individual, differentiated task.

For individuals to become a group and employees to identify with the organization, establishing an identity is 'the ideal motivator if the effort of a worker is either hard to observe or hard to reward' (Akerlof and Kranton, 2005, p.10). The seminal work by Tajfel and Turner (1986) on social-identity theory suggests that one possible path to endogenize the identity-formation process is to generate competition between (or amongst) groups. Competition with out-groups has been shown to engender in-group enhancement, stimulate in-group effort, and

induce group-contingent social preferences (Charness and Chen, 2020). Accordingly, we induce a sense of group identity by having competition in the individually-conducted tasks. We thus portray corporations as indirect and unstructured entities where members may develop a sense of group identity that affects their values and behaviour. This is a novelty in relation to other studies on group performance in creative tasks, and it is a main contribution of this paper.

As a second contribution, we consider the interplay between formal and informal corporate institutions by testing whether an incentive structure (a formal institution), combined with corporate culture (an informal institution), can be used to foster creative outcomes. This framework follows Graham *et al*. (2021) who, in line with prior research (e.g., North, 1991; Guiso *et al*., 2015), conceptualize corporate culture as the less tangible and more informal side of corporate institutions. These institutions also have a formal counterpart, represented by firm governance and compensation. From interviews with business executives, Graham *et al*. (2021) find that the effectiveness of corporate culture depends not only on the alignment of values and norms, but also on possible interactions with formal institutions such as incentive compensation.

A firm can shape the process of preference formation by setting incentives aimed at fostering the desired type of corporate culture (Rob and Zemsky, 2002; Dur and Sol, 2010); in fact, incentives may affect the process of preference formation, for instance by inducing workers to be more helpful to each other or stimulating competition among them. A substantial part of how firms develop a certain corporate culture is concerned with controlling the behaviour and attitude of organization members (Kerr and Slocum, 1981, 1987; Lawler and Jenkins, 1992). The reward system is a primary way to achieve such control, by specifying the contribution the organization expects from members and the response individuals expect to receive according to their performance (Kerr and Slocum, 1987; Li *et al*., 2013). Establishing a

certain culture can be pursued by aligning to it the financial interests of executives or setting employees' compensation practices in that direction (Quinn, 2018). Compensation systems are also believed to affect culture and performance through self-selection of organizational members (Kuhn, 2009). The incentive system - who gets rewarded, why, and how - is thus 'an unequivocal statement of the corporation's values and beliefs' (Kerr and Slocum, 2005, p. 130).

Although there is mounting evidence that the performance of organizations depends on both economic incentives and its management practices (Kaplan and Henderson, 2005; Bloom and Van Reenen, 2007, 2010) or culture, very few papers look at the interplay between economic incentives and culture. An exception is Kets and Sandroni (2021), who 'identify a new mechanism through which cultural diversity affects economic outcomes, based on a model of culture as shared cognition' (p. 287). As a result, we have a rather limited understanding of how incentives and corporate culture interact, both in general and particularly when considering creative endeavours. This paper aims to help bridge this gap.

As a third contribution, we provide a measure of the effect of corporate institutions on values by administering a questionnaire on corporate values *after* the subjects have participated in the experiment. This helps to establish how performance ranking and incentives can foster a culture in the group. In fact, to be able to speak of culture, the system of values that the scheme intends to reflect should be embraced by the individuals and shared by the organization's members. We thus assess whether being ranked against competitors, and receiving incentives set at the individual or at the group level, can establish a corporate culture, variously "individualistic" or "group-oriented". Finally, we explore whether and how creative performance, as compared to performance in a standardized, non-creative task, is affected by our instantiation of corporate culture.

Our results are clear and yet perhaps surprising in some respects: being ranked against out-group members seems to induce an increase in both pro-social values towards the in-group and creative performance. Financial incentives can further promote pro-group or pro-social values in individuals that, when shared, translate into a corporate culture that successfully fosters creativity. The proportion of groups who share a pro-social attitude is much higher when incentives are set at the group level, corresponding to a much higher creative score for the group. Our experimental evidence thus provides support in favour of group-oriented environments promoting performance in creative tasks significantly more than environments featuring a high degree of individualism doing so. To our knowledge, there has been no previous evidence regarding the relative effects of different types of corporate cultures on creative endeavours.

The remainder of this paper is organized as follows. We discuss related literature in Section 2 and illustrate the experimental design in Section 3. Section 4 shows the experimental results. Section 5 provides a discussion and concludes.

2. Related Literature

Organizational creativity is the successful implementation of creative ideas within a firm, these ideas being new products, processes, services, or even procedures or policies within the organization itself (Amabile, 1988). While it is shaped by its members' individual creativity, organizational creativity depends greatly on the organization features. The sum of values, resources, institutionalized mechanisms, and tacit tools the corporation uses to encourage (or discourage) novel behaviours represents the firm's corporate culture with respect to creativity and innovation. If corporate institutions can be considered to have two branches ("formal"

versus "informal"), corporate culture is in the latter, which is less tangible and more informal (Graham *et al*., 2021); corporate incentives are in the former.

To the best of our knowledge, no previous research has experimentally tested the effect of corporate culture on creativity, which scholars and practitioners (e.g., Kotter, 2008; Kotter and Heskett, 1992; Amabile *et al.*, 2004; Martinez *et al.*, 2015) have argued powerfully influences the economic performance of firms. A rationale for this view is that corporate culture acts as a guide or constraint in situations where employees face choices that cannot be properly regulated by formal contracts (for example, when there are unforeseen events). Which of multiple possible equilibria emerges may be determined by the underlying corporate culture that prevails in a company, as shown formally in O'Reilly (1989) and Kreps (1990). A crucial – but certainly not the only – dimension of corporate culture involves whether people are encouraged to work independently ("individualistic") or in groups ("group-oriented"). These variations may very well be differently conducive to creative performance.[1]

For employees to be influenced by a group-oriented corporate culture, a sense of identification with the organization is needed. Our paper thus contributes not only to the literature on corporate culture, but also to the studies on how a sense of group or organization identity can be developed, and how this is conducive to higher creative performance. Individuals' relationship with the organization and, specifically, their identification with it, can influence the extent to which individuals are motivated to engage in creative efforts (Ashforth and Mael, 1989; Van Knippenberg and Van Schie, 2000). In general, increasing the identification of individuals to the group to which they belong by emphasizing the group's

[1] The topic of group decision-making and performance relative to that of individuals has increasingly become a focus in economics. See Charness and Sutter (2012) for an extensive discussion.

distinctiveness, comparing in-groups with out-groups, or making the social context salient has been shown to promote creative performance (Hirst *et al*., 2009).

