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DISSERTATION

THE EFFECTS OF REWARD SCHEMES, INDIVIDUALISM-COLLECTIVISM, AND INTRINSIC MOTIVATION ON TEAMS' CREATIVE PERFORMANCE

Submitted by

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Psychology

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer 2001

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Committee on Graduate Work

Advisor

Department Head

ABSTRACT OF DISSERTATION

THE EFFECTS OF REWARD SCHEMES, INDIVIDUALISM-COLLECTIVISM, AND INTRINSIC MOTIVATION ON TEAMS' CREATIVE PERFORMANCE

This study tests predictions driven from two competing theories regarding the effects that rewards have on creative performance and task motivation. Cognitive Evaluation Theory (CET) claims that external rewards are detrimental to intrinsic motivation (IM) and creativity, and more so when rewards are expected, tangible, and performance-contingent because they shift self-attribution to extrinsic causes. Neo-behaviorist models suggest that rewards decrease IM and creative behavior only when they are tangible and non-contingent on performance. The present study was the first to test these theories in a group-performance context. To further explore variables that may be responsible for the contradictory results in past studies, I examined the possibility that Individualism-Collectivism (I-C), assessed here as a personality variable, would interact with reward types to affect creative performance and motivation. 340 students worked in small groups simulating project teams under one of three reward conditions: individual performance reward (IR), group performance reward (GR), and performance non-contingent reward (PNR). Situational motivation was assessed for two tasks requiring creativity: generation of product improvement ideas (PI), which was performed in individual setting, and creation of slogans for marketing the new product, a task performed in team setting. The interaction of rewards X I-C had significant effects only

on group creativity, albeit in a different direction to the predicted. IR resulted in higher IM than PNR and GR, while PNR individuals were significantly more creative on the individual creativity task then GR individuals. GR and PNR teams displayed significantly higher group creativity than IR teams. IM and cohesiveness partially mediated some of the effects of rewards on creativity. The need to incorporate task type and group context in theories of motivation and creativity is discussed, as well as implications for designing incentive and motivation systems to enhance creativity in the workplace.

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To my wife *Maureen*

Thank you for being with me and supporting me in this long way.

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INTRODUCTION AND STATEMENT OF RESEARCH QUESTIONS

Thousands of for-profit and non-profit organizations around the world are struggling to find the best means to motivate their employees. Continuous innovation has been recognized as one of the most crucial factors in organizational competitiveness and success (Janszen, 2000). The competition is especially fierce among high-tech and knowledge-rich companies where even small differences in units' creative performance can determine survival or failure of their companies.

Teams that perform well are one of the most desirable commodities in the work world of the 90s (Guzzo, 1996; West, 1996) and this trend continues well into the 21st century. With more and more work functions having become dependent on teamwork, teams are playing an increasingly larger part in contributing to organization's innovation through producing new ideas, processes, and products. Team creativity is especially important in knowledge-rich industries that focus on research and new product development, as well as in other areas that rely on both teamwork and on basic and applied creativity, such as symphonies, restaurants, architecture firms, and advertising agencies.

From a theoretical perspective, we are still struggling to understand how the interaction of situational and personality variables determines complex behaviors, such as creative thinking, both at the individual and the group level. The mapping of the paths that mediate the effects of incentives on performance in groups is still underway, while

the debate over whether rewards increase or decrease creative performance is currently at its peak (see, for example, Eisenberger, Armeli, & Pretz, 1998).

The present study examines the interactive effects of relevant contextual and personality variables on team creativity. I believe that such an interactionist approach will help to advance the field by examining more complex, and perhaps more realistic, situations than employing only situational or only personality variables. While the cost of such an approach is having to deal with a higher level of conceptual and analytical complexity, we gain the ability of looking at the combined effects of several forces at the same time and within the same experimental framework.

The research has two major foci. One aspect feeds more of practices in the filed and is concerned with comparing the effects of group versus individual rewards for performance (or bonuses) on creative performance and the variables that mediate and moderate these effects. The other aspect of the study stems from more theoretical concerns and tests contrasting motivation theories by comparing the effects of performance-based rewards with the effects of performance non-contingent rewards on team members' intrinsic motivation and creativity.

To that end, this research project synthesizes knowledge from the social, personality, organizational, and cross-cultural areas of psychology. The findings of this project are important for application as well as for theory building. My hope is that the present study will be successful in providing some answers for theoreticians and researchers as well as practitioners about task motivation and creative performance in groups.

The general goal of the project is to identify the influences of personal and context variables that interact with, moderate and mediate the effects of rewards on creative performance of teams. The model presented in Figure 1 (and the hypotheses outlined later in the study) suggests that reward types interact with individualism-collectivism (I-C) levels to affect individual and group creativity. I propose that these effects (as well as the main effects) are mediated by individuals' intrinsic motivation and by group cohesiveness.

Figure 1: The full model: Factors that mediate and moderate the effects of rewards and individualism-collectivism on group creativity

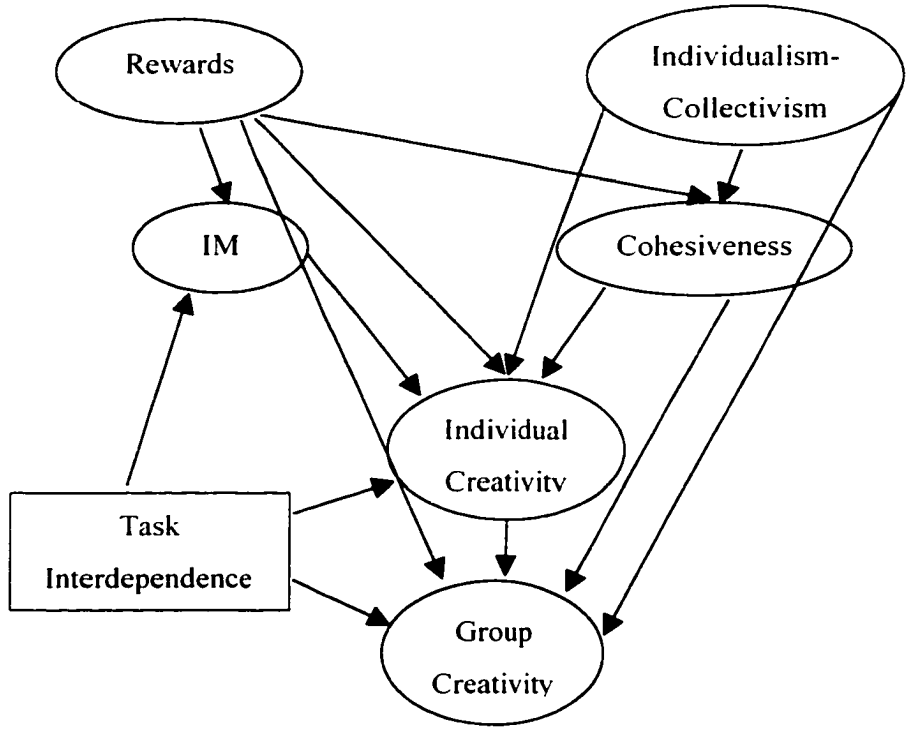


Figure 1 presents a graphic summary of the main variables employed in the present study. In terms of context variables, I am looking at three generic reward schemes that may be employed to compensate and motivate team members' performance. These

reward conditions are individual-based compensation (**IR**), group based compensation (**GR**), and performance non-contingent reward (**PNR**). The dispositional variable of interest is collectivism-individualism. When measured as a personality variable it assesses whether persons are high on individualism (HI) or high on collectivism (HC).

Individual and group measures of creative performance serve as the primary dependent variables of interest. The two creativity tasks performed during the study also serve as a repeated measures variable. One task does not require cooperation among team members (and can be conceptualized as an *additive* or an *independent* task) while the other depends on cooperation between the members (an *interdependent* type task). Thus, task interdependence is presented in the model as a moderating variable.

As my working definition of creativity, I adopt the one proposed by Amabile (1983) and others. According to Amabile (1983, p. 33), "A product or response will be judged as creative to the extent that (a) it is both a novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic." While broad agreement can be found for the first part of the definition, the second requirement is not included in most definitions of creativity (for support of the second part see James, Chen, & Goldberg, 1992). Examining the various measures used for creativity it appears that there is a continuum on which tasks can be placed--some being highly open-ended and others strictly algorithmic. My interest in the present study is in employing tasks that are relatively less structured; I believe that this type of tasks allows for a better ecological validity in such a study.

In the first part of the introduction, I review literature on the issues relevant for the present study. I start by reviewing studies and models that deal with the effects of

rewards on motivation and creative performance. Next, I review more general literature on task performance in small groups and teams and describe types of teams and types of tasks performed by them. Then, I focus on factors affecting creative problem solving in teams. The second part of the introduction focuses further on the present study and describes the situational, individual differences, process and dependent variables, which are been examined in the study. At the end of the introduction, hypotheses are formally laid out. The introduction is followed by the methodology section, the results, and ends with discussion and implications sections.

Effects of Rewards on Creative Performance and Intrinsic Motivators

The traditional approach in psychology, dating to early behaviorism, holds that rewards, as much as they are desirable to the organism, would increase the likelihood of any rewarded behavior. This position has been challenged by an increasing number of psychologists, comprised initially from humanist psychologists and psychoanalysts. However, until the 1970s there was not a systematic body of theoretical and empirical studies to support the claims that rewards can function as disincentives in some circumstances.

One of the earliest explanations offered for the failure of rewards to increase performance was based on the Yerkes-Dodson Law. This explanation accepted that rewards do increase the motivation of an organism to engage in effort towards accomplishing a certain task. However, if we accept that, at least for complex behaviors, exceeding a certain optimal level of arousal or motivation will result in decreased performance then it is conceivable that 'excessive rewarding' may be detrimental to performance (McCullers, 1978).

The study of the detrimental effects of rewards became more systematic during the 70s with investigators such as Deci (1975), McGraw (1978) and others (Condry, 1977; Kruglanski et al., 1975; Lepper, Greene, & Nisbett, 1973) who offered theoretical and empirical support to the idea that, for some behaviors, rewards are not beneficial and, furthermore, may be detrimental. A common thread in these scholars' ideas revolved around the concepts of intrinsic and extrinsic motivations. In general, the argument goes, extrinsic rewards for intrinsically motivated tasks can decrease likelihood of the rewarded behavior occurring, especially when the extrinsic contingencies are later absent.

Deci and Ryan (e.g., 1975, 1985) suggested that in order to understand fully the effects of rewards on the whole spectrum of human behavior we should differentiate between the two motivation types. Intrinsic motivation "is based in the innate, organismic needs for competence and self-determination. It energizes a wide variety of behaviors and psychological processes for which the primary rewards are the experiences of effectance and autonomy" (Deci & Ryan, 1985, p. 32). Emotions of interest, enjoyment and excitement often accompany engagement in intrinsically motivated activities. Deci and Ryan further assert that "When people are intrinsically motivated...they perceive the locus of causality for their activity to be internal...the antithesis of interest and flow is pressure and tension. Insofar as people are pressuring themselves, feeling anxious, and working with great urgency, we can be sure that there is at least some extrinsic motivation involved" (Deci & Ryan, 1985, p. 34).

Extrinsic motivation refers to behavior where the reason for doing it is something other than an interest in the activity itself. Typically, extrinsic motivation involves an activity with reward contingency or some external control, for example external

evaluation or appraisal of one's performance. Deci and Ryan offered the *Self-Determination* theory to explain how certain affective states relate to motivation and can potentially affect performance. Self-determination revolves around the experience of choice and the belief of having control over one's actions. Self-determination is not impossible under conditions of external control, but is much more likely to occur when the locus of control over outcomes is perceived as internal. Deci and Ryan (1985) view self-determination both as a human capacity and as a basic need. As such, it is a universal characteristic of human functioning.

Utman (1997) attended to potential mediators of the effects of motivational states on performance, including, but not limited to, creative performance. He examined studies that compared effectiveness of *learning goals* (which closely resemble intrinsic motivation or task involvement) with *performance goals* (*resembling extrinsic motivation* or *ego-involvement*). In his meta-analysis (which included 25 experiments) he found that, overall, learning goals led to better performance than performance goals. Task complexity was identified as a moderator, and the advantage of learning goals grew larger as the complexity of the task increased. Age was also found to moderate the effects: the effect size was smaller for younger students. Finally, the advantage of learning goals was smaller for participants tested alone compared to those tested with others.

Self-determination is integral for intrinsically motivated behavior; intrinsic motivation, in turn, is important for learning, adaptation, and cognitive performance. It has been suggested and demonstrated that intrinsic motivation plays a crucial role in motivating problem solving and creative behavior of various sorts (Amabile, 1996; Deci & Ryan, 1985). Motivation often predicts the quality of innovative work performed by

work groups. Payne (1990), for example, describes studies by Andrews who found that team members' intrinsic motivation, measured through subjective reports in three areas (dedication, voluntary overtime and interest in the work itself), correlated positively with qualitative performance measures of innovation (but not with quantitative ones). Somewhat more controversial is the notion that introduction of *extrinsic* motivators typically decreases intrinsic motivation and, consequently, is detrimental to intrinsically-motivated behaviors, including creativity.