While the relationship between corporate culture and creativity has seldom been studied explicitly, there is considerable work on group creativity. The evidence on the effect of competition on creativity seems mixed (e.g., Hill and Amabile, 1993; Amabile, 1996; Shalley and Oldham, 1997; Paulus, 2000; Anderson and Cabral, 2007: Ariely *et al*., 2009; Gross, 2020). Indeed, the mechanism through which group creativity develops is difficult to decode *per se*. Studies on innovation have emphasized that organizational culture is a decisive factor for a firm's innovativeness and performance (Matzler *et al*., 2013), and articles have suggested that organizational culture is a key determinant of innovation (e.g., Ahmed, 1998; Dobni, 2008; Jassawalla and Sashittal, 2002; Martins and Terblanche, 2003). But it is far from easy to establish which cultural dimensions facilitate innovation and improved performance, as seen in these quotations: 'an innovation supportive culture remains an intricate and amorphous phenomenon' (Khazanchi *et al*., 2007, p. 872) and 'empirical research remains somehow limited' (Naranjo-Valencia *et al*., 2011, p. 56).

In general, the emphasis organizations should put on individualism among the members of work groups is an "age-old controversy" (Beersma *et al*., 2003). If having working groups is increasingly seen as an appropriate structure for organizing labour environments (e.g., Prat, 2002; Zwick, 2004), the suitable provision of incentives for groups remains one of the most challenging tasks in labour economics (Irlenbusch and Ruchala, 2008). The economics literature shows two alternative consequences of group-based incentives in (non-creative) real-effort tasks.

On the one hand, the literature emphasizes the effectiveness of incentives targeting individuals in a wide range of tasks and situations (see Camerer *et al*., 1999 and Lazear, 2018 for reviews). Rewards using individual relative performance, as in tournaments, are often considered a fruitful way to promote efficiency because they stimulate individuals to outperform each other by working faster, or smarter, or cheaper (Beersma *et al*., 2003). Furthermore, individual incentives do not face the problem of opportunistic behaviour that frequently undermines the success of group-based rewards, as widely documented by the rich evidence on public-goods experiments: not only do free riders not exert effort, but reciprocators also become discouraged by the low contributions of others and so reduce their own. Finally, groups might be characterized by a relative inefficiency caused by coordination issues involved in combining members' contributions and by diminishing marginal productivity (e.g. Treffinger *et al*., 2006).

On the other hand, group-based incentives can prevail over individual incentives, since the former are not only likely to enhance co-worker relations, but also provide the benefits of peer pressure, mutual monitoring (e.g. Lazear, 1989; Kandel and Lazear, 1992; Friebel *et al*., 2017) and social norms (Barnes *et al*., 2011; Rankin, 2004). The allocation of collaborative rewards has been observed to promote trust, cohesiveness, and mutually-supportive behaviour among group members, which in turn foster performance (Ivancevich and Matteson, 1999). Group-based pay may improve upon the work climate by increasing workers' willingness to help each other, especially with social cohesive teams (Delfgaauw *et al*., 2022) or when workers are "reciprocally minded" (Carpenter *et al*., 2018). Altruism serves as a commitment device to exert more effort, especially when workers' actions are strategic complements or, in Stanne *et al*. (1999)'s words, when people work on tasks with high "means interdependence" (i.e., when

the task that one member of a group faces is affected by the performance of others on the group). Becoming altruistic thus represents a rational strategy to increase own payoff when payment is a function of joint output (Rotemberg, 1994).

And yet competition might nevertheless be destructive (e.g., Charness *et al*., 2014; Bandiera *et al*., 2013) because individuals place their own goals above those of the organization, obtain gains at the expense of the others, and suffer from competitive pressure. In this vein, some recent works interpret the effort choice (as in a tournament) as a bid an agent would make in an all-pay auction. Fang *et al*. (2020) show that competition may discourage people because effort costs are convex, and more "spread-out" effort distributions yield lower expected effort when agents are homogeneous. Xiao (2018) accounts for heterogeneity among agents and finds that higher competition maximizes effort only if the top players are similar, whereas a less competitive prize sequence maximizes effort if the bottom players are similar.

The search for the roots of cooperation has led to two main categories of explanations. First, individuals might derive an intrinsic pleasure from working with other people to reach a common goal, sharing the burden of the task with peers, and appreciating the gratification of seeing the group succeed. Second, people might enjoy the extrinsic returns of reciprocal positive externalities (e.g., van Dijk and van Winden, 1997; Boone *et al*., 2008; Camerer and Fehr, 2006; Huck *et al*., 2012). This is especially true when the task allows for synergies (Stanne *et al*., 1999) and the exchange of ideas, or requires uncommon skills when effort alone is not sufficient. Extrinsic incentives deriving from positive externalities transform the payoff matrix of a social dilemma so that 'cooperation becomes an economically rational choice

yielding tangible rewards' (Declerck *et al*., 2013), convincing even those not naturally inclined to cooperate.[2]

Extrinsic incentives may come also in the form of long-term benefits from reciprocation of peers' pro-social behaviour or from acquiring the reputation of being generous. However, this class of explanation requires a repeated-game setting where subjects interact for multiple periods and modify their behaviour after observing their peers' choices. We do not focus on this aspect since we have a one-shot design.

Although the management literature is not very explicit about how the atmosphere of a firm may nurture a particular form of behaviour, previous economic approaches to corporate culture (Rob and Zemsky, 2002) assume that the firm is able to affect the process of workers' preference formation by choosing incentives. Intuitively, the type of task the group is asked to solve is likely to determine the effectiveness of monetary incentives. There are a handful of recent experimental papers that consider aspects of incentives and the environment in creative versus non-creative tasks.

Bradler *et al*. (2019) compare the effects of financial incentives on performance on a routine task (the Gill and Prowse, 2012 slider task) and a creative task (the "Unusual Uses task") from Guilford (1967), and Torrance (1968), where people list unusual uses for a routine object. The payoffs are structured as a tournament prize for above-average effort, and this incentive was found to work well. Concern for relative rank accounts for about one-fourth of this effect.

Erat and Gneezy (2015) consider piece-rate and competitive incentives with a rebus task ('a puzzle made with words and/or pictures with a hidden and non-obvious solution') with

[2] The notion that mutual cooperation can be an equilibrium in a Prisoner's Dilemma game (due to reciprocity concerns) lies at the heart of Rabin (1993).

a unique correct response. While financial incentives led to more effort, they did not improve the creative output. In fact, competitive incentives reduced creativity relative to piece-rate incentives. Laske and Schröder (2017) introduced incentives for either quantity alone or for quantity in combination with usability or novelty; the baseline had fixed incentives. Incentivizing quantity alone or quantity in combination with novelty results in an increase in quantity and novelty, but decreases the average quality compared to the baseline. The study closest to the research conducted in this paper is our own work (Charness and Grieco, 2019) on creativity and incentives with different types of individual tasks. The main results are that, while peer ranking motivates people regardless of the type of task, financial incentives for creativity are effective when a task is better delineated but not when it is more open-ended.

What emerges in general is that, when the task requires complex, uncommon solutions, a group could be more likely to solve a problem than its smartest member would be if acting alone (Shaw, 1932), since one might expect some other group members to produce thoughtful work and reject incorrect solutions (Davis, 1992). Azoulay *et al*. (2011) find that researchers produced high-impact articles at a much higher rate (thus showing higher scientific creativity) in environments that gives freedom to experiment and avoid highly competitive renewal policies unforgiving of failure. Similarly, Englmaier *et al*. (2018) find that bonus incentives at the group level increase the performance in non-routinized, analytical tasks (a real-life "escape" game) since they can promote a more focused and coordinated approach to solving the problem. This is also observed in Ederer (2021): when workers can learn from each other's experience, group incentives for joint success might be able to foster innovation more than individual pay-for-performance pay.

Analogously, Chen *et al*. (2012) show that having individual intra-group tournament pay increases individual efforts but does not enhance the creativity of group solutions relative to individual piece-rate pay. With more standardized endeavours, it appears that workers' need to rely on peers' help might be lower and the gains from cooperation would shrink. In organizational studies on how to promote group innovation, empirical results have consistently identified the roles of developing group collaboration (West and Wallace, 1991) and a group climate of trust and openness (Anderson and West, 1998), vision and shared objectives (West, 1990). In particular, making group members' goals and rewards interdependent (e.g. Van der Vegt and Van de Vliert, 2002) induces individuals to 'pull together, help each other, and discuss different viewpoints to optimize performance' (Hülsheger *et al*., 2009). This helps both the group and each member to engage in critical discussion and synthesis of different viewpoints (Tjosvold *et al*., 2004; Van der Vegt and Janssen, 2003); both mechanisms are shown to stimulate innovation (Bledow *et al*. 2009). A further contribution of this article is to shed light on how corporate culture and incentives work differently according to the creative content of the task.

3. The experiment: Creative tasks

Researchers have designed a multiplicity of creative tasks. Charness and Grieco (2019) and Attanasi *et al*. (2021) offer extensive discussions of different types of creative tasks; there is no clear consensus regarding which are the most useful. Since one of the most acknowledged definitions of creativity refers to it as a "combination of existing things" (Mumford, 2003), the task we use here is a "combination" task, in which subjects must assemble items in a creative manner under the constraint of using *all* the items provided.

In our experiment, we ask individuals belonging to groups of three people to perform a task in a creative manner. We refer to Mumford (2003)'s key feature of creativity as being recognized in its utility by peers: payments at the individual or group level reflect the evaluation of peers in the session (more on this below). We vary the type of ranking (at the individual or at the group level) and provide financial incentives (at the individual or at the group level) or flat payments. We have a control treatment without any ranking and with a flat payment. Note that individuals and groups are ranked against out-group members *rather than against in-group members*. Subjects perform individually. What binds groups together is a nominal affiliation assigned randomly by the experimenter; this may or may not be reinforced by the type of ranking or reward in place. The payoff structure was set so that the average earnings from the tasks were identical across treatments.

Each participant completed an assigned type of real-effort task; no person participated in more than one session. Group members could communicate and even switch tasks with each other: however, interaction among subjects was limited and switching tasks with one other was observed to happen only once.[3]

Participants in another group in the session evaluated the (anonymous) relative creativity of the participants they were assigned to evaluate, so that we could pay people immediately in the lab; two external judges (blind to treatment) later evaluated creativity. In no case did we provide any guidance concerning how to do so. We follow Amabile (1982)'s "consensual assessment technique" that relies on the idea that judges must rate creativity by using their own subjective definition instead of any given objective criteria, since establishing objective criteria

[3] Note that choosing a task rather than being assigned to it could affect behavior and performance Babcock et al. (2013) provide a clean test (with no selection bias) showing that people who select a task have better performance than those who were assigned the same task.

for creative outcomes is ultimately impossible. Rather, a product can be judged as creative when 'appropriate observers independently agree it is creative' (Amabile, 1983, p.31).

3.1. Tasks

We used three types of creative questions: verbal, math, and drawing. Participants had 25 minutes to answer a specific question of this set of three questions:

1. *"Choose a combination of words to write a creative story." The words supplied were: house, zero, forgive, curve, relevance, cow, tree, planet, ring, send. Participants were told that they must use these words along with any other combination of words that they wished*. (verbal)

2. *"Starting from the number 27, obtain the number 6 in the most creative way you can by using at least two different numerical operations." Participants were told that they must use these numbers along with any other combination of numbers that they wished.* (math)

3. *"Draw a creative picture using the following shapes [a figure presenting a set of shapes follows]". Participants were told that they must use these shapes along with any other combination of shapes that they wished.* (drawing)

The three types of tasks (verbal, math, and drawing) share the feature that the outcome is the creative combination of existing items (words, numbers/operations, and forms, respectively). The choice of having *three* of them is motivated by the need of asking each group member to deal with a specific type of task that could match or not with her abilities, thereby

including the possibility of mutual help: subjects could re-allocate the tasks and could also help each other on the tasks themselves.

Participants were told that the creativity of their output in each specific question would be ranked in relation to that of the mutually-anonymous people in other groups answering the same question (verbal, math, or draw). People who answered a different question (to avoid strategic effects on the evaluations) performed this ranking.[4]

3.2. Treatments

We use financial incentives to induce culture in the lab by paying based on the individual relative performance ("individual incentives") or the group relative performance ("group incentives"). To disentangle the effect of payments from that of being evaluated by peers, we have two conditions where subjects receive flat payments but are nevertheless ranked by individual ("Individual ranking with flat payment") or group performance ("Group ranking with flat payment"). In all incentivized tasks, subjects learn their rank through their payoffs; in the flat-payment treatments, subjects were told that they could learn their rank at the end of the session. We also have a control treatment where subjects are not ranked (neither at the individual nor at the group level) and receive a flat payment ("No ranking, flat payment").

No ranking, flat payment (NR-F). Subjects are not ranked (neither at the individual nor at the group level) and do not receive performance-based incentives. We paid people a flat amount of $9 (plus the $5 show-up fee) for completing the response.

[4] Those subjects involved in the verbal task individually evaluated people in the math task; subjects involved in the math task evaluated people in the draw task; subjects involved in the draw task evaluated people in the verbal task. Each evaluator provided her own ranking; the rankings were then averaged to provide a general ranking.

Individual ranking with flat payment (IR-F). In this condition, subjects do not receive performance-based incentives. We paid people a flat amount of $9 (plus the $5 show-up fee) for completing the response. Participants who responded to the same task (verbal, math or drawing) were ranked according to their individual performance.

Group ranking with flat payment (GR-F). Again, we paid people a flat amount of $9 (plus the $5 show-up fee) for completing the response. In this condition, not only were participants involved in the same task ranked according to their own relative performance, but groups were also ranked by averaging the ranking of its members. Thus, individual ranking occurs also in this condition: this means that each subject's contribution to the group's performance is clearly identifiable. The only difference between this condition and the previous one is that here subjects additionally can receive the feedback on group's ranking. The tasks were identical to those in the previous conditions.

Individual ranking with incentives (IR-I). We paid each person based on assessments made in the task they were assigned, no matter the performance of the group to which they belong. Participants involved in the same task (verbal, math or drawing) were ranked: the person with the best ranking received $15, the person with the 2nd-best ranking received $12, the person with the 3rd-best rating received $9, the person with the 4th-best ranking received $6, and the person with the least-best ranking received $3; these payments were made in addition to the standard $5 payment for showing up on time to the experiment. The tasks were identical to those in the previous conditions.