A series of studies by Amabile and her colleagues (see Amabile, 1996 for a summary) indicated that rewards, evaluation and situations of externally imposed competition all result in lower creative performance compared with conditions that do not employ any of these extrinsic motivators. Amabile's and Deci and Ryan's explanation for these negative effects is that the extrinsic motivators induced a change in the perceived locus of control from internal to external, resulting in decreased intrinsic motivation for the activity. Thus, the behavior is no longer done because it is interesting, but rather to get an external reward or to comply with an external demand. This shift in causal attribution of the underlying motivation occurs primarily when the activities one performs are cognitively challenging, which is typically the case for creative problem-solving type tasks. Supposedly, creative thinking necessitates mental flexibility and freedom, which are constrained by perceptions of individuals that they do not have the choice to behave as they wish.

A further significant contribution to the research on motivation and performance was made by Lepper et al. (1973) who suggested the *overjustification* hypothesis to explain the process by which rewards may decrease subsequent behavior or the quality of

one's performance. The core idea is that when a person is engaged in an intrinsically interesting activity, imposing superfluous extrinsic rewards may be detrimental for his/her intrinsic motivation. The overjustification paradigm is based on self-directed inference processes such as those employed in explanations of the "cognitive dissonance" phenomena. When an individual is engaged, or about to be engaged, in an activity which is by itself interesting for him/her, offering an excessive reward to engage in that behavior would lead the person to attribute the interest or motivation to engage in the activity to the (external) reward. The person would be therefore less likely to regard the activity as interesting in itself. In as much as interest in an activity functions to facilitate performance on that activity, reduced interest during or after performing the task would decrease one's future task performance. Finally, a distinction should be made between 'contracted for' rewards and 'unexpected' rewards. Only the former, say Lepper, Greene and colleagues, would produce significant decrease in intrinsic motivation. When the reward follows an intrinsically interesting activity but there is no perception that the activity was initially performed to gain the reward, the overjustification effect would not occur. A series of experiments that employed a variety of activities and rewards lent support to these propositions (see Lepper & Greene, 1978 for a review).

Another interesting issue, distinct somewhat from the discussion of consequences to intrinsic motivation caused by rewards, is how rewards affect performance on the rewarded tasks *as they are being performed.* This issue is closely related to the focus of the present study. Lepper and Greene (1978) report several studies in which a positive correlation between performance during a task and future intrinsic motivation for the task was found. However, different procedures produced somewhat varying results and

Lepper and Greene concluded that decreased performance is not necessarily related to or predictive of decreased future intrinsic motivation. One general observation that seems valid across many procedures and dependent measures is that although rewards often result in increased *quantitative* production on a task, *quality* often does not increase or even decrease compared to conditions where rewards were not promised.

Finally, Deci and Ryan (1985), in order to explain differing effects of rewards, distinguish between *controlling* and *informational* aspects of rewards. Rewards function to control certain behaviors (e.g., they aim at making the person perform a task better or longer). The informational aspect of rewards, on the other hand, conveys positive or negative information about a person's competence and self-determination. Deci and Ryan suggest that rewards are sometimes used in ways that emphasize control, and at other times, information. They further propose that when the controlling aspect of a reward is emphasized, it will result in changing one's causality focus (for doing an initially interesting activity) from internal to external. When the informational aspect is emphasized, on the other hand, no such shift in causality should occur. A series of field and laboratory studies confirmed this hypothesis (Deci & Ryan, 1985).

In sum, the major tenants behind the "intrinsic motivation" explanations for the detrimental effects of rewards on creative performance (arguably, the most prevalent models since the 1970s) are based on the presumptions that:

A. All humans have strong need for self-determination and self-actualization;

B. Perceiving internal locus of control or causality is essential toward this end;

C. Events that promote more external perceived locus of causality undermine self-determination, perceived internal control and, therefore, intrinsic motivation, and;

D. Decreases in intrinsic motivation have detrimental effects on performance of tasks that require intrinsic motivation. Creative thinking is seen as among these tasks.

The last group of studies I review have been performed by Teresa Amabile and her colleagues and loan empirical support for the negative effects of extrinsic motivators on mental performance. Amabile's (1983, 1986) research has focused specifically on performance of creative tasks. Her extensive research program initially focused on various artistic behaviors and later proceeded to examine creative performance in the work place. She suggested that extrinsic motivators such as evaluation and reward undermines creativity displayed on *heuristic* tasks--where the task is at least somewhat open-ended and there is no clear and readily identifiable path to the solution. On the other hand, evaluation and reward may enhance creativity on *algorithmic* tasks--when the path to the solution is clear and straightforward, when it is clear to the performers what it is, exactly, that they are expected to do (some students of creativity, however, view the latter as tapping convergent thinking rather than truly creative thinking). These explanations follow the rationale of the self-determination theory, suggesting that when flexible and divergent reasoning (exploring in different directions in order to discover many possible ideas that may serve as solutions for posed problems) is required, perception of external constraints would undermine performance.

In several (mostly lab designed) studies involving effects of rewards on creative performance, Amabile and colleagues found that, almost without exception, participants in conditions where reward was promised for performing a task scored lower on the rated creativity of their products than those in no-reward conditions. While impressively supported within Amabile's series of studies, the conclusion that rewards are detrimental

for creative performance did not lay unchallenged for long. The most effective "opposition" was offered by Eisenberger and his colleagues (1996, 1998). They argued that, in general, 'there is nothing wrong' with rewards--when administered properly rewards enhance any behaviors, including creative ones. In a series of laboratory experiments, Eisenberger demonstrated that under most conditions, rewards (as well as promised rewards) do serve as incentives for creative behavior. He observed better performance (as measured by divergent thinking tests) among the participants who were rewarded compared to those who were not. Only when the reward was highly salient and served to distract participants' attention from the task were rewards found not to increase performance.

Further, a meta-analysis examining the effects of rewards on intrinsic motivation by Cameron (Eisenberger & Cameron, 1996) revealed that these results were not a random trend. The studies that went into the meta-analysis were classified according to several design characteristics of the rewards used: verbal vs. tangible, expected vs. unexpected, and quality dependent vs. completion dependent vs. performance independent. The authors concluded that, in most situations and for most types of rewards, intrinsic motivation was higher under reward (versus non-reward) conditions. In some reward conditions, there were no differences, and only in a small number of studies did rewards prove detrimental to intrinsic motivation. The analysis shows that the latter results occurred only when the rewards were tangible, expected, and performance independent.

I believe that the reasons for these widely different conclusions from Amabile and from Eisenberger about the effects of reward on intrinsic motivation and creative performance can be traced mainly to two sources:

1. The use of different experimental methods including different tasks, different types of participants, different procedures and different environments.

2. The existence of certain variables that moderate the relationship between rewards and creative performance. Such variables could include presence of others, open-endness of tasks, other influences on participants' motivation, and stress.

Recently, psychologists have started to research these two issues. For example, Carton (1998) reviewed the differences in methodology among the various studies of reward and creativity. He noticed that key features in experimental design, such as whether the desired outcome was explicitly specified and use of one-time performance versus a multi-trial reinforcement schedule, differed among studies and often related to their results. Typically, when researchers stated explicitly that they are looking for unusual responses, and when the study included reinforcement-training sessions, rewards increased intrinsic motivation. Studies that did not include these features were more likely to report that reward did not increase, or even decreased, intrinsic motivation.

It is apparent that the issue of how rewards affect motivation and creative performance is complex and not resolved as yet. My interest in the present study however, is not in testing a 'general' theory of incentives, intrinsic motivation and performance but rather in addressing more specific matters, namely effects of reward systems on teams' creative performance.

It is worthwhile to note that most of the aforementioned studies employed children and play situations in their procedures. Some of the reasons behind these choices are theoretical (such as an interest in educational and developmental questions), and some are pragmatic (e.g., smaller rewards are needed to significantly motivate children than to

motivate adults). I believe that when investigating effects of incentives on working adults we deal with somewhat different issues. First, almost by definition, work is different from play as it typically involves commitment to perform certain tasks, even if they are not fully desirable or chosen by the individual. Second, employees almost universally expect to be rewarded for their efforts by some kind of commodity, which takes the form of monetary compensation in most countries. Thus, workers expect their work to be rewarded and, furthermore, believe that good performance is desirable and may lead to higher compensation. Following these premises, my main interest is to compare how effective different compensation systems are for promoting creative performance by adults on different types of tasks commonly performed by groups in the workplace. While highly relevant for organizational theory and practice alike, very few studies examined team creative performance in the behavioral level (see review in Paulus, 2000). The next section reviews literature that specifically deals with theory and research on the effects of various incentive structures on individual performance in group settings and work-like situations.

Task Performance in Small Groups and Teams

The present paper deals with *small groups*, specifically how some situational and individual differences can affect the creative performance of individuals working in such groups. There is no definite number agreed upon as defining 'small' groups. I will be using the term to refer to groups that have between two and few dozens member (see also the discussion in McGrath, 1984). Most of us are members of at least few small groups: families, work teams or departments, sport teams, committees, and more. Even a brief consideration of this not exhaustive list of small groups reveals that they can vary widely

on several dimensions such as potential size and type of relations among their members. Several typologies of groups have been offered to cover these and other dimensions of groups (e.g., Hare, 1994; McGrath, 1984).

Teams at Work: Background and Definitions

In essence, research on teams is based largely on group research. One way to think about the shift from groups to teams is as indicating a shift in focus from social psychology to industrial/organizational-psychology, and, consequently, putting more emphasis on field and organizational context. Nevertheless, even leading organizational scholars find the distinction between groups and teams semantic in essence (e.g., Guzzo, 1995). From now on, 'teams' and 'groups' will be used mostly interchangeably in the present study.

Though the concept of teams or work-groups is not revolutionary, interest in teams at the workplace increased tremendously in the late 1980s and 1990s. "Teams and teaming have become hot topics, almost faddish in recent years..." (Guzzo, 1995, p. 1). One of the results is that "every person in a medium- to large-size organization hears the word *team* or *team building* at least once every day" (Recardo et al., 1996, p. 2). This team-enthusiasm was accompanied by dozens of books and hundreds of articles, whose audience were researchers, consultants, managers and team members. Consequently, various definitions and descriptions for *teams* were offered. These definitions range from ones that are quite restrictive, to fairly broad ones.

Recardo et al. (1996) note that the term "teams" has been used not merely in a descriptive fashion but as a prescription, as well. The latter uses typically have positive

connotations and imply that group members work in harmony and cooperatively. They suggest the following definition for a team:

> "A unified, interdependent, cohesive group of people working together to achieve common objectives. Whereas each person may have a specialized function, each person also needs the resources and support of others and must be willing to forego individual autonomy to the extent necessary to accomplish those objectives." (p. 6)

Guzzo (1995), on the other hand, takes a more general approach to defining teams: "we make no real distinction between teams and groups...we use these terms interchangeably..." (p. 2). However, similarly to Recardo et al. (1996), he emphasizes the task-based interdependence among group members as a critical characteristic of a team. "That is, a group's work must require, to an appreciable degree, that team members interact by way of exchanging information, sharing resources, and coordinating with and reacting to one another in the course of accomplishing the group task" (Guzzo, 1995, p. 3).

Taxonomy of Groups and Teams

As with definitions, there is no sharp consensus regarding how one should categorize types of groups. Recurring themes in these taxonomies are classification along dimensions of purpose, scope, nature and structure of tasks, composition and functional diversity of members, dynamics of leadership, and maturity level. In the following section, I review some of the earlier, more general classification systems offered for groups and then some taxonomies that focus specifically on work teams.

McGrath classified groups along two main dimensions: the groups' *activity scope* and their *temporal scope*. He suggested three broad categories relevant for group researchers: natural groups, concocted groups, and quasi-groups. Natural groups are those "groups that exist independent of the researcher's activities and purposes (p. 41)." Examples include families, friendship groups, sport teams and work crews. Concocted groups are those "that are created for the purpose of being vehicles for research" (p. 41). This category includes experimentally created groups such as mock jury, test-crews, simulated work teams or expeditions and ad hoc laboratory groups. The groups used in the present study resemble best the characteristics of the "simulated work teams."

Lastly, there are the quasi-groups. These groups differ qualitatively from groups in the previous two categories. While natural and concocted groups are both 'real', in the sense that the individuals in them are indeed working together on tasks while interacting and communicating unrestrictedly (as group members normally would), and have the awareness that they are members of a specific group, quasi-groups are not quite 'real' since their members have no, or very limited opportunity, to communicate and interact with each other.

To provide a broader context for the present study I review some of the general characteristics pertaining to groups as task performing units. Several dimensions of tasks typologies have been offered (McGrath & Altman, 1966; Shaw, 1973; and Steiner, 1972). Based on his own and others previous work (most notably on Hackman, 1976 and Laughlin, 1980) McGrath suggested a model, labeled the *Group Task Circumplex* that uses four main task categories, each including two sub-types within it. The main categories are: Generate, Choose, Negotiate, and Execute. *Generate*, the category closest

related to the tasks employed in the present study, includes generating plans (type 1: "planning tasks") in which a group has to generate action-oriented plans, and generating ideas (type 2: "creativity tasks") in which a group has to come up with creative ideas (e.g., brainstorming tasks). In McGrath's model, creativity tasks fall well within the *cooperation* (as opposed to *conflict*) dimension.