Group ranking with incentives (GR-I). In this condition, we paid people according to the group's assessed performance. Participants answering each task (verbal, math or draw) were

ranked and the group ranking was obtained by averaging the ranking of its members. In addition to the $5 show-up fee, each person in the group with the best ranking received $15, those in the group with the 2nd-best ranking received $12, those in the 3rd-best group received $9, those in the 4th-best group received $6, and those in the least-best group received $3. The tasks were the same as before.

3.3. Corporate culture

To test whether being ranked against competitors and receiving incentives effectively instantiates a certain type of culture in the laboratory, we ask the subjects (after completing the task) to answer three questions about their preferences and values about being part of a group or alone. The questions were inspired by Wagner (1995)'s measure of collectivist attitude. Subjects were presented with the following three pairs of sentences (corresponding to questions 11, 12 and 13 in the final questionnaire in Appendix A) and, for each pair, each subject chose the statement that most accurately reflected the subject's attitude:

Question 11: preference for working alone or with others

11A. I prefer to work with others in group rather than working alone.

11B. Given the choice, I would rather do a job where I can work alone rather than a job where I have to work with others in a group.

Question 12: beliefs about group productivity

12A. If you want something done right, you have got to do it yourself.

12B. People in a group are more productive than people working alone.

Question 13: group orientation

13A. A group is more efficient when people do what they want to do instead of what the group wants them to do.

13B. People in groups should be willing to make sacrifices for the sake of the group's well-being.

If the different types of incentives and ranking affected subjects' values, we might expect to observe a significant difference in answers across subjects who received individual versus group payments and/or ranking, particularly for Question 13.

3.4. Questionnaire

In addition to the previous questions, subjects were asked to answer (after the task) two incentivized questions on risk and ambiguity attitude. In the question on risk attitude, each individual was endowed with 100 units and could invest any portion of this amount in a risky asset that had a 50% chance of success and was paid 2.5 times the amount invested if successful and lost the investment if unsuccessful; the individual retained the units not invested (Gneezy and Potters, 1997; Charness and Gneezy, 2010).

Participants were told that two different people (one for the risk-aversion question and one for the ambiguity-aversion question) would be chosen at random in each session for actual payoff implementation of these choices, and a coin would be flipped after the session to determine success or failure for these investors. This procedure provides an individual measure of risk aversion: the higher the investment, the less risk averse is the individual. The question on ambiguity attitude was identical except that we did not tell people until later the probability that this investment would be successful.

Our subjects were also asked to complete a questionnaire where we requested information on their demographic characteristics: gender, age, major, number of siblings, birth-order, right or left-handed, married/divorced/unmarried parents plus other six questions on past involvement in creative activities, as in Hocevar (1980). For the latter set of questions, the scoring rule we used was to sum up each participant's ratings for the activities concerning six areas: art, crafts, performing arts, math-science, literature, and music.

Finally, we presented subjects with ten questions on creative and cognitive style and sensation-seeking attitude, based on Nielsen *et al*. (2008)'s questions on creative style and on Zuckerman *et al*. (1964)'s questions on sensation-seeking attitude for the purpose of measuring one's preferences for the new and unfamiliar and one's need for general excitement. The questionnaire is reported in Appendix A.

3.5. Procedure

The experiments were conducted at the University of California, Santa Barbara between February of 2014 and March of 2020. There were 12 pen-and-paper sessions, with a total of 214 participants. There were 93 people in the Individual Ranking treatment, with 48 in the Incentives condition (IR-I) and 45 in the Flat condition (IR-F); 81 people in the Group Ranking treatment, with 39 in the incentives condition (GR-I) and 42 in the no-incentives condition (GR-F); 40 people in the control with no ranking and flat payment (NR-F). NR-F data are from the non-ranking treatment in Charness and Grieco (2019), where people were in 5-person groups. These sessions were conducted in the same room as the others in this article.[5] The subjects were students (35 percent from Social Sciences, 48 percent from STEM and 17 percent from

[5] Since not all sessions consisted of fifteen subjects, ranking and payments were normalized to keep the average payment equal to $9.

Humanities), with 58 percent females. We used a between-subjects design, and no one participated in more than one session. Participants were paid a $5 show-up fee, plus their earnings from the experiment.

At the beginning of each session, we welcomed participants and handed out written instructions that were then read aloud by the experimenter. Each three-person group was seated separately from the other groups, with the group members seated in a row in three seats (about two or three feet apart); the rows were about five feet apart. Thus, participants could easily observe the effort levels of peers, but not those of competitors. All subjects completed the final questionnaire. The sessions took approximately one hour, with average total earnings of $15.

4. Experimental results: Creative tasks

4.1. Creativity evaluation

As mentioned above, people who performed a task (verbal, math, or draw) evaluated and ranked the individual responses from people who performed a different task. The rankings show a fair level of consistency (Cronbach's alpha = .713), that can be evaluated as acceptable if compared to the standard 0.7 level required for inter-rater reliability in studies based on the consensual assessment technique (Amabile, 1982).

To make comparisons across treatments, we had two external judges - blind to treatments - evaluate the answers on a 1-10 scale: our creativity score is the average of the two independent evaluations. The two external judges' evaluations also exhibited an adequate

degree of consistency (Cronbach's alpha = .685) and are correlated with the rankings (Spearman correlation test, with coef. = .159, $p = 0.049$).[6]

4.2. Role of ranking and incentives

Table 1 shows a clear pattern. Regarding individual performance, the average creativity scores for three of the conditions with ranking are nearly identical (close to 4.7 out of a maximum score of 10), but the average score with group-ranking and incentives is much higher (6.141). The average creativity score is significantly higher in case of group incentives than for individual incentives (Wilcoxon rank-sum test on individual averages, with $Z = -4.527$, $p = 0.000$). Individual incentives do not affect the creativity score significantly with respect to the condition where incentives are not in place (Wilcoxon rank-sum test on individual averages, with $Z = 0.232$, $p = 0.816$),[7] while they do in case of group incentives (Wilcoxon rank-sum test on individual averages, with $Z = 4.067$, $p = 0.000$).

The average creativity score without ranking and incentives is significantly lower (3.626) than the score in all the conditions where subjects are ranked and receive a flat payment: no ranking versus individual ranking: Wilcoxon rank-sum test, $Z = -3.097$, $p = 0.002$; no ranking versus group ranking: Wilcoxon rank-sum test, $Z = -3.374$, $p = 0.000$). Being ranked results in better individuals' performance, no matter the presence of monetary incentives: as

[6] We round all *p*-values to the nearest three decimal places.

[7] This result differs with the one in Charness and Grieco (2019), where incentives were observed to significantly increase creative performance in a context where individuals competed against each other but did not belong to any group. The current setup differs in assigning each subject an "experimental" group affiliation that appears to undermine the effectiveness of setting incentives at the individual level.

emphasized in the literature (e.g., Morgan *et al*., 2020), under peer evaluation subjects tend to report higher motivation and worked harder.

Table 1.