Moving on to classification systems of work teams, Recardo et al. (1996) suggest a fairly basic taxonomy with four types of teams based on some of the above dimensions and organized according to increasing involvement and participation of team members.

- Simple Problem-Solving Teams typically address problems within certain units and work within a fixed, short to medium time frame. Membership is assigned externally and the team's task is to react to and solve relatively simple technical problems.

- Task Forces are composed of team members with highly specialized and functionally complimentary skills (e.g., accountants, engineers and programmers). The aim of such teams is to solve complicated problems that necessitate a high degree of specialization. Task forces conduct research and make recommendations but do not implement solutions.

- Cross-Functional Teams' members, like those of task forces, represent a variety of functions within the organization and aim at solving complicated problems. Unlike task forces, cross-functional teams have more authority and responsibility for implementing the solutions they come up with. Unlike problem-solving and task-forces, cross-functional teams may operate on a permanent basis.

- Self-Directed Work Teams (SDWT) are unique in that they manage their own affairs, including human resources decisions (such as hiring, firing, compensation) and have substantial financial control over their budgets. More than the previous three team types, SDWT develop over time and cannot be successfully implemented within a short time period.

In my study, the artificially comprised teams share aspects with 'simple problem-solving teams' as well as with 'task-forces'. On the one hand, members were externally nominated to the group and have worked in a time-limited framework; on the other hand, members were asked to solve some complicated problems (but not implement them).

A major portion of the group-performance research (including McGrath, 1984) focuses on performance comparisons between groups of various types and individuals operating alone. It also attempts to determine the types of tasks where groups have advantage over individuals, and vice-versa. These are not major interests in the present study. My starting point is that many organizational and work settings have been structured, a-priori, for group performance (though sometimes unwisely so; see Recardo, Wade, Mention & Jolly, 1996). Hence, the issue of comparing individuals' performance to groups' is not very relevant for many organizations. The reasons for requiring that some tasks be performed in group settings are varied. Contributing factors could be high complexity of a task, a need for a consensual decision, or a need to pull together experts from different areas in order to complete the task (as is the case in cross-functional teams). In light of that, my interest lies in 'group versus group' performance comparisons,

i.e., examining how different group settings and compositions would affect groups' performance.

General Issues in Teams' Performance

Due to the vast number of group studies and their large variance in variables employed, any summary that attempts to present general conclusions is doomed to be inaccurate. With that disclaimer in mind I try to review some of the more general factors associated with teams' successful performance before focusing on creativity and innovation in teams. Indeed, as was mentioned above, one major reason a generalized summary of successful team practices would be inherently inaccurate is that the variables necessary for successful team performance depend heavily on the nature of the task.

Guzzo and Shea (1993) reviewed factors associated with group performance and members' relations. Group composition is seen by most researchers as a crucial element in group's success. However, they note, "The 'right' combination of members has been very difficult to specify" (p. 301). Theory and research emphasized personal fit in terms of needs, personality and abilities. Both task-relevant and interpersonal skills were shown important. The effects of members' homogeneity and heterogeneity on group effectiveness has received preliminary examination. Guzzo (1988, in Guzzo & Shea) suggests that while more heterogeneous groups would be advantageous for cognitive, decision-making tasks, other tasks, possibly less complex and more manual ones or those performed under extreme pressure, would benefit more from a relatively homogeneous composition.

Factors related to 'social interaction process' comprise another prominent category of precursors to effectiveness. Some studies emphasized the importance of *expressive*

(affective or socioemotional) interactions, while others emphasized *instrumental* (task-related) interactions. Often, expressive interaction is seen as precondition for successful instrumental interaction in the group (Guzzo & Shea, 1993).

Motivational issues have important bearing on group effectiveness. From the task-type perspective, some tasks would obviously be more successful in motivating some people than others (Amabile, 1996, Steiner, 1972). Other sources of motivation include identification with the group and its goals; optimally challenging goals; rewards; and personal values (Guzzo & Shea, 1993; James & Eisenberg, 2000a).

The surrounding environment can also influence group performance. Adapting and interacting effectively with the broader organizational environment is crucial for the team's success, especially in the long run (Guzzo & Shea, 1993; Hartley, 1996). Central themes in groups' environments include organizational culture and climate (Anderson & West, 1998; Guzzo & Shea); organizational structure (Gladstein, 1984); managerial support; and, of course, leadership (Guzzo & Shea). Finally, at a broader level, national or regional culture is an important factor used for explaining why some types of groups, quality circles for example, enjoy more success in some countries than others (Ledford, Lawler & Mohrman, 1988; Triandis, 1994).

Task Interdependence in Teamwork

The nature of the task performed by the group received, naturally, considerable attention from group process and performance researchers (e.g., Guzzo, 1995; McGrath, 1984; Recardo et al., 1996). Several models have suggested, and studies confirmed, that task characteristics are crucial moderators of factors affecting group structure, group climate and groups' performance. My interest is in examining tasks requiring creative

thinking but that vary in degrees of required interdependence. Interdependence is often explicitly included in the definition of a "team" and seen as a necessary characteristic by several team researchers and practitioners (e.g., Guzzo; Recardo et al.). Definitions of interdependence vary according to researchers and it seems that the scope of the term is still being negotiated. Guzzo suggested that interdependence is "the degree of task-required cooperation in a group" (1986, p. 48). McIntyre and Salas (1995) who take a detailed look at the conditions for teamwork behavior, emphasize that interconnectedness of subtasks is essential for interdependence. This means that "The degree of success on the overall team task depends on the degree of success on each of the subtasks (1995, p. 21)." In general, task interdependence is the extent to which group members have to rely on each other to effectively accomplish some given task (see Georgopoulos, 1986). This latter definition is used to conceive and operationalize task interdependence in the present research.

It is hard to find a definitive summary that reveals the relationship between degree of task interdependence, task content, group processes and group outcomes. I believe that one of the reasons is that so many related terms (cooperation, collaboration, cohesiveness, and coordination, to name a few) are used to describe related psychosocial phenomena in groups. To complicate matters further, the research on interdependence and performance has been conducted by researchers from various sub-areas of psychology (mainly social, personality, educational, and organizational) that often have limited familiarity with the work of their peers from other sub-areas. Furthermore, and maybe most importantly, interdependence (or cooperation) is sometimes used to describe roles, sometimes goals, sometimes tasks, and sometimes member relationships in groups (see for example

Johnson et al., 1981; Tjosvold, 1986; Tjosvold, 1990). McIntyre and Salas raise a similar point "...a distinction must be made between the *actual interdependence* and an *attitude of interdependence* among team members." (1995, p. 28). It is my impression that a thorough 'house cleaning' is needed in the relevant literature to relate data from various disciplines. Obviously, it is beyond the scope of the present study (indeed it may be a task for a separate thesis) to try to organize this literature. My focus here is on interdependence defined as a task characteristic, and in exploring the relation between task interdependence and group creative performance.

Within the social/organizational literature, group task interdependence was found, under some conditions, to correlate positively with general performance. Tjosvold (1995) concludes that as much as task interdependence is antecedent of cooperative goals and trust, it will contribute to better performance, especially in a crisis situation. McIntyre and Salas (1995) review literature that points that team (members') interdependence is a common characteristic of most effective teams. A necessary (though not sufficient) condition for achieving interdependence at the member attitude level is task structure that not only allows, but actually necessitates, interdependent work.

Factors Affecting Teams' Creative Problem Solving Performance

Relatively few studies have focused on creative performance or idea generation in teams. One reason is the potentially limited ecological validity in such studies. Guzzo (1995), for example, see generating ideas and decision making as inherently integrated and interrelated areas. He believes that, typically, teams in organizations work through decision-making processes and that generating ideas is part of such a process.

King and Anderson (1990), who focus more on innovation in groups (e.g., implementation of creative ideas over time), identify several variables that have been shown to determine groups' innovativeness. Leadership, an extensively studied factor in group performance in general, features also in many group innovation studies. One of the conclusions is that a democratic-collaborative style encourages group innovation. For some type of teams though, (e.g., scientific research), optimal innovativeness is achieved with moderate levels of leader's control over the group, and not by maximal or minimal levels (King & Anderson).

Among the group level variable, cohesiveness, also is related to innovation and creative performance in groups. I discuss this research later in the paper. *Group longevity* was found, in a few studies, to relate negatively to innovativeness: members were more creative in relatively short-lived groups. We should bear in mind that even the shortest of these studies, which were conducted in real organizations (and not in laboratories), spanned longer time periods than the typical laboratory studies. Finally, Studies that examined the effects of *group composition* suggest that diverse organizational functions, dissenting minority members, and stimulating colleagues can contribute to the quality of the solutions suggested by creative problem solving groups (King & Anderson, 1990). King and Anderson, who reviewed this literature, caution that most of this evidence is inconclusive, mainly due to the limited scope and range of studies and because researchers have not been taking into consideration other potentially relevant conditions.

Payne (1990) provides another review and summary of relevant literature. The main source his review is based on is an extensive research project reported by F. M.

Andrews in his 1979 book "Scientific Productivity". This project examined 1222 research teams in academic, government, non-profit, and private organizations in six countries. The project examined effectiveness of research group as defined by several quantitative (e.g., number of publications or patents) and qualitative (e.g., international recognition and reputation and administrative effectiveness of the unit). As in previous studies, group leadership played a significant role in the team's productivity. The team leader's personal productivity correlated highly with the group's productivity (rs of 0.62-0.68), and also higher than other team members' productivity did. Of special relevance to my study is that cohesiveness was also related to higher productivity, and crucially so in the larger groups: groups larger than seven had poor performance unless cohesiveness was high.

Other findings point to the crucial role of communication, both technical and interpersonal. Internal and external communication accounted for considerable variance in teams' productivity and effectiveness, with the first playing a more important role. Diversity of teams was also assessed on six dimensions: diversity in projects, interdisciplinary orientation, diversity in specialties, diversity in funding resources, diversity in R & D activities, and diversity in professional functions. All dimensions of diversity related positively to both quantitative and qualitative measures of performance and accounted for an average of 10% of the variance (Payne, 1990).

In the following sections, the remainder of the introduction, I look more specifically at the variables employed in the present study and seek to relate them to theoretical models and to previous empirical findings.

Overview of Variables Employed in The Present Study

Contextual Variables

In general, when a task is performed in a group context, (e.g., team, department), there are two fundamental ways to reward group members. One way is to reward individuals regardless of the group outcomes or performance. Thus, compensation may be a fixed amount for number of hours worked, it may be given for completion of a task or some quota; it may be awarded relative to worker's share in the output, or as a combination of these methods. In such a system, there is no direct contingency between one member's compensation and the performance of other members (such as the case when production norms serve as a basis for compensation in certain units). An alternative strategy is to reward the group as a whole. One way to create such a contingency is by rewarding members according to the pooled performance of the whole group or work unit. In such case, one member's compensation would depend on the performance of other work-group members.

While some organizations implement reward structures that mix, or integrate, individual- and group-based rewards (e.g., Wageman, 1995), in the present study I will examine only the 'pure' versions of these structures. This will help to insure clarity in this initial test of the effects of reward structures on creativity.

One of the common reasons that organizations (business and educational alike) are reluctant to use group-based evaluation and reward is the fear of productivity losses due to group-related processes (see for example McGrath, 1984). A well-known group-process performance phenomenon is *social loafing*. Social loafing is one of several 'group motivation loss effects' (Harkins & Szymanski, 1989). Essentially, social loafing

refers to the finding that people do not try as hard when performing a task in which individuals' outputs are combined (or pooled) such that individual contributions can not be identified. Following Latane and colleagues' experiments in the 1970s (e.g., Latane, Williams & Harkins, 1979), many researchers have replicated social loafing in various situations. Thus, across various tasks (from rope pulling to unusual uses generation) participants in groups whose output was pooled performed worse compared to situations where every group member's input or performance could be distinguished from other members' input. Typically, for performance to be rewarded in organizations it has to be identified and assessed. It seems reasonable to expect that when rewards are given in a way that does not identify the efforts or outputs of discrete individuals, individuals will, by and large, tend to invest less effort than if their individual output was being evaluated. Further studies explored the conditions under which social loafing occurs, trying to identify which are necessary and sufficient and which would reduce social loafing.

As will be discussed in the next sections, cultural differences in values and goals may interact with reward structures to affect motivation, effort and performance, resulting in the elimination of the social loafing effect (Earley, 1989). Individual's levels of I-C, whether measured as a cultural value, a trait, or triggered as a result of a situational manipulation, seem to influence loafing and other group-related effects on performance (James, 1993; James & Eisenberg, 2000b).

Personality Variables

Group members' personalities are, of course, one of the most crucial factors in determining group productivity in general, and group innovation, in particular (e.g., Driskell, Hogan, & Salas, 1987; King & Anderson, 1990). The present study focuses on

one individual-level variable: individualism/collectivism. While more often I-C has been treated as a cultural variable, it also varies effectively across individuals within cultures, which makes it possible to measure it as a personality variable (see James & Eisenberg, 2000a; Triandis, 1995). American samples (consisting mainly of college students) were found to differ effectively on I-C; valid and reliable measures of I-C as an individual difference were achieved by several researchers (e.g., Hui & Yee, 1994; Triandis, Leung, Villareal & Clark, 1985). Variations in I-C were found important in studies of numerous psychological phenomena including morality, work-related values, child-rearing, cognition, and affective patterns (see Markus & Kitayama, 1991; and Triandis et al., 1985, for reviews). In the following section, I review I-C and its relevance for the outcome measures employed in my study.

Individualism/Collectivism: An interesting development in the social loafing research was the exploration of the moderating functions that personality variables played. Somewhat later, attention turned to the moderating role of cross-cultural differences as well. Until the late 1980s it was commonly accepted that social loafing is a fairly general (i.e., universal) phenomenon that occurs whenever pooled output in groups involved, in the absence of identifiable output or externally provided standards for group performance. A series of studies by Earley (1989) revealed how powerful cultural differences in values are in shaping some of the most 'basic' psychological phenomena such as social loafing. One of the value dimensions he looked at was Individualism-Collectivism, a dimension I will explore further in the present study.

Individualism vs. *collectivism* became one of the most commonly used dimensions to differentiate among cultures or clusters of cultures. According to Triandis (1996)

individualism is when "the self is defined as independent and autonomous from collectives. Personal goals are given priority over the goals of collectives" (p. 409). 'Collectives' refer to social units ranging from family to nation. Collectivism is described as having the self "defined as an aspect of a collective; personal goals are subordinated to the goals of this collective...taking into account the needs of others in the regulation of social behavior is widely practiced" (Triandis, p. 409).

As mentioned above, the I-C dimension can be treated as a personality-level variable as well (Triandis et al., 1985; Triandis, 1994). Triandis has used the terms *cultural* vs. *psychological* to describe these two different dimensions (several other related terms are used in the literature to describe I-C at the individual level; the most common are Triandis' (1985) idiocentrism vs. allocentrism and Markus and Kitayama's (1991) independent vs. interdependent self-construals). Both dimensions of I-C, the cultural and the individual, share many similar features. Some of the characterizing differences include: in-group regulation of behavior for collectivists versus individual regulation of behavior for individualists; emphasis on interdependence in collectivist cultures vs. emphasis on self-sufficiency in individualistic cultures; and strong regard for in-group harmony versus acceptance of confrontations within in-group as legitimate. Despite the similarity of the concept across the two dimensions, one should be aware of the differences as well. Accordingly, different scales have been devised to tap I-C at the personal and cultural levels. When culture is the level of interest (e.g., Hofstede, 1980) one tends to average responses within a country and analyze the correlations among values using the number of countries as the N. When one is interested in tapping the individual level, the correlations are computed across subjects (Triandis et al., 1985).

Personality I-C has been found to moderate performance in groups. Social loafing, for example, seems significantly lower (Earley, 1989; Karau & Williams, 1993) among collectivist participants than among individualists. Similarly, Chen, Chen, and Meindl (1998) found that individualists and collectivists differed significantly in their cooperation and competition patterns and concluded that these differences have significant bearings on the performance of individuals in many group situations. Triandis (1994) also discusses several organizational practices relevant to teams (e.g., performance appraisal systems, equity versus equality based allocation of rewards, communication styles and strategies, and priority of task compared to relationship aspects) where one should take into account the level of I-C of the group members.

Lastly, a series of studies by James and colleagues (e.g., James, 1994; James & Chen, 1992; and James & Eisenberg, 2000b) showed that situational variables interact with personality constructs similar to I-C to affect creative performance. These studies, which were performed with US participants, often employed a situational manipulation of individuals' self-conception--i.e. collectivistically vs. individualistically primed participants. It was found that, in general, when situational dispositions matched the comparison frame, (i.e., performance compared either across individuals or between groups), creative performance was higher than when such match did not exist. For example, collectivistically-primed participants were more creative when told that an in-group's performance would be compared with an out-group than when told their personal performance would be compared with that of other individuals.

Based on the above, it seems that dispositional I-C will affect team performance and interact with situational and task factors to do so. Other evidence suggests that

collectivists are more motivated by group-level rewards while individualists prefer individual-level rewards (Eisenberg, 1999; Triandis, 1994), but this has not been systematically examined thus far. In the present study, I intend to examine how I-C interacts with variation in reward schemes to affect performance.

I expect that I-C will interact with reward types such that collectivists will perform better on the creativity tasks when the reward is group-based compared to an individual-based reward, while individualists will perform better in the individual-based reward type than in the group-based one. There is no basis in the literature to suggest whether the effects of performance non-contingent reward would differ across I-C levels.

Mediating and Moderating Variables

In this subsection, I discuss three variables that are expected to mediate the effects of rewards and I-C on creative performance. These variables are intrinsic and extrinsic motivation (IM and EM, respectively) and perceived group cohesiveness. Type of creative task, which is a repeated measures variable in this study, is expected to interact with I-C and thus is seen as a potential moderator.

Intrinsic/Extrinsic Motivation: As discussed above, intrinsic and extrinsic motivations are of considerable importance to performance of cognitively complex tasks, in general, and to creative thinking, in particular. Most often, IM and EM are treated as situationally induced conditions and, in times, as an unstable disposition. Researchers differed in their approach to what constructs should be assessed and how should they be measured. Methodologically, the main distinction can be drawn between measures that employ paper and pencil approach versus those assessed through behavioral indices (e.g., how long children would play a certain game once they are not evaluated or rewarded for

the activity?). Deci and Ryan (1985) describe several studies where they employed the behavioral approach to assessing motivation. The behavioral strategy works well in some designs, especially when one seeks to look at intrinsic motivation (IM) as a dependent variable. However, the present study seeks to examine it as a mediating variable, rather than merely a dependent variable and the behavioral approach does not fit well within the employed design.

For the present study, I was looking for a measure that would assess motivation as a situational outcome following the reward types manipulation. Many of the studies that used questionnaires to assess situational (or contextual) IM followed Deci and Ryan's (1985) constructs. The studies by Vallerand and his colleagues (e.g., Vallerand et al., 1993) have been among the more systematic ones in developing written measures of IM and EM. I chose to use Guay, Vallerand, and Blanchard's (in press) SIMS, which satisfies the needs of the current study. The Situational Motivation Scale is a situational (or state) measure of motivation. The SIMS is designed to assess the constructs of intrinsic motivation (IM), identified regulation (IR), external regulation (ER), and amotivation (AM) (Deci & Ryan), in both field and laboratory settings. Of the four subscales, I use here participants' scores on the IM subscale.

The present study attempts to put forth a model where the interaction of reward types with individualism-collectivism would explain some of the anomalies found in the literature (see above the discussion of Amabile's and Deci & Ryan's models compared to those of Eisenberger). While ultimately both IM and EM are predicted to function as mediators of the interactive effect of rewards and I-C on creative performance, in the present study I will be limiting my analysis to IM. The interaction/mediation pattern is

expected to be as follows: HCs (participants high on collectivism) will be more motivated (on both IM and EM) by group-based rewards while HIs (participants high on individualism) will be more motivated (both IM and EM) by individual-based rewards. Again, there is no basis in the literature to suggest what would the pattern be in the performance non-contingent reward condition; non-contingent reward is included as a baseline comparison for the other reward conditions.

Cohesiveness: I reviewed earlier some evidence suggesting that persons or cultures high on collectivism may have an advantage (compared to those low on collectivism) when performing in group-based reward structure. Cohesion was offered as possible mediator of this relationship. Cohesiveness has been related to a climate of trust among group members that facilitates risk taking and can lead to higher levels of creativity and innovation in work groups (West, 1990). Thus, we may expect that members of groups working under collective-reward conditions may enjoy higher cohesion and participative safety, which should lead to higher numbers of creative ideas. The present study examines the potential role of perceived group cohesiveness in mediating the effects of the interaction between I-C and reward types and groups' creative performance.

Cohesiveness of a work group is seen as an important predictor of its performance. While most reviews (including a meta-analysis by Evans & Dion, 1991) tend to point towards the benefits of cohesiveness for performance (e.g., Hare, 1994), some evidence exists to the contrary (e.g., Zaccaro & Lowe, 1989). In situations when innovativeness and/or creativity are sought, it is generally argued that cohesiveness promotes creativity of groups, but there is evidence to the contrary as well (see reviews by King & Anderson, 1990; McIntyre & Salas, 1995). On the one hand, it is argued, cohesiveness facilitates

innovation because it increases feelings of psychological safety and individuals, identifying stronger with their group, derive more satisfaction of their group's success. On the other hand, cohesiveness is often a result of group homogeneity, which is likely to inhibit creativity because it leads to a stronger focus on relationship, rather than on task aspects (Zaccaro & Lowe). If cohesiveness is extremely high, it may lead to 'Group Think' (Janis, 1982). More studies that look at the relation of cohesiveness to groups' creative performance are needed.

Interestingly, some of the group-level effects of cohesiveness on members resemble some of the suggested effects of collectivism (as an either individual or a culture level variable). Thus, higher identification with one's group (cohesiveness) is suggested to lead to higher motivation to work for group-level accomplishments; this is similar to the definition of collectivism.

In the present study, I seek to explore further the relationship between cohesiveness and creative performance in teams by examining whether perceived cohesiveness moderates the effects of the interaction between participants' I-C and the three reward schemes on members' performance. It is conceivable that collectivists would be high on cohesiveness regardless of whether the reward is individually or group based. On the other hand, individuals may perceive their group as more cohesive when performing in the group based reward compared with the individual based reward. Somewhat related results were obtained by Ely (1993) who successfully used group versus individual allocation of rewards to manipulate levels of collectivism and individualism in US participants.

I expect that overall, cohesiveness will be positively related to creative performance. I also predict that participants high on collectivism (HCs) will report higher cohesiveness levels than those high on individualism (HIs). I expect that cohesiveness will be higher in the group reward condition than in the individual or performance noncontingent conditions. Finally, I predict that cohesiveness will mediate the effects of the interaction between I-C and reward types on group creative performance. I expected that GR x HC would result in the highest cohesiveness levels and, consequently, highest creative performance. I expected that this would be followed by declining levels of cohesiveness in the combinations of HC and IR, HC and PNR; cohesiveness will be lowest in the HI x IR cell.

Creativity Tasks: Task interdependence may play an important role in moderating the effects of personality and reward type on performance in groups (e.g., Earley, 1989, and Erez & Earley, 1993). The present project used two creativity tasks. In the first one, participants were asked to generate product ideas; group performance is merely additive in this task, as it requires no collaboration among group members. The second task required participants to generate slogans to market a product. In this task, interdependence is built in the task design within the project team. In other words, there is interdependence of individuals in the team such as that high quality performance depends on members' coordinated effort on the task.

I expected that the two creativity tasks, which functioned as a repeated measures factor, would moderate the effects of rewards on creativity. I predicted that IR would result in higher creativity on the independent task (compared to GR and PNR), while GR would result in higher creativity on the group-level task compared with IR and PNR. I

also expected that HC, relatively to HI, would perform better on the group-level task; HI would perform relatively better on the independent task. I expected that given the group-level task, both HC and HI would perform better in the GR condition than in the IR condition; the opposite is expected in the dependent task condition.

Closing the introduction section, I present several hypotheses that follow the variables I presented throughout the introduction.

Primary Hypotheses

Two-Way Interaction Effects

- Hypothesis 1A: Participants high on individualism (HI) will perform more creatively in an individual reward (IR) condition than in the group reward (GR) condition;
- Hypothesis 1B: Participants high on collectivism (HC) will perform better under GR then under IR;
- Hypothesis 1C: Based on the literature, no hypothesis on the effects of PNR compared with IR or GR can be made neither for HIs nor for HCs.
- Hypothesis 2A: Reward types will interact with task types, such that participants in the GR condition will perform better than IR condition participants on the **group-level** task (GRP);
- Hypothesis 2B: Participants in the IR condition will perform better than GR condition participants on the **independent** task (IND);
- Hypothesis 2C: No hypothesis is made regarding the performance of the PNR condition participants.

- Hypothesis 3A: I-C will interact with task type to affect creativity such that HI participants will perform better than HC participants on the individual-level task (IND);
- Hypothesis 3B: HC participants will perform better than HI participants on the group-level task (GRP);
- Hypothesis 3C: No prediction is offered for the PNR condition.

The evidence in the literature does not suffice for hypothesizing differential effects of IR versus GR on motivation and creative performance. Neither can a prediction be made regarding the main effects of I-C on motivation or on creative performance. Thus, I will avoid hypothesizing on the main effects of I-C. Rather, I suggest that the interactions hypothesized above will help to clarify the contradictory predictions in the literature. Following the theoretical focus of the present study, the **primary hypotheses** are for interactions and mediation effects; the main effect hypotheses given below are of secondary interest.

Secondary Hypotheses

Main Effects

Note that hypotheses 4A and 4B, as well as 5A and 5B, are offered as alternative hypotheses.

- Hypothesis 4A: After Deci and Ryan: Participants in the performance noncontingent reward (PNR) condition will score higher on intrinsic motivation than participants in the individual reward (IR) or group reward (GR) conditions.

- Hypothesis 4B: After Eisenberger: Participants in the IR and GR conditions will score higher on intrinsic motivation compared with participants in the individual reward PNR condition.

- Hypothesis 5A: After Amabile: Participants in the performance noncontingent rewards (PNR) condition will perform more creatively (as measured by novelty and quantity of products) than participants in the individual reward (IR) or group reward (GR) conditions.