Creativity score: summary statistics

Treatment	Average	Std. Error	Min	Max	Obs
GR_F	4.756	0.227	2,5	8,5	39
GR_I	6.141	0.200	4	9	39
IR_F	4.700	0.220	2,5	8	45
IR_I	4.760	0.182	2,5	7,5	48
NR_F	3.625	0.224	1	7,5	40

Table 2 reports a set of OLS regressions (Tobit regressions in Table B1 in Appendix B show the same results) exploring the determinants of the individual creativity score. The results confirm the findings from our non-parametric tests. Column 1 shows a positive and highly-significant effect for being ranked *per se* (compared to no ranking). Financial incentives significantly increase the creativity score with respect to flat payments. Note that the incentive effect shown in column 2 is driven by group incentives. The regression indicates that incentives induce a significantly higher creativity score only when they are set at the group level.

Table 2.

Determinants of creativity score (OLS)

	(1)	(2)	(3)	(4)	(5)
Ranking	0.763**	1.075***	0.974***	0.827**	1.581***
	[0.326]	[0.347]	[0.333]	[0.345]	[0.423]
Incentives	0.665**	0.060	0.086	0.427	0.273
	[0.257]	[0.354]	[0.324]	[0.469]	[0.546]
group ranking	0.728***	0.056	0.023	0.529	-0.123
	[0.262]	[0.373]	[0.350]	[0.562]	[0.591]
group rank*inc		1.324**	1.249***	1.396***	1.510***
		[0.502]	[0.468]	[0.468]	[0.458]
peers score			0.020	0.049**	0.049**
			[0.019]	[0.022]	[0.022]
peers score*ranking				-0.041	-0.001
				[0.029]	[0.033]
peers score*incentives				-0.029	-0.030
				[0.028]	[0.035]
risk aversion					-0.002
					[0.005]
ambiguity aversion					0.002
					[0.005]
creative style					0.015**
					[0.006]
sensation seeking					0.149
					[0.131]
Male					-0.028
					[0.206]
Constant	3.625***	3.625***	3.487***	3.286***	2.760***
	[0.225]	[0.225]	[0.243]	[0.233]	[0.629]
Observations	211	211	211	211	185

OLS (standard errors in parentheses, clustered at the group level). The dependent variable assumes value ranging from 1 to 10. *ranking* is a dummy variable assuming value equal to 1 when subjects are ranked (individually and/or group-based) and 0 elsewhere. *incentives* is a dummy variable assuming value equal to 1 when payment is output-related and 0 elsewhere. *group ranking* is a dummy variable assuming value equal to 1 when the ranking is group-based and 0 when the ranking is individual-based. *group rank*inc* is the interacted variable between the dummy variables *group ranking* and *incentives*. *peers score* ranking* is the interacted variable between *peers score* and the dummy variable *group ranking*. *peers score*incentives* is the interacted variable between *peers score* and the dummy variable *incentives*. Other controls (not reported in the table because non-significant): age, major, artistic endeavours the subject has performed in the past, number of siblings, parents' marital status, birth order, right-handed. *** significant at 1%; ** significant at 5%; * significant at 10%.

Columns 3-5 show another interesting effect: one's creative score increases with the average score of one's peers (column 3), with no interaction with the type of ranking (column 4) or incentives (column 5). This suggests that group members conform to the level of creative output prevailing in the group, as if they followed a social norm. It is important to note that subjects have no feedback on peers' score during the experiment (they are ranked and paid only at the end of the experiment), but they worked physically side by side, so that one would have some sense of one peers' effort. A group comprised of industrious people has been shown in other contexts to generate a "positive climate": those who observe peers exerting high effort exert higher effort themselves (Banerjee and Besley, 1990; Falk and Ichino, 2006; Mas and Moretti, 2009). We provide a rationale for this result below, based on corporate culture.

It is important to recall that, with incentives set at the individual level, each subject competes individually against the other subjects completing the same task (verbal, math, or draw) in the session, rather than against group peers. Since they cannot observe competitors, but can observe the effort level of their peers, we speculate that subjects may use peers' observed industriousness as a signal of competitors' performance. They are not spaced closely enough to easily see the creative output of the other group members, but the degree of effort is apparent.

These results hold when controlling for demographic characteristics, creative style, sensation-seeking attitude, and risk/ambiguity attitude (column 5).[8] Subjects with a more "explorative" creative style (i.e., people who do not have clearly-established methods or definite goals and who use trial and error) show slightly higher creative scores. In all regressions, errors are clustered at the group level. We ran a robustness check that excludes from the sample the

[8] The differences in the number of observations across column 5 and columns 1-4 are mainly due to some technical problems in one session that caused subjects not to report their investment in the risky lottery (variable "risk aversion", 15 missing answers). In addition, four subjects did not report their gender, three did not report information to define their creative style, and four did not answer to the question on the investment in the ambiguous lottery.

two subjects who decided to switch the task: as shown in Table B2 in the Appendix, results are not affected. A further robustness check splits the sample according to the type of task: verbal, math, or drawing. As shown in Table B3 in the Appendix, results do not change. Furthermore, reporting previous experience in endeavours related to the type of task appear not to influence subjects' creative performance significantly (except for participants who were familiar with computer programming, who happen to be significantly more creative in the math task).

Thus, Table 2 suggests that subjects' individual creative output is positively affected by the score of their peers, regardless of the presence of incentives or peer ranking. This suggests some effect from being part of a relatively more creative group. The next section further investigates this aspect and attempts to shed light on how corporate culture could have driven these results.

4.3. Role of corporate culture

Our analysis delves more deeply into the mechanisms that lead ranking and incentives set at the group level to foster creativity, by examining their effectiveness in establishing a certain culture in the group with respect to the absence of ranking and to incentives at the individual level. For a group-oriented corporate culture to emerge, a successful manipulation should change the system of values that group members share.

Table 3.

Corporate culture questions with creative tasks: percentage of respondents

	Question 11	*Question 12*	*Question 13*	
Treatment	% of Resp. who chose A	% of Resp. who chose B	% of Resp. who chose B	Obs.
GR_F	0.381	0.366	0.667	42
GR_I	0.342	0.243	0.861	38
IR_F	0.444	0.333	0.644	45
IR_I	0.250	0.250	0.479	48
NR_F	0.282	0.077	0.250	39

The Table reports the percentage of answers showing a group-oriented (vs. individualistic) attitude in each of the three questions.

Table 3 summarizes subjects' preferences and values about being part of a group or alone according to their answers in the questions 11, 12 and 13 in the post-experimental questionnaire (see Section 3.3 for the questions). There are three main observations: First, the percentage of subjects who prefer working in group instead of alone (elicited through question 11, asking subjects to choose either "I prefer to work with others in group rather than working alone (A)" or "Given the choice, I would rather do a job where I can work alone rather than a job where I have to work with others in a group (B)") has no clear pattern across treatments. There is no effect of ranking (Wilcoxon rank-sum test, with $Z = -0.038$, $p = 0.402$) or of group incentives versus individual ones (Wilcoxon rank-sum test, with $Z = 0.929$, $p = 0.353$).