- Hypothesis 5B: After Eisenberger: Participants in the IR and GR conditions will perform more creatively than participants in the PNR condition.

The following hypothesis is regarding the three-way interaction effects. Due to scarcity of research in the literature, is more speculative and less central to my interests than the 2-way interactions laid out above.

Three-Way Interaction Effects

- Hypothesis 6A: Reward types, I-C and task types will interact such that the highest performance will be when rewards match I-C orientation and task type. The following arrangement of the 12 3-way interaction cells is tentatively predicted:

- IR x HI x IND = GR x HC x GRP > IR x HI x GRP = GR x HC x IND > PNR x HI or HC x IND or GRP > IR x HC x IND or GRP = GR x HI x IND or GRP.

Mediation Effects

- Hypothesis 7A: Motivation levels will partially mediate the effects of the Reward x I-C interaction on individual creativity. IR x HI and GR x HC will result in

the highest motivation levels. Higher motivation will be positively correlated with higher individual creative performance.

- Hypothesis 7B: Generally, GR is expected to yield higher cohesiveness levels than IR or PNR.

- Hypothesis 7C: Collectivism will be positively related to cohesiveness. Participants higher on collectivism will report higher cohesiveness than those low on collectivism.

- Hypothesis 7D: Cohesiveness will partially mediate the effects of the Reward x I-C interaction on individual and group creativity. Higher levels of reported cohesiveness will correlate with higher levels of individual and group creative performance.

- Hypothesis 7E: Individual creativity will partially mediate the effects of rewards and I-C, on group creativity. Higher individual creativity will lead to higher group creativity.

METHOD

Participants and Design

Participants were introductory psychology class students in Colorado State University who participated in the experiment in partial fulfillment of the course requirements. After dropping one session with eight questionnaire packets that were compiled erroneously, the final sample consisted of 340 participants, of whom 182 were females, 155 were males and three neglected to indicate their sex. Their age ranged from 17 to 28 with a mean of 18.7; 301 reported they were White/Caucasian, 36 that they were minorities (which is fairly similar to their representation in the overall student population in the university), and three neglected to indicate their ethnic background.

Participants worked in six to eight member groups. Out of the 49 teams who completed the study, as mentioned above, one team was dropped due to a material mix-up. Average group size was 7.2 (16 groups had six members, 12 had seven members, and 20 had eight members). There were two manipulations of interest: 1) The types of reward schemes used to reward performance in the teams who will participate in the study. This was a between-subjects variable with three possible levels: Individual Reward (IR), Group Reward (GR) and Performance Noncontingent Reward (PNR). 2) The type of creative task performed by participants, a repeated measures (within-subjects) variable with two levels: individual-level task (IND), which is performed individually, and group-level task (GRP), which is performed by a group.

Materials (See Appendix I)

Individualism-Collectivism (personality level) This instrument (see Appendix I) was developed by Triandis et al. (1985) to measure I-C as a personality/individual difference variable. This measure has been extensively validated with US samples and is one of the most commonly used measures for assessing I-C in the personal level (see for example, Triandis et al. 1985; Triandis, 1995).

Dependent Measures Individual- and group-level measures of creative performance will be obtained for both the IND and the GRP tasks. The independent-type task was a Product Improvement (PI) task, developed by Torrance (1974) and used extensively, over several decades, in creative performance studies. In this task, participants are asked to propose suggestions for improving an ordinary object presented to them. In the present study, a classroom **chair** was used for this purpose. Participants were asked to list as many ideas as they could for improving the object within a given time. Ideas were evaluated for both quality--how original the ideas offered were compared to the general pool of ideas; and for quantity (or fluency)--the number of ideas suggested by each participant. Thus, each participant's performance yielded both an originality and a fluency score. For each team, the product improvement originality scores of all team members were averaged to yield a group score for originality, and team members' fluency scores were averaged to yield a group score for fluency.

The interdependent-type (group-level) task asked participants to work as group to generate slogans for an ad campaign for promoting one of the product-ideas that were generated during the individual-level task. The interdependence is fostered through an emphasis on team effort and combination of team members' ideas for producing the final

slogan and process facilitation that insures that all group members take part in creating and choosing the (one) final product.

Individual creativity on the group-level task was assessed in the following way: After participants finished working on both creativity tasks, they were asked to rate their team members on three dimensions: (1) how much did the member contributed original ideas to the project, (2) how many ideas were contributed by a member, and (3) how much leadership toward task completion did each member demonstrate. The main function for these items is to provide an additional measure of individual creative performance on the group task since that task does not allow a direct assessment of individual performance during the group interaction. The scoring sheet consisted of three Likert-type scales ranging from (1) very much to (5) very little.

Assessment of group-level creativity in the group task was done through Amabile's (1983) Consensual Assessment Technique (CAT). In CAT, expert judges task performance outcomes on specified dimensions based on consensually defined evaluation criteria. Assuming sufficient inter-rater agreement, scores are averaged across judges.

The Situational Motivation Scale (SIMS) is a brief and versatile self-report measure of situational (or state) motivation developed to test some of Deci & Ryan's (1985) theoretical constructs (see Appendix I). Several studies, in both field and laboratory settings, demonstrated that the scale has adequate construct validity (Guay et al., in press). Additionally, the SIMS is responsive to experimental manipulations, conceptually similar to the ones employed in the present study. The SIMS is comprised of four subscales assessing four basic motivational orientations (intrinsic motivation, identified regulation, extrinsic regulation, and amotivation) with four items for each subscale, to a

total of 16 items. Only the scores of the IM subscale were used in this study. It uses a 7-point Likert type scale, ranging from "correspond not at all" to "correspond exactly."

Cohesiveness In the present study, cohesiveness was measured using an integrated adaptation of two scales, six modified items from of the *Group Environment Questionnaire* (GEQ; Widmeyer, Brawley, & Carron, 1985), and five items used by Hogg, Cooper-Shaw, and Holzworth (1993, study 2). The GEQ scale (see Appendix I) is one of the most widely used cohesiveness measures in the last decade and was designed through an extremely rigorous and systematic psychometric process, which reduced a 354-item pool to a final 18-item scale. The scale was originally intended for use with sports teams. Modified versions were successfully used with other types of groups as well (see for example Hogg et al, 1993, study 1 who used it to study groups in organizations).

Because some of the 18 items in the original scale did not fit the purpose and design of the my study, I have adopted only six items for the present study. Additionally, I added five items, which were found by Hogg et al. (1993, Study 2) to correlate highly with external observers ratings of cohesiveness of short-lived, quasi-naturalistic groups of unacquainted students. I have retained the 9-point response options (used in both studies) to the items (*strongly agree, strongly disagree*).

Task Comparison Questionnaire (TCQ) For this questionnaire, which served as the manipulation check for task interdependence, four items were derived form Chen's (1995) work that examined the effects of task interdependence on group effectiveness (see Appendix I). Chen developed a measure of interdependence at work and explored its relation to various work outcomes. For the purpose of the present study, four applicable

items that had stronger loadings on the relevant factors were adopted (e.g., "My team members' work depended directly on my performance"; "Most of my task activities were affected by the task activities of my team members").

Post Experimental Questionnaire Finally, participants completed a biographical sheet that included sex, age, residency background, academic major, and year in school.

Procedure

When recruited, participants were told it is for a study of the relationship between personality and various types of problem-solving skills in teams. Participants were tested in groups of six-eight persons at a time (i.e., in one session). With the exception of the first four sessions (which were administered by the author), all remaining sessions were administered by undergraduate research assistants. At the beginning of a session, the experimenter, who was blind to the experimental condition (type of reward used) explained the general focus and progression of the tests. The experimental condition for a given session was determined randomly prior to each session by the author. All test packets had similar appearance to ensure that experimenters are blind to the condition being administered.

After the preliminary explanations, a short team building activity was performed to facilitate a feeling of team membership among participants. First, they receive nametags on which they wrote their first names and a letter, A-H, which was used in the group task peer-evaluation forms. Then, team members were asked to introduce themselves and tell their group what their favorite color, animal and place to travel were. Lastly, they were asked to choose a name for their group. Experimenters' observations confirmed that these team building activities indeed succeeded in 'breaking the ice' in the groups. After

this team-building activity, which lasted about ten minutes, participants completed the first item in the testing materials packet--the Individualism-Collectivism scale. Participants received written instructions for this scale, as well as all other materials and tasks.

Next, participants received a sheet with task instructions and the manipulation of reward schemes, which appeared on the same sheet. The instructions read:

"You were hired as a member of a consulting team for the "Progress" company, which manages projects in various domains. You will be asked to work on two tasks in which you will make proposals for several of the company's planned new projects." At this point, the manipulation was introduced (key words which are being manipulated are underlined here, but not in the participants' version). The **IR** version read: "To further simulate a real-life work setting, your performance will be evaluated and you will have a chance to receive compensation for your work. After completing the experiment, you will be receiving coupon-dollars that will serve as lottery tickets. For all tasks, each team member will be rewarded according to his/her **personal** performance on the task. In previous experiments, individuals received an average of three tickets, each. Shortly after the experiment is over, we will assess your performance and will let you know how many tickets you received."

The **GR** version read: "To further simulate a real-life work setting, your team's performance will be evaluated and you will have a chance to receive compensation for your work. After completing the experiment, you will be receiving coupon-dollars that will serve as lottery tickets. For all tasks, each team will be rewarded according to the performance of the **whole group** on the task. In previous experiments, a seven-member

team received an average of 21 tickets (that is, each team member received three tickets). Shortly after the experiment is over, we will assess your team's performance, allocate the rewards equally to the team members, and will let you know how many tickets you received."

The **PNR** version read: "To further simulate a real-life work setting, your performance will be evaluated and you will have a chance to receive compensation for your work. After completing the experiment, you will be receiving coupon-dollars that will serve as lottery tickets. For all tasks, all participants will receive three lottery tickets for their work, once the experiment is over."

Following the manipulation texts, the following text was included in all three conditions: "Then, you can participate in the lottery and have a chance to win prizes, which include various merchandise (e.g., books, T-shirts, games, pens, and computer accessories) that will be awarded to participants at that time. For each lottery ticket, the odds of winning a prize are 1 in 12."

After they finish reading the information/manipulation sheets, participants received instructions for performing the first of the two creativity tasks. After generating and writing down their ideas in the individual-level task, participants received the first of the two (identical) Situational Motivation Surveys (SIMS). Then, each participant chose their two best ideas and presented them to the group, briefly explaining their merits. Next, the group discussed and decided (mostly through consensus, and rarely through voting) which idea would be used further in the slogan generation (group-type creativity) task. Members were asked to select the 'most creative' idea proposed, out of the best ideas proposed by each team member. To insure that each of the team members had an

opportunity to express him/herself, the experimenter facilitated the group process of choosing the product idea.

Next, members were asked to think of a target group for the slogans they are about to compose. Then, members had up to a minute to explain and advocate their target group. The team then chose one target group (again, in most cases, by consensus). Next, each member composed one or more slogans (in a given time), presented it to the group, which proceeded to discuss and choose the best slogan through an experimenter facilitated discussion (when needed). In most cases, the slogan chosen was a product composed of several parts of slogans suggested by several team members, further confirming the interdependent nature of this task.

After completing the group task, participants were asked to rate the other team members on three dimensions: originality of ideas contributed by each team member, number of ideas contributed, and how much leadership did each member demonstrate. In this rating, participants were identified only by the one-letter that appeared on their nametags.

Once finished ranking their teammates, participants received the SIMS for the second time. After that, participants were handed the following questionnaires: cohesiveness, TCQ (which served as a measure of perceived task interdependence), and finally the post-experimental questionnaire. Once done, participants were debriefed, both orally as well as in writing. Each session lasted between 1.5 to 2 hours.

Scale Reliabilities and Properties

Individualism-Collectivism: A Principle Component Analysis (PCA) performed on the 17 items resulted in a solution with six factors with Eigenvalues larger than 1,

which accounted for 55.3% of the total variance. Most items loaded positively and moderately to highly on the primary component; three items loaded at .1 or lower. These three items were omitted from the original scale, which increased its reliability from α = .63 to an α of .67, which was lower than desired, but at an acceptable level.

One potential concern when using the I-C scale with a relatively culturally homogenous sample (such as the one in the present study) is whether the sample has enough variance to allow I-C function well as an independent variable. On the I-C scale used in the study participants could score a minimum of 14 and a maximum of 98. Results show that the actual range was 42-87, with a mean of 64.7, SD = 8.7, and a median score of 65.5. Skewness and kurtosis were not significant and the distribution was very close to normal.

The Situational Motivation Scale (SIMS): The SIMS was administered twice, following the administration of each of the two dependent (creativity) measures. SIMS is comprised of four sub-scales, measuring related albeit different motivational concepts. The IM subscale is of primary interest in this work. PCAs on both SIMS scales indicated that four factors reached Eigenvalues greater than 1 and accounted for 63.8% of the total variance. All variables loaded as expected according to their corresponding sub-scales and according to the patterns revealed in the original scale validation (see Guay et al., in press).

The reliability analyses of interest are on the items of each sub-scale. For SIMS 1, the reliability of intrinsic motivation (IM), identified regulation (IR), extrinsic motivation (ER) and amotivation (AM) were, respectively, at alpha levels of .86, .69, .79, and .73.

For SIMS 2, they were .88, .57, .86, and .79. Both IM sub-scales reached acceptable reliability levels.

Cohesiveness: This scale was adapted from two existing scales: six items were from the *Group Environment Questionnaire* (GEQ; Widmeyer et al., 1985) and five items were used in a study by Hogg, et al. (1993, study 2). All items were slightly modified to fit the specific aspects of the present study (mainly the ad-hoc and organizational characteristics of the teams). A PCA indicated that three factors reached Eigenvalues of above 1 and accounted for an accumulative 60.2% of variance. Except for items 1 and 8, all other items loaded highly and positively on the primary component and either low positive or low negative on the second.

The overall α of the new scale was .78; the six GEQ items had an α of .64 and the five items from Hogg et al had an α of .69. Following the PCA, which indicated that two items loaded differently on the primary factor, I have omitted these items; the final cohesiveness scale was unidimensional, and contained nine items with an $\alpha = .85$ (and .74 and .81 alphas for the GEQ and Hogg et al. modified subscales, respectively). The sum of the nine items comprised the cohesiveness score assigned to each participant in this study.

Task Comparison Questionnaire: The main function of this measure was to serve as a manipulation check for the within-subjects variable of task interdependence. The questionnaire, comprised of four items adapted from Chen (1995) asked participants to indicate how interdependent was each of the two creativity tasks (product improvement and slogan generation) they performed. A PCA indicated that all eight items (four for

each of the two tasks) loaded fairly similarly on the primary component, although the fourth item (for both tasks) loaded somewhat lower than the others. The item also loaded very differently on the secondary component. Following an examination of the scale reliability statistics it was decided to omit this item from the scale. The resulting TCQ scale had three items (administered twice, for each of the tasks), with an $\alpha = .62$ for the first task, and $\alpha = .63$ for the second task.

Assessment of Group Creativity: Group creativity was assessed following the Consensual Assessment Technique (CAT), which has been widely employed by leading researchers of creativity, including Amabile (1983, 1996). The technique, which is based on multiple subjective judgments of products, is an effective and reliable method to assess various dimensions of objects in different domains (Hennessey, 1994). The central principles of the CAT are:

1) The judges should all have some experience with the domain in question. Both judges were familiar with the concepts of successful slogans and participated in discussions that revolved around the characteristics of effective advertising slogans.

2) The judges should not be given specific criteria for judging the evaluated dimensions and they should not be given the opportunity to confer while making their assessments. Both judges in the present study were given only brief description of the criteria they are to use for evaluating the slogans (namely, that a creative slogan is one that is both original and useful) and all judging sessions were conducted individually.

3) The judges should be instructed to rate products relative to one another, rather than rating them against some absolute standards. I emphasized to the judges that they are to

judge the 48 slogans relative to each other and not according to absolute quality criteria. To enable judges to establish a range and a feel of the relative quality of the slogans, they first reviewed them all before assigning specific scores.

4) Each judge should view the products in a different random order. The order of slogans judged was fully randomized between each judge.

The correlation between the two independent judges' evaluation of slogans' creativity was .92. Subsequently, their evaluations were averaged to form the group creativity score on the group task.

RESULTS

Preliminary Analysis

Manipulation Check: Type of creative task served as a within-subjects variable in this study. A-priori, I conceived the product improvement task (suggesting ideas) to be more independent in nature than the group creativity task (slogan generation). To assess whether participants indeed experienced differences in interdependence between the two tasks, the Task Comparison Questionnaire (TCQ) was administered twice: once asking about interdependence in the product improvement task and the second time asking about interdependence in the group creativity task.

A paired sample t-test on the TCQ scores for the two tasks indicated that all three item pairs differed significantly from each other, $t = -3.47$, $p = .001$; $t = -2.4$, $p = .017$; $t = -2.56$, $p = .011$ for pairs one through three, respectively and $df = 337$ for all three item pairs. The means indicated that participants perceived that the slogan generation (group creativity task) indeed required more interdependence than the product improvement (individual-level) task.

Differences among Experimental Conditions: In spite of the random allocation of participants to conditions, group sizes differed across conditions. There were also some differences on the dependent measures for sessions conducted by the different experimenters. Group size and the experimenter factor were controlled for in subsequent analyses.

Dependent Measures (Creativity): Several measures were used to assess creative performance, the primary dependent variable in the present study. Measures differed on several dimensions: Level of measure (group vs. individual); aspect of creative performance assessed (quality, a.k.a. originality vs. quantity, a.k.a. fluency); and method of data collection (self-report vs. peer rated vs. experimenter rated/counted). See Table 1 for a classification of these measures.

Due to the nature of the slogans task, which resulted in one creative product for the whole team, no direct assessment of individual creativity on this task could be obtained. Instead, I obtained a proxy of individual creativity by asking each team member to rate his/her teammates on the amount of ideas they contributed ("peer rated fluency") and how original were their ideas ("peer rated originality"). Throughout the paper I use "rated fluency" and "rated originality" to refer to these measures. While not a perfect approximation, peer or supervisor ratings of team members' task performance have been found to correlate substantially with more direct measures of individual performance (for creativity-specific examples see Oldham and Cummings, 1996 who found that supervisor ratings of employee's creativity correlated positively and significantly with number of patents employees successfully suggested, and Scott and Bruce (1994) who found that their supervisor-based measure of innovative behavior correlated positively and significantly with an objective measure of individual innovativeness—number of invention disclosures filed). In the present study, rated originality of slogans correlated positively (but non-significantly) with externally assessed slogan creativity. Rated fluency correlated positively ($r = .28$) and significantly with slogan (group) creativity; the correlation remained significant ($r = .20$) even when reward type was controlled for.

To sum, I use the terms *fluency* and *originality* to refer to individual creativity assessed on the first task, product improvement. I use *rated fluency* and *rated originality* to refer to measures of individual creativity (derived from peer ratings) for the second task, slogan generation. Lastly, when referring to creativity of slogans produced by the team as a whole, I will be using the term *group creativity*. I use the term 'aggregated' to refer to aggregated measures of individual level variables, summed and averaged across all members of a given team.

As for the two tasks I refer to, the first task is the product improvement task (PI), which is independent in its structure and its corresponding measure will be referred to as 'Individual Creativity'; the second task is the slogans generation task, interdependent in structure, with the measure referred to as 'Group Creativity'. When referring to the SIMS subscales, IM-IND refers to intrinsic motivation on the product improvement task and IM-GRP refers to intrinsic motivation on the slogan generation task.

Table 1: Dimensions of creative performance measures

	Individual vs. **G**roup	**Qual**ity or **Quan**tity	**S**elf-Report vs. **P**eer Rated vs. **E**xperimenter Rated
Fluency	I	Quan	E
Originality	I	Qual	E
Peer Rated Fluency	I	Quan	P
Peer Rated Originality	I	Qual	P
Group (slogans) Creativity	G	Qual	E

In the results section I present hypotheses testing starting with the primary hypotheses (two-way interactions) and following with the secondary hypotheses and the additional outcomes. Whenever feasible, I use multiple regression analysis to test

hypotheses, supplemented by ANOVA/ANCOVA analyses as needed. To enhance comprehension of the complex data, results are organized, as much as possible, according to outcome variables (e.g., motivation, individual creativity, group creativity). A brief section indicating whether the hypotheses were confirmed or rejected follows every analysis section.

Descriptives and correlations: Table 2 presents the means (M) and standard deviations (SD) of the main variables for each of the reward conditions. Table 3 presents the correlations among variables. All correlations are two-tailed Pearson correlations.

Table 2: Descriptives for variables

	IR		PNR		GR	
	M	**s.d.**	**M**	**s.d.**	**M**	**s.d.**
1. IM-IND	12.98	5.02	12.30	4.80	12.26	4.56
2. IM-GRP	15.28	5.28	13.35	5.44	13.47	5.17
3. Cohesiveness	55.85	11.54	58.44	13.53	57.12	14.89
4. Fluency	6.79	2.64	7.00	2.99	6.46	2.50
5. Originality	.052	.02	.054	.015	.054	.015
6. Group creativity	3.21	1.77	5.37	1.76	5.38	2.38

Note: All variables except group-level creativity describe data at the individual level; Group creativity data is for group-level products. Both motivation variables are on 7-point scales (7 corresponding to the highest motivation). Cohesiveness is assessed on a 9-point scale (9 representing highest cohesiveness); Fluency scores represent number of ideas proposed; Originality represents relative frequency of idea categories within the sample (lower numbers indicate higher originality); and slogans' creativity was assessed with a 10-point scale, with 10 being most creative.

Table 3: Correlations among variables

	1	2	3	4	5	6	7	8	9
1. I-C	1	.08	.16	.09	.04	-.01	-.01	.00	-.00
2. Cohesiveness		1	.12	.17	.14	-.00	.05	.00	.07
3. IM (IND)			1	.72	.10	-.10	.14	.12	.02
4. IM (GRP)				1	.09	-.01	.16	.15	-.12
5. Fluency (IND)					1	-.17	.06	.13	.09
6. Original (IND)						1	-.04	.03	.02
7. Rated Fluency (GRP)							1	.62	.19
8. Rated Orig. (GRP)								1	.04
9. Group Creativ. (GRP)									1

Note: N = 325-339. For the I-C scale, higher scores indicate higher collectivism. (IND) = Product improvement task; (GRP) = Slogan generation task. For group creativity, each team member was assigned the team score. For Original (IND), lower scores indicate higher originality.

Correlations of $r = |.09|$ and higher are significant at the $p = .10$ level; $r = |.11|$ at the $p = .05$; $r = |.14|$ at the $p = .01$; $r = |.16|$ at the $p = .005$; and r above $|.20|$ at the $p = .001$ level.

Effects on Creativity

Testing Hypotheses 1 and 5. Hypotheses 1 A and B stated that high individualism would result in better creative performance under the IR condition, while high collectivism will result in better performance under GR. No specific prediction was offered for the PNR condition effects. Hypotheses 5 A and B presented alternative predictions: According to Hypothesis 5A, participants in the PNR condition would be more creative than those in the performance contingent conditions—IR and GR; Hypothesis 5B stated the opposite.

To test the effects of the interaction between I-C and rewards and of the main effects on creative performance, I used multiple regression analyses with cross-products entered at the last step. Experimenter effects were controlled for in all analyses with variables related to the individual-level task; group size was controlled for in all analyses. Five analyses were performed, four in the individual level (fluency and originality of product ideas and rated fluency and originality of ideas for slogans), and the last one (group creativity) in the group level. For all analyses that assessed creative performance, motivation or group processes on the group task, I included aggregated terms that represented the effects of these variables in the team level. Since the individual-level task involved team members working independently from each other, there was no theoretically compelling reason to assume group level effects during that task (product improvement ideas).

To analyze predictor effects on the group creativity task, I assigned back the average team scores on creativity, I-C, and cohesiveness to each of the team members. In this procedure I followed recommendations by Rousseau (1985, p. 31) and others that when, as in the present study, cross-level hypotheses that relate individual-level variables (e.g., intrinsic motivation) to group-level variables (e.g., group creativity) are proposed, all individual in the same unit (i.e., team) should be assigned the same score for the group variables, and the analysis should be carried out at the individual level (see Shamir, Zakay, Breinin, & Popper, 1998 for a recent application). Here, I assigned all members in a given team that group's average score on group creativity, I-C, and cohesiveness, while control variables and rewards were individual-level variables in the analysis.

Following the theoretical interests of this work in group-level processes and products, when conducting the present analysis (and subsequent ones), both individual-level and group-level variables were expected to have effects on the dependent variables. Wherever feasible, I included in the multiple regression group-level variables and followed Firebaugh (1978) who suggested that to identify contextual effects in multilevel models one should enter the individual-level variable in a separate step before entering the group-level variable. This way, if the group-variable is significant when the individual-level variable has been controlled for, we can be confident that there is indeed a contextual (or unit level) effect.

Individual Creativity

Fluency (individual-level task): Experimenter and group size were entered in the first step, I-C in the second, two dummy coded reward variables (one contrasting PNR with IR and the second contrasting PNR with GR) in the third, and the Reward X I-C interaction in the last step. The final model accounted for a non significant 3% variance, $F(6, 324) < 1.7$, $p = .13$. The interaction was not significant, but the gr-pnr dummy variable was significant, $\beta = -.15$, $t = 2.21$, $p = .03$. See Table 4 for the full regression results. A follow up analysis indicated that only the PNR and GR conditions differed significantly, $p = .03$. PNR participants produced the largest number of ideas, $M = 7.12$, followed by IR, $M = 6.70$, and GR, $M = 6.29$.

Originality (individual-level): The final model accounted for less than 1% and was not significant, $F(6, 324) < 1$. Neither the interaction, nor any of the main effects were significant.

Table 4: Effects on Fluency (individual task)

Variable	β	t	ΔR^2
1. Control			.013
Experimenter	.11	1.99*	
Group Size	-.06	-1.06	
2. I-C	.05	.82	.002
3. Rewards			.015*
IR-PNR	-.08	-1.22	
GR-PNR	-.15	-2.21**	
7. Reward X I-C	1.00	.17	.000
R^2			**.03**

Note. N = 330. * p = .10; ** p = .05.