Second, ranking subjects' performance shows a stronger belief that working in group is more productive than working individually, elicited through question 12, that asks subjects to

choose between the claim that "If you want something done right, you have got to do it yourself (A)" and "People in a group are more productive than people working alone (B)" (Wilcoxon rank-sum test, with $Z = -2.847$, $p = 0.004$). Third, the willingness to sacrifice for the group's sake ("group oriented behaviour", elicited through question 13, that asks subjects to choose between the claim that "A group is more efficient when people do what they want to do instead of what the group wants them to do (A)" and "People in groups should be willing to make sacrifices for the sake of the group's well-being (B)") increases significantly when subjects are peer-ranked with respect to no ranking (Wilcoxon rank-sum test, with $Z = -4.584$, $p = 0.001$), and when they receive group incentives instead of individual ones (Wilcoxon rank-sum test, with $Z = 3.594$, $p = 0.001$).

In sum, we observe that having people ranked against individuals who are part of competing groups appears to strengthen in-group cohesion against rivals and pro-sociality. Competing against different groups (and sharing a common fate from the outcomes with in-group peers) has been shown in other contexts to generate a sense of group identity that might affect beliefs and interaction within the group. This result is consistent with the predictions that inter-team competition induces group-contingent social preferences (Charness and Chen, 2020). In this vein, Charness and Holder (2019) find that forming anonymous and random teams competing for matching funds leads to higher donations to charities than having individuals competing for matching funds, thus providing evidence that combining group identity and competition can motivate pro-social behaviour.

A pro-social attitude indicates that the group's benefits may well be considered important *per se*.[9] Then, a personal attitude becomes culture when it is shared amongst the

[9] Pro-social here means having positive weight on the welfare of other group members.

group members. We thus test whether group-based incentives correlate with a significant difference in the rate of people willing to sacrifice their own interest in favour of the group's. If the way we set incentives at the group level (rewarding group performance, with each group member responsible for her performance) can induce a more group-oriented attitude, then group incentives could be seen to act as a "social cue" for a certain type of corporate culture to emerge in the group.[10]

Table 4.

Determinants of individual belief about group productivity with creative tasks

	(1)	(2)
Ranking	0.995***	1.078***
	[0.353]	[0.378]
Incentives	-0.244	-0.299
	[0.276]	[0.296]
group ranking	0.088	0.060
	[0.278]	[0.299]
group rank*inc	-0.109	-0.026
	[0.408]	[0.430]
Constant	-1.426***	-1.779***
	[0.296]	[0.588]
Controls	NO	YES
Observations	210	204

Probit (standard errors in parentheses, clustered at the group level). The dependent variable assumes value 0 or 1. *ranking* is a dummy variable assuming value equal to 1 when subjects are ranked (individually and/or group-based) and 0 elsewhere. *incentives* is a dummy variable assuming value equal to 1 when payment is output-related and 0 elsewhere. *group ranking* is a dummy variable assuming value equal to 1 when the ranking is group-based and 0 when the ranking is individual-based. *group rank*inc* is the interacted variable between the dummy variables *incentives* and *group ranking*. *C*ontrols in column 2 (not reported in the table because non-significant): gender, sensation_seeking, creative_style, age, major, artistic endeavours the subject has performed in the past, risk attitude, ambiguity attitude, number of siblings, parents' marital status, birth order, right-handed. *** significant at 1%; ** significant at 5%; * significant at 10%.

[10] We thank Willemien Kets for a very useful discussion on this point.

Table 4 reports the significant effect of ranking in increasing the probability that subjects believe that groups are more productive than individuals (identified as subjects who selected 12B in response to Question 12). On the other hand, Table B4 in the Appendix shows no significant effect of our treatments on one's preference for working in group or alone (captured by the percentage of subjects who selected 11A in response to Question 11). In fact, Question 11 captures a pure individual preference that is idiosyncratic to the subject.

Table 5.

Determinants of individual pro-social attitude with creative tasks

	(1)	(2)
Ranking	1.045***	0.972***
	[0.288]	[0.310]
Incentives	-0.423	-0.425
	[0.264]	[0.280]
group ranking	0.060	0.049
	[0.277]	[0.294]
group rank*inc	1.077**	0.985**
	[0.421]	[0.441]
Constant	-0.674***	-1.186**
	[0.215]	[0.507]
Controls	NO	YES
Observations	211	205

Probit (standard errors in parentheses, clustered at the group level). The dependent variable assumes value 0 or 1. *ranking* is a dummy variable assuming value equal to 1 when subjects are ranked (individually and/or group-based) and 0 elsewhere. *incentives* is a dummy variable assuming value equal to 1 when payment is output-related and 0 elsewhere. *group ranking* is a dummy variable assuming value equal to 1 when the ranking is group-based and 0 when the ranking is individual-based. *group rank*inc* is the interacted variable between the dummy variables *incentives* and *group ranking*. *C*ontrols in column 2 (not reported in the table because non-significant): gender, sensation_seeking, creative_style, age, major, artistic endeavours the subject has performed in the past, risk attitude, ambiguity attitude, number of siblings, parents' marital status, birth order, right-handed. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 5 summarizes the effects of (individual versus group) ranking and (individual versus group) incentives on the probability that subjects exhibit a more pro-social attitude by choosing 13B in response to Question 13. We note once again that this question was asked after subjects had completed their tasks. Our results show that individual ranking and group-level incentives are jointly effective for instilling a pro-social attitude in individuals, confirming the non-parametric test above. Being ranked may help generate a sense of group identity: group members share the common fate against the competitors, perhaps thereby increasing the rate of people who think that "People in groups should be willing to make sacrifices for the sake of the group's well-being". Analogously, being ranked and receiving incentives at the group level make subjects focus on the group's sake.

An alternative interpretation is that being responsible for one's performance in front of the group generates some sense of peer pressure that not only resolves the free-riding problem of group incentives, but also creates an additional layer of incentives that is not present when incentives are set at the individual level. Group incentives may therefore out-perform individual incentives when these group incentives lead to substantial peer pressure. Adding controls does not alter the results (column 2).

In sum, we observe that corporate values may have a mediating effect between the incentives structure and the creative performance. We thus provide some suggestive evidence on such role of corporate values by running two-stage least squares (2SLS) regressions. Results are reported in Table B5 in Appendix B and confirm the finding on the mediating role of individual prosocial attitude discussed above.[11]

[11] However, a caveat is that values are elicited after completing the task, so that endogeneity issues may emerge.

For an individual attitude to become a culture, the same attitude must be shared among the group members. The key result of our paper is that, when a group exhibits group-oriented culture (that is, when a pro-social attitude is shared by at least two of the three members of the group), the group shows a significantly higher creative performance. In fact, when group members share a pro-social attitude, the group's average creative score is significantly higher: considering what happens at the group level, the average score obtained by the group is 18.42 (out of 30) versus 15.72, and this difference is significant (Wilcoxon rank-sum test, with $Z = -3.586$, $p = 0.000$).

Considering again what happens at the group level, we observe that the proportion of groups whose members share a pro-social attitude is significantly higher when individual performance is ranked against competitors (26% versus 7%): this difference is significant (Wilcoxon rank-sum test, with $Z = -3.662$, $p = 0.000$), and corresponds to a significantly higher creative score (21.23 versus 19.02). The proportion of groups who share a pro-social attitude is also significantly higher when incentives are set at the group level (32% versus 15%); again, the difference is significant (Wilcoxon rank-sum test, with $Z = -2.940$, $p = 0.003$), and corresponds to a significantly and dramatically higher creative score (18.64 versus 10.48).