Rated Fluency (group-level): Group size was entered at the first step, I-C in the second, aggregated I-C (i.e., the average I-C of each team) in the third, reward in the fourth, and two interaction terms—Reward X I-C and Reward X aggregate I-C in the last step. The final model accounted for a significant 6.1% variance, F (7, 331) = 3.06, p = .004. The interactions were not significant; gr-pnr variable had a significant effect, β = .23, t = 3.50, p = .001, as well as the aggregated I-C variable, β = .12, t = 2.06, p = .04. See Table 5 for the full regression results. A follow up analysis indicated that the GR condition differed marginally from both PNR and IR conditions, p = .08; IR and PNR did not differ significantly. The highest number of rated slogan ideas was produced by GR participants, M = 3.42, followed by IR, M = 3.15, and PNR, M = 3.11.

Rated Originality (group-level): I followed the same steps as in the regression above. The final model was not significant and accounted for 1.6% variance, F (7, 331) < 1. Only the ir-pnr variable reached marginal significance, β = -1.05, t = -1.71, p = .09,

when entered with the interaction terms. See Table 5 for the full regression results. A follow up analysis indicated that the IR condition differed marginally from both PNR and GR conditions, ps = .09 and .099, respectively. GR and PNR did not differ significantly. GR participants received highest originality ratings, M = 4.89, followed by PNR, M = 3.71, and IR, M = 2.50.

Group Creativity

As explained above, I assigned back the group creativity scores to individual team members. The final model was significant accounting for 22.3% of the variance in group creativity scores, F (7, 331) = 13.59, p = .0001. The interactions were not significant; ir-pnr was highly significant, β = -.46, t = -8.11, p = .0001. See Table 6 for the full regression results. A follow up analysis indicated that the IR condition differed

Table 5: Effects on individual rated fluency and originality (group task)

	Rated Fluency			**Rated Originality**		
Variable	β	t	ΔR^2	β	t	ΔR^2
1. Control			.002			.001
Group Size	-.04	-.77		-.03	-.51	
2. I-C	-.00	-.013	.00	-.01	-.013	.00
3. Aggregate I-C	.12	2.06	.013**	.06	.92	.003
4. Rewards			.041****			.004
IR-PNR	.03	.53		-.07	-1.03	
GR-PNR	.23	3.50****		-.00	-.05	
5. Interaction			.005			.009
Reward X I-C	.10	.23		-.31	-.67	
Reward X Aggreg. I-C	-1.54	-1.35		-1.42	-1.22	
R^2			**.061**			**.016**

Note. N = 338. * p = .10; ** p = .05; *** p = .01; **** p = .005 (or lower).

significantly from both PNR and GR conditions, p = .0001. GR and PNR did not differ significantly. GR produced the most creative slogans, M = 5.41, followed by PNR, M = 5.32, and IR, M = 3.20.

Since none of the interaction terms in the above analyses were significant, hypothesis 1 is rejected. As for hypotheses 5 A and B, comparing across all five creativity measures, neither Hypotheses 5A or 5B were fully supported. While PNR resulted in the largest number of product improvement ideas, it differed significantly only from the GR condition, but not from the IR condition. On the other hand, GR groups had the highest mean rated fluency scores on the group task, while no difference was found between IR and PNR teams. Finally, PNR and GR teams displayed similar level of group creativity, which were significantly higher than those of IR teams.

Table 6: Effects on group creativity (group task)

Variable	β	t	ΔR^2
1. Control			.00
Group Size	-.01	-.14	
2. I-C	-.00	-.02	.00
3. Aggregate I-C	-.00	-.04	.00
4. Rewards			.219****
IR-PNR	-.46	-8.11****	
GR-PNR	.02	.34	
5. Interaction			.004
Reward X I-C	.00	.00	
Reward X Aggreg. I-C	-1.24	-1.19	
R^2			**.223**

Note. N = 338. *** p = .01; **** p = .001 (or lower).

Tests of Hypotheses 2 A and B These hypotheses predicted that reward type will interact with task type, such that participants in the IR condition will perform better than GR condition participants on the Product Improvement task, which was at the individual-level, while the reversal of this pattern was expected for performance on the slogans generation task, which was a group-level task. As before, no exact hypothesis was offered for the PNR condition.

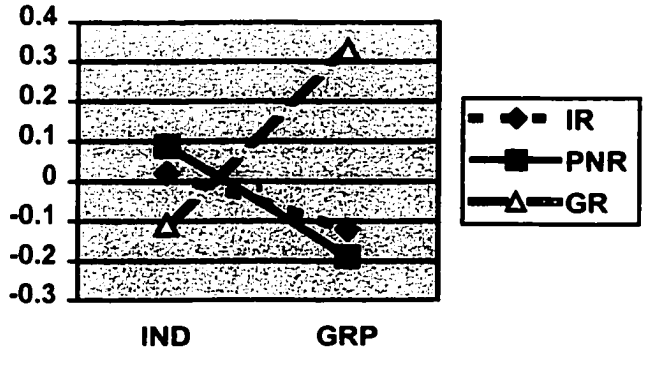
Since task type is a within-subjects variable, a repeated measures framework was employed to test these hypotheses. The following section present three different tests of hypothesis 2. First, I present two repeated measures tests in the individual level of analysis: one comparing effects of rewards on fluency in the individual task (IND) with the effects on rated fluency in the group task (GRP), and the second contrasting reward effects on originality in the individual task with rated originality on the group task. The third test is performed at the team level, contrasting reward effects on aggregated team originality at the individual task with team-creativity on the group task. Because of the different measures employed in the two tasks to assess fluency and originality, all variables were standardized and transformed to Z scores.

A repeated measures MANOVA with task as a within-subjects variable and rewards as a between-subjects variable revealed that the effects of the interaction between reward type and task type on fluency was significant, $F(2, 337) = 9.70$, $p = .0001$, $Eta^2 = .05$. A follow up analysis indicated that while the highest fluency (number of ideas) for the IND task was achieved in the PNR condition, $M = .09$, followed by IR, $M = .02$, and GR, $M = -.11$ the highest fluency for the GRP task was displayed by GR participants, M

= .33, followed by IR, M = -.12, and PNR, M = -.19 (see Figure 2). The reward X task interaction had no significant effects on individual originality.

Lastly, the group-level analysis comparing effects on group-originality in IND with group-originality in GRP, indicated that the effects of the interaction were not significant, p = .16. To sum, there was partial support for hypothesis 2—while number of ideas was affected by the interaction in the predicted direction originality was not affected.

Figure 2: Effects of reward type on fluency on two types (IND and GRP) of creativity tasks



Testing Hypothesis 3: This hypothesis suggested that participants high on individualism (HI) would outperform participants high on collectivism (HC) on the IND task, while the opposite pattern was expected for the GRP task. To test this hypothesis I performed a partite (three parts) split on I-C scores, which resulted in three categories: HC, MC, and LC (high-, medium-, and low-collectivism, respectively). Then, I performed repeated measures MANOVA similar to the way Hypothesis 2 was tested.

No significant effects were found for the I-C X task interaction for either fluency or originality scores and tests of effects in the group level resulted in no significant results either. In sum, Hypothesis 3 was not supported.

Hypothesis 6: The sixth hypothesis was exploratory in nature and speculated about obtaining three-way interaction effects between type of reward, level of collectivism, and type of creativity task. In general, it proposed that congruence among these three factors would result in higher performance. Thus, I expected that when high collectivists perform under group reward and the task is on the group-level, performance would be better than given other combinations of task and reward. Similarly, I expected that in the individual-level task and individual reward condition, high individualists would perform better than under other types of reward by task conditions.

To test Hypothesis 6, I performed a repeated MANOVA with task as a within-subjects variable and with reward, partite split of I-C, and their cross-products as between subjects variables. As in the previous repeated measures analyses, dependent variables were fluency and originality and the analyses was performed both at the individual as well as at the group level.

For fluency, no significant interaction effects were found comparing fluency on IND with rated fluency on GRP. No interaction effects on originality of IND and GRP ideas were found either. Lastly, no significant effects for the reward X I-C X task type interaction were found in the group level analysis. Hypothesis 6 was not supported.

Mediators

In this section, I start with analyses of the effects rewards, I-C and their interaction had on each of the postulated mediators—IM (intrinsic motivation) and cohesiveness.

Then, I perform mediation tests and examine whether the mediators affected creative performance.

Effects on Intrinsic Motivation

Differences between the two tasks: I performed a paired samples t-test on the two IM subscales to detect differences in motivation for the individual creativity task (IM-IND) vs. the group creativity task (IM-GRP). The subscales differed significantly indicating that participants reported higher intrinsic motivation for the slogans task than for the PI. Effect size was small, $\underline{d} = .22$.

Test of Hypotheses 4 and 7A. The first hypothesis presented alternative predictions regarding the effects of rewards on intrinsic motivation. Hypothesis 4A suggested that performance-contingent rewards would result in lower intrinsic motivation than performance non-contingent rewards, while hypothesis 4B proposed the opposite. To test these alternative hypotheses I performed a multiple regression analysis. I entered group size and experimenter in the first step, I-C in the second, two dummy coded reward variables in the third, and the reward X I-C interaction in the last step. The final model accounted for a non-significant 2.5% of variance, $F(6, 316) < 1.5$. Rewards had no significant effect on IM-IND. No interaction effects were found either. I-C was a significant predictor of IM-IND, $\beta = .15$, $\underline{t} = 2.63$, $\underline{p} = .009$. As can be seen from the correlations in Table 3, I-C and IM-IND were positively correlated indicating that higher collectivism was related to higher intrinsic motivation on the product improvement task.

Next, I performed the same test for IM-GRP. As with all other measures that related to the group task, I included aggregated level variables to capture the group level effects.

Thus, group size was entered in the first step, followed by I-C, aggregated I-C, Reward, and the two interaction terms, reward X I-C and reward X aggregated I-C, in the last step.

The final model accounted for a significant 4.6% of variance, $F(7, 330) = 2.29$, $p = .03$. The ir-pnr reward variable was significant, $\beta = .16$, $t = 2.54$, $p = .01$. No interaction effects were found. I-C reached marginal significance, $\beta = .09$, $t = 1.69$, $p = .09$. As can be seen from Table 3, the correlation between I-C and IM-GRP is positive. See Table 7 for full results.

Table 7: Effects on IM-GRP

Variable	β	t	ΔR^2
1. Control			.003
Group Size	-.06	-1.07	
2. I-C	-.09	1.69	.008*
3. Aggregate I-C	-.01	-.085	.00
4. Rewards			.03***
IR-PNR	.16	2.54***	
GR-PNR	-.03	-.38	
5. Interaction			.005
Reward X I-C	-.01	-.01	
Reward X Aggreg. I-C	-1.37	-1.18	
R^2			**.046**

Note. N = 337. * p = .10; ** p = .05; *** p = .01; **** p = .001 (or lower).

A post-hoc analysis on the IM-GRP effect revealed that the individual reward condition differed significantly from both the group reward and the performance non-contingent reward, ps < 02. The two latter conditions did not differ significantly. IR

resulted in the highest intrinsic motivation, M = 15.24, followed by GR, M = 13.54, and PNR, M = 13.43.

Hypothesis 4: Because of the differences between IR and GR, the picture emerging from the above results does not clearly support neither Hypothesis 4A, nor Hypothesis 4B. However, if we limit the tests to only comparing the effects of the two individual-level rewards (i.e., the IR and PNR conditions), these results support Eisenberger's theoretical position and his previous findings.

IM effects on Creativity

Hypothesis 7A: This hypothesis suggested that IM would relate positively to individual and group creativity and that IM would mediate the effects of the reward X I-C interaction on creative performance.

As can be seen from Table 3, IM-IND correlated significantly (or marginally) and positively in low-moderate levels with all individual measures of creativity. Thus, the higher participants' IM on the IND task was, the higher they scored on fluency and originality during IND and were rated higher on fluency and originality during GRP. No correlation was found with group creativity.

IM-GRP correlated significantly (or marginally) and positively with three of the four individual creativity measures (all except originality on IND) and significantly but negatively with the group creativity task. That is, the higher the average IM-GRP scores of team members' were, the lower was the group creativity of their team.

Next, I performed several mediation analyses. First, I tested whether intrinsic motivation mediates the effects of rewards on individual and group creativity. Since

rewards had significant effects only on fluency, rated fluency and group creativity, I limited my mediation tests to these three variables.

Fluency Mediation I entered reward in the second step, after entering control variables in the first step; IM-IND was entered in the third step. Reward accounted for a significant 1.6% of the variance, $p = .02$. IM was also significant, accounting for 1.2% of the variance, $p = .05$. In the second analysis, I entered IM in the second step and reward in the third. Reward accounted for exactly the same amount of variance in fluency scores as in the previous analysis, 1.6%; IM accounted for the same amount of variance, 1.2% as well; both predictors remained significant at the same level. IM did not mediate the effects of reward on fluency.

Rated Fluency Mediation Since the work on the GRP task chronologically followed the work on the IND task, and since rated fluency correlated positively with both IM-IND and IM-GRP, I used both IM measures as potential mediators when testing for mediation effects on rated fluency. I entered reward in the second step, after entering control variables in the first step; IM-IND and IM-GRP were entered in the third step. Reward accounted for a significant 5.9% of the variance, $p = .0005$. IM was also significant, accounting for 2.5% of the variance, $p = .01$. Only IM-GRP reached marginal significance as a predictor. In the second analysis, I entered IM IND and GRP in the second step and reward in the third. Reward accounted now for **more** variance in rated fluency, 6.3%, and remained significant at the .0005 level. IM accounted for **less** variance, 2.0% than in the previous analysis, and remained significant, $p = .04$. This time, neither IM-IND nor IM-GRP were significant as single predictors in the regression. This pattern suggests that IM acted as a suppressor of the effects of rewards on rated fluency.

Group Creativity Mediation Since IM-IND did not correlate with group creativity, only IM-GRP was used in this analysis. I entered the two dummy coded reward variables in the first step and the IM variable in the second step. Reward was a significant predictor accounting for 22.1% of the variance, $p = .0005$. IM was not significant, $p = .35$ and did not account for a meaningful amount of variance in group creativity. In the second analysis, I entered IM first and reward second. This time IM was significant, $p = .03$ accounting for 1.3% variance. Reward remained a significant predictor and accounted for 20.9% of the variance. Since one of the conditions for mediation (James & Brett, 1984), that the mediating variable is a significant predictor of the dependent variable in both equations, was not met, IM is not a mediator of the effects of rewards on group creativity.

Since no significant interaction effects of rewards and I-C were found, mediation test for the interaction could not be performed. To sum, IM-IND and IM-GRP generally predicted individual creativity, but the relationship with group creativity was not straightforward. Contrary to what was hypothesized, IM did not mediate effects of rewards on creative performance.

Testing Hypothesis 7B and 7C: Effects of Rewards and I-C on Cohesiveness

Hypothesis 7B predicted that GR would result in highest cohesiveness levels, IR in the lowest cohesiveness, and PNR with intermediate levels. Hypothesis 7C suggested that participants higher on collectivism would report higher cohesiveness than participants lower on collectivism.

Similar to the tests of the effects on IM above, I tested these two hypotheses using one multiple regression analysis. The predicted variable was the group-level cohesiveness

variable (i.e., average team members' cohesiveness assigned to each team member). After entering group size and experimenter in the firs step, I entered the individual-level cohesiveness variable (i.e., self-reported by each participant) in the 2nd step, I-C in the 3rd step, aggregated I-C in the 4th, rewards in the 5th, and the two interaction terms—rewards X I-C and rewards X aggregate I-C in the 6th and last step. I also performed an analysis where I-C variables were entered after reward variables. Since this did not result in any changes to predictors' significance and only in a small change in the variance accounted for (.5%), I present only the results of the first analysis.

Multiple regression analysis revealed that individual-cohesiveness was a significant predictor of group-cohesiveness and accounted for 21% of the variance, β = .46, t = 9.40, $p < .001$. I-C was not significant, but aggregate I-C was and accounted for 2.7% of the variance, β = .18, t = 3.43, p = .001. Both reward dummy variables were significant predictors, accounting for 27% of the variance, β = -.18, t = -3.17, $p < .002$ for inr-pnr, and β = -.17, t = -2.84, $p < .005$ for gr-pnr. Neither interaction was significant. The final model was significant accounting for 29.8% of the variance, $F(9, 314) = 14.80$, $p < .001$. See Table 8 for full results.

Follow up ANCOVA showed that PNR teams had the highest cohesiveness, M = 58.28; GR second highest, M = 56.97, and IR the lowest, M = 55.93. PNR cohesiveness means differed significantly from those of IR teams and marginally from GR teams; IR and GR teams did not differ significantly.

To identify further the relationship between aggregate I-C and cohesiveness I performed a partial one-tailed correlation analysis. The correlation was significant, $p <$

.001 and positive, r = .20. Further tests revealed that I-C and individual-cohesiveness were also positively correlated, r = .07, but the significance was only marginal, p = .09.

Table 8: Effects on Group Cohesiveness

Variable	β	t	ΔR^2
1. Control			.028***
Experimenter	.16	.26	
Group Size	.04	.61	
2. Indiv. Cohesiveness	.46	9.40	.21****
3. I-C	.06	1.18	.003
4. Aggregate I-C	.18	3.43	.027****
5. Rewards			.027***
IR-PNR	-.18	-3.17***	
GR-PNR	-.17	-2.84***	
6. Interaction			.003
Reward X I-C	-.16	-.39	
Reward X Aggreg. I-C	-.82	-.77	
R^2			**.298**

Note. N = 323. * p = .10; ** p = .05; *** p = .01; **** p = .001 (or lower).

To sum, Hypothesis 7B was only partially supported: although the effects of reward were significant, the trend of means was only partially in the predicted direction since IR and GR did not differ significantly. Hypothesis 7C was supported: both individuals and groups, when higher on collectivism, were higher on cohesiveness as well.

Testing Hypothesis 7D: Effects of Cohesiveness on Creativity and Mediation

Hypothesis 7D suggested that higher cohesiveness levels would correlate with higher levels of individual and group creative performance and that cohesiveness will

partially mediate the effects of the Reward x I-C interaction on individual and group creativity.

Individual Creativity: Group-cohesiveness correlated positively and significantly with individual fluency, $r = .14$, $p = .004$ (one-tailed test), but had no correlation with individual originality. Group-cohesiveness correlated positively and significantly (one-tailed tests) with the two individual creativity measures of the GRP task. The correlation with rated-fluency was $r = .32$, $p < .001$, and with rated-originality, $r = .13$, $p = .008$.

Group Creativity: Group creativity correlated positively and significantly (one-tail test) with group-cohesiveness, $r = .15$, $p = .002$.

Mediation Tests

To test whether group-cohesiveness mediated the effects of rewards on creativity, I generally followed the procedures performed to test the mediation effects of IM above. That is, I used multiple regression analyses with entering reward variables before/after cohesiveness variables into the regression to test for mediation. To avoid excess narration I do not describe the various mediation steps and present only their results.

Fluency Mediation Entered before cohesiveness, reward accounted for a non-significant 1.3% of variance in fluency scores. The variance accounted for dropped to a non-significant 1% when rewards were entered after cohesiveness.

Rated-Fluency Mediation When cohesiveness was entered **before** rewards, the variance accounted for **increased** from significant 5.2% to a significant 5.8% of the variance.

Rated-Originality Mediation The variance accounted for by rewards in both regression analyses was non-significant and accounted for less than 1% of the variance.

Group Creativity Mediation: When entered after cohesiveness, the variance accounted for by rewards dropped from a significant 22% ($p = .001$) to a significant 20.7% of variance accounted. Since cohesiveness was a significant predictor only when entered before rewards, but ceased to be significant predictor of group creativity when entered after rewards, the conditions for mediation were not met.

To sum, hypothesis 7D was partially supported: all but one measure of creative performance (originality on IND) were positively and significantly related to cohesiveness. However, no mediation effects on creativity were detected neither for rewards, nor for the reward x I-C interaction. Cohesiveness suppressed the effects rewards on rated fluency.

Relations between Individual and Group Creative Performance

Hypothesis 7E stated that individual creativity would contribute to group creativity, and that individual creativity would partially mediate the effects of rewards, I-C, reward X I-C interaction, motivation, and cohesiveness on group creativity. As in previous analyses, I used multiple regression methods to test for mediation (see James & Brett, 1984) and analyzed the data in the individual level.

Since a pre-condition for testing for mediation is that the IV has to have significant effect on the DV, I tested for mediation only for IVs whose effects on group creativity were significant: rewards, group-cohesiveness and intrinsic motivation. As in earlier analyses involving the relation between individual level factors and group level factors, I followed the procedure of assigning the group creativity score to the individuals in each team and analyzing the data in the individual level.

First, I tested for mediation in the effects of rewards on group creativity. I started with a multiple regression where I entered fluency and originality in the first step. Fluency and originality accounted for 0.09% of the variance in slogan creativity, but the change in F was not significant. Of the two creativity measures, fluency was marginally significant, $p = .094$. I proceeded to test whether fluency by itself would be a significant predictor of group creativity. Fluency accounted for 0.08% in variance of group creativity scores, but did not reach significance, $F(1, 338) = 2.57$, $p = .11$. Therefore, further mediation tests using fluency or originality were not performed.

The next analysis was performed to test whether rated fluency and rated originality functioned as mediators. I entered reward variables first, followed by rated fluency and rated originality in the second step. Reward accounted for a significant 21.6% of the variance, $F(2, 337) = 46.45$, $p < .001$. Rated fluency and rated originality accounted for a significant 3.3%, with ps of $< .001$ and $= .03$, for rated fluency and originality, respectively.

In the second regression, I entered rated fluency and rated originality in the first step, and reward variables in the second. Rated fluency and rated originality accounted for a significant 4.4% of variance, an increase of 1%, $F(2, 337) = 7.83$, $p < .001$. Rated originality was marginally significant and rated fluency was significant at the $p < .001$ level. The variance accounted for by rewards dropped by the same amount (1%) to a significant 20.5 %, $p < .001$. These results indicate that there is a partial mediation of a small magnitude.

The next mediation analysis was performed to test whether individual creativity mediates the effects of intrinsic motivation on group creativity. I entered IM-IND and

IM-GRP in the first step and rated fluency and originality in the second step with group creativity as the predicted. The effects of IM A and B were significant, $F(2, 328) = 7.88$, $p < .001$. IM A and B were significant at the .002, and .001 levels, respectively, and accounted for 4.6% of the variance. Adding rated originality and fluency resulted in a significant addition of 4.8% explained variance, but only rated fluency reached significance ($p < .001$). Next, I entered the mediators in the first step, and the motivation items in the second. The variance accounted for by the mediators actually slightly decreased to 4.2% and remained significant, $F(2, 328) = 7.19$, $p = .001$ (as before, only rated fluency was significant). The variance accounted for by the IM items slightly increased to 5.2% and was statistically significant at $p < .001$, with both predictors significant as well ($ps < .005$). This pattern of results indicates that individual creativity did not mediate the effects of intrinsic motivation on group creativity; neither did intrinsic motivation mediate the effects of individual creativity on group creativity.

The last mediation analysis was performed to test if individual creativity mediated the effects of group-cohesiveness on group creativity. In the mediated regression analyses, fluency was not a significant predictor of group creativity; no further mediation tests were performed. With rated fluency and rated originality, while entering cohesiveness before the two individual creativity variables reduced the variance they accounted for from a significant 4.1% to a significant 2.9%, since cohesiveness was not a significant predictor of group creativity when entered after individual creativity, the conditions for mediation were not met.

Finally, I used correlational analysis to test the second part of the hypothesis that individual creativity would contribute to group creativity and would be positively related

to it. One tailed Pearson correlation indicated that the correlations of group creativity with originality and rated originality were not statistically significant. Fluency was significantly correlated with group creativity, $r = .09$, $p = .055$, as well as rated fluency, $r = .19$, $p < .001$.

To sum, hypothesis 7E was only partially supported. While fluency and rated fluency were positively correlated with group creativity, neither originality nor rated originality did. Individual creativity was only a weak partial mediator of the effects of rewards on group creativity and did not mediate the effects of motivation and cohesiveness on group creativity.

Testing the Full Model

This last analysis was performed to test the overall model I suggested in the introduction (see also Figure 1), which postulates that rewards, I-C, intrinsic motivation, cohesiveness, and individual creativity—will all contribute to explaining group creative performance. After entering several control variables in the first step, I entered I-C (individual and aggregate) in the second step, followed by rewards in the third step. This order followed the rationale that I-C is both a personality measure and was administered to participants before the reward manipulation and hence is not expected to be affected by rewards and other variables in the study. IM-IND and IM-GRP were entered next, followed by cohesiveness (both individual and aggregate levels) in the fifth step. These variables were entered at this stage because they are conceived as mediators and may be affected by rewards and also affecting creative performance. Individual creativity—rated fluency and rated originality were entered in the sixth step. In the seventh and last step I entered the two rewards X I-C interaction variables.

This full model was significant, $F(16, 295) = 12.09$, $p < .001$ and accounted for 39.6% of the variance in group creativity. Rewards, IM-IND and IM-GRP, rated fluency and, interestingly, the reward x aggregate I-C interaction were statistically significant. See Table 9 for full results.

Table 9: Predicting group creativity: Testing the Full Model

Variable	β	t	ΔR^2
1. Control			.045***
Experimenter	.20	3.48***	
Group Size	-.05	-.88	
Major	.06	1.95	
SES	-.05	-.82	
2. I-C			.002
Individual	-.02	-.30	
Aggregate	.05	.86	
3. Rewards			.241****
IR-PNR	-.49	-8.66****	
GR-PNR	.16	.26	
4. Motivation			.022***
IM-IND	.20	2.87***	
IM-GRP	-.20	-2.90***	
5. Cohesiveness			.00
Individual	-.00	-.02	
Aggregate	.02	-.42	
6. Individual Creativity			.029***
Rated Fluency	.23	3.49***	
Rated Originality	-.09	-1.40	
7. Interaction			.057****
Reward X I-C	-.11	-.50	
Reward X Aggregate I-C	3.01	5.07****	
R^2			**.40**

Note. N = 311. * p = .10; ** p = .05; *** p = .