This evidence, although based on self-reported answers, provides a rationale for the result shown above regarding individual creative output being positively affected by the scores of their peers. Being part of a group where a group-oriented culture prevails means sharing a pro-social attitude that motivates people to work for the group's sake instead of shirking. This generates a social norm of high effort that explains the improvement in creative performance.

5. Non-creative tasks

We ran three additional sessions of each of the treatments No ranking-Flat payment, Individual ranking-Incentives and Group ranking-Incentives using non-creative, standardized tasks to see whether our results speak specifically to creativity or, on the contrary, may hold also with non-creative real effort tasks. As in case of creative tasks, subjects are divided in groups of three and receive a verbal, math, or drawing task. Instead of combining words, numbers/operations or shapes in a creative way, subjects had to complete routinized endeavours that consists of putting words in alphabetical order, counting 0s over a set of rows made of 0s and 1s, or making shapes using a geometric template and colour them. As before, participants had 25 minutes to answer a specific question of this set of three questions:

1. *"You receive ten sets of 30 words. For each set, you have to put words in alphabetical order. Answers will be evaluated as correct if all the words in each set are put in the correct order.*" (verbal)

2. *"You receive ten pages containing 0's and 1's. For each page, you have to count the amount of 0's and write it in the box at the end of each page. Answers will be evaluated as correct if the number you write corresponds to the exact number of 0's in the page."* (math)

3. *"You receive ten blank pages. For each blank page, you have to draw the amount of shapes asked on top of the page using a geometry template and fill them in with the indicated colour. Answers will be evaluated as correct if all the shapes in each set are completely drawn and coloured."* (drawing)

The instructions and the procedure were identical to the ones used for creative tasks, thereby isolating the effect of the type of task (creative vs. non-creative) in the three treatments of interest. The experimental sessions were conducted at the University of California, Santa Barbara. There were nine pen-and-paper sessions, with a total of 129 participants. There were 45 people in the control with no ranking, flat payment (NR-F), 45 in the Individual with Incentives condition (IR-I) and 45 in the Group Ranking with incentives condition (GR-I). These sessions were conducted in the same room as the others in this article. The subjects were students (27 percent from Social Sciences, 46 percent from STEM and 27 percent from Humanities), with 65 percent females. We used a between-subjects design, and no one participated in more than one session. Participants were paid a $5 show-up fee, plus their earnings from the experiment.

Table 6 below suggest that with non-creative tasks, ranking and incentives set at the individual level foster productivity, while ranking and incentives set at the group level do not.

Table 6.

Non-creative score: summary statistics

Treatment	**Average**	**Std. Err**	**Min**	**Max**	**Obs**
GR_I	5.026	0.545	0	10	39
IR_I	6.711	0.457	0	10	45
NR_F	5.689	0.453	0	10	45

In fact, looking at individual performance in the non-creative tasks, the average score when subjects are ranked and receive an individual payment is significantly higher (6.711) than the score in the condition without ranking and incentives (5.689): Wilcoxon rank-sum test, Z = -1.795, $p = 0.080$, two-tailed test ($p = 0.040$, one-tailed test). This result is in line with the papers documenting a positive effect of monetary incentives. Interestingly, not only do group incentives not work with respect to flat payment with non-creative tasks (Wilcoxon rank-sum test on individual averages, with $Z = 1.184$, $p = 0.236$), they induce a *decrease* in performance with respect to individual incentives (Wilcoxon rank-sum test on individual averages, with $Z = 2.371$, $p = 0.017$), strongly departing from what happens in the case of creative tasks.

Table 7 reports a set of OLS regressions (Tobit regressions in Table B6 in Appendix B show the same results) where we explore the determinants of the individual score in the non-creative task. In all the regressions, the NR-F condition is taken as reference and we consider the effect of being ranked and paid at the individual level, and the effect of being ranked and paid at the group level. The results of column 1 confirm the findings from our non-parametric tests: ranking and financial incentives at the individual level significantly increase the score with respect to no ranking and flat payments, while ranking and incentives set at the group level produce a significantly lower score.

Table 7.

Determinants of non-creative score (OLS)

	(1)	(2)	(3)	(4)
ranking&incentives	1.022**	1.853**	1.381	1.967
	[0.448]	[0.855]	[2.286]	[2.684]
group_ranking&incentives	-1.685***	-3.056***	-1.060	0.261
	[0.448]	[0.863]	[2.464]	[2.235]
peers score		-0.407***	-0.369***	-0.279*
		[0.073]	[0.123]	[0.143]
peers score* ranking&incentives			0.030	-0.054
			[0.163]	[0.196]
peers score*group_ranking&incentives			-0.176	-0.247
			[0.181]	[0.155]
risk aversion				0.010
				[0.014]
ambiguity aversion				-0.002
				[0.012]
creative style				0.078
				[0.168]
sensation seeking				0.351
				[0.327]
Male				-0.794
				[0.586]
Constant	5.689***	10.314***	9.888***	7.912***
	[0.310]	[0.987]	[1.486]	[1.812]
Observations	129	129	129	115

OLS (standard errors in parentheses, clustered at the group level). The dependent variable assumes value ranging from 0 to 10. *ranking&incentives* is a dummy variable assuming value equal to 1 when subjects are ranked and paid (individually and/or group-based) and 0 elsewhere. *group_ranking&incentives* is a dummy variable assuming value equal to 1 when ranking and incentives are group-based and 0 when ranking and incentives are individual-based. *peers score*ranking&incentives* is the interacted variable between *peers score* and the dummy variable *ranking&incentives*. *peers score* group_ranking&incentives* is the interacted variable between *peers score* and the dummy variable *group_ranking&incentives*. Other controls (not reported in the table because non-significant): age, major, artistic endeavours the subject has performed in the past, number of siblings, parents' marital status, birth order, right-handed. *** significant at 1%; ** significant at 5%; * significant at 10%.

Column 2 shows an interesting effect: one's score decreases with the average score of one's peers (the opposite effect we found with creative tasks), with no interaction with the type of ranking or incentives (column 3), and no effect of adding controls (column 4). Since non-

creative score is interpreted as a proxy of effort in non-creative tasks, this suggests that group members' effort decreases in the level of effort prevailing in the group, as if agents were discouraged by seeing peers working hard, as already documented in Gill and Prowse (2012) 's experiment with a standardized task. Competition may generate a feeling of rivalry; Grosch *et al*. (2022)' find that confrontations in the workplace caused workers to see each other as opponents, As happened with creative tasks, subjects have no feedback on peers' score during the experiment (they are ranked and paid only at the end of the experiment), but they worked physically side by side, so that one would have some sense of one's peers' effort.

Peer effort constitutes the subject's reference point; as shown by Gill and Prowse (2012), agents adjust their own effort choice depending on their perception of others' effort because they are loss averse around their expected payoff, so losses relative to this expectation are perceived as painful. We thus find no evidence in favour of the positive peer pressure emerging with creative task, where more creative groups fostered subject's creative performance. On the contrary, Table 6 suggests that subjects' individual performance in a standardized task is *negatively* affected by the score of peers, regardless of the presence of incentives or peer ranking.

We further investigate this aspect and attempt to shed light on how corporate culture (or the absence of it) could have driven these results. Subjects' preferences and values about being part of a group or alone according to their answers in the questions 11, 12 and 13 in the post-experimental questionnaire (see again Section 3.3 for the questions), are summarized in Table 8. Non-parametric tests show that there is no significant difference across treatments for

questions 11 and 13, but answers to question 12 reveal an interesting pattern.[12] Subjects who receive group ranking and incentives show a significantly weaker belief that working in group is more productive than working individually, whether compared to subjects in the NR-F or to subjects in the IR-I treatment. This belief is elicited through question 12, that asks subjects to choose between the claim that "If you want something done right, you have got to do it yourself (A)" and "People in a group are more productive than people working alone (B)"): NR-F versus GR-I: Wilcoxon rank-sum test, $Z = -1.980$, $p = 0.047$, IR-IF versus GR-I: Wilcoxon rank-sum test, $Z = -2.757$, $p = 0.006$; NR-F versus IR-I: Wilcoxon rank-sum test, $Z = 0.839$, $p = 0.402$.

Table 8.

Corporate culture questions with non-creative tasks: percentage of respondents

	Question 11	*Question 12*	*Question 13*	
Treatment	% of Resp. who chose A	% of Resp. who chose B	% of Resp. who chose B	Obs.
GR_I	0.564	0.256	0.692	39
IR_I	0.622	0.556	0.622	45
NR_F	0.511	0.467	0.733	45

The Table reports the percentage of answers showing a group-oriented (vs. individualistic) attitude in each of the three questions.

[12] For question 11, NR-F versus IR-I: Wilcoxon rank-sum test, $Z = 1.058$, $p = 0.290$; NR-F versus GR-I: Wilcoxon rank-sum test, $Z = -0.483$, $p = 0.692$, IR-IF versus GR-I: Wilcoxon rank-sum test, $Z = -0.538$, $p = 0.590$. For question 13, NR-F versus IR-I: Wilcoxon rank-sum test, $Z = -1.122$, $p = 0.262$; NR-F versus GR-I: Wilcoxon rank-sum test, $Z = -0.413$, $p = 0.780$, IR-IF versus GR-I: Wilcoxon rank-sum test, $Z = 0.670$, $p = 0.503$.

With non-creative tasks, we thus observe that having people ranked and paid according to the group performance appears to generate the belief that working as a group is detrimental for performance. Subjects are basically correct, since the average score in the GR-I treatment is the lowest across treatments (although they only know what happens in their own session and do not have information about average scores across sessions). A possible interpretation is that when completing a standardized and repetitive task, what matters is just being fast and concentrated; the presence of other people can only slow the process down. The same result has been observed in Van Bavel and Packer (2021), who document that the only task (of many) where teams performed worse than individuals was a simple typing assignment in which working together and coordinating responses slowed them down. This helps explain why group incentives fail to instil a sufficiently pro-social attitude in individuals, unlike with the creative tasks. As emphasized in Huck *et al*. (2012), 'norms are rooted in the presence of externalities.' (p.173). A social norm of high effort cannot emerge if agents hamper each other.

6. Discussion and conclusion

We explore the effects of attempting to establish a culture in the laboratory on creative performance, by testing whether the combination of an incentive structure (a formal institution) and corporate culture (an informal institution) succeeds in fostering creative outcomes. We find that being ranked against competitors and having a group pay structure can have a positive effect on group creativity. Our view is that this calls for the interplay of two dimensions: values and incentives.

We propose a possible measure of the effect of corporate institutions on values and find that such corporate values are shaped by incentives. This reflects the possibility of encouraging a group-oriented corporate culture and internalizing the effects of a social norm of

high effort. When groups compete against an out-group and incentives are set at the group level, this serves as a social cue that prompts the formation of a sense of group identity and induces a stronger pro-social attitude amongst the group members. When this is shared, a social norm of high effort emerges, with better creative performance.

Our instantiation of corporate culture affects performance in creative tasks but has no effect on performance in standardized, non-creative endeavours. When the task is creative, the presence of a norm for desirable action appears to multiply the benefits of financial incentives. With non-creative tasks, not only do group incentives produce poorer performance, but they also generate the belief that people in group are less productive. The reason(s) why the type of task interacts with the formation of a social norm of high effort can be related to the specificities of the creative tasks, which tend to be more complex, intrinsically rewarding, and associated with more uncertainty about the value of output (Bradler *et al*., 2019).

The intrinsic challenge that a creative endeavour implies may represent a motivating cue for establishing a norm of high effort in the group. In fact, motivated employees are shown to have a stronger commitment towards the organization, and the level of organization commitment is correlated with the strength of corporate culture. Different organizational levers of motivation, such as workers' motivation and sense of accomplishment, can make organizational culture more effective (Lee *et al*, 2016).

Our findings are consistent with previous investigations in suggesting that motivating independent individual efforts does not enhance group creativity, whereas incentives stimulating group cohesion better promote group creativity. Knowledge-intensive firms are often singled out as organizational forms that use social identity as a mode for managerial control (Kaarreman and Alvesson, 2004). A strong identification between the employees and

the corporation may stimulate higher effort, since highly-identified employees wish to preserve their self-concept by avoiding corporate failure (Hirst *et al*., 2009). This is a powerful motivation, particularly where creative problem-solving involves uncertain and untested solutions with a high risk of failure (Elliot and McGregor, 2001; Fisher and Ford, 1998).

It is important to emphasize that, in our design, group ranking always comes with individual ranking: the group relative position with respect to other groups in the session is obtained by averaging the group members' performances, and information on the latter is provided to participants, acknowledging each member's contribution to the group's outcome. A possible extension would consist of giving information on the group's ranking only, and check whether this implies higher free-riding behaviour and possibly worst members' performance.

Another remarkable aspect to emphasize is that our manipulations of culture succeed in having an impact on creativity notwithstanding the fact that subjects interact only once. We wonder how things would change when considering a repeated interaction where subjects complete creative tasks repeatedly and receive feedback on individual/group performance after each round. It would be interesting to investigate whether the effect of culture on creative performance we find would strengthen further, and how difficult could be to replace a certain culture with another.

Our results on creative tasks also have implications for innovation. One suggestion is to have people work together as a group and providing them with ranking and financial incentives in relation to other groups. The results (in Table 1) do provide evidence along this line. While it is not generally true that groups are more creative than individuals are, the creative performance in the GR-I treatment is in fact much higher than in any other treatment. This suggests that firms considering offering incentives to workers and deciding whether to form

groups might be well-advised to do so. While this is only one result, it does provide some potential guidance. However, it seems clear that more evidence is needed for such a claim.

In closing, our results suggest some directions for fruitful research in this developing area. We hope that other researchers will join us in exploring what is best for encouraging or facilitating creativity in a variety of economic environments.

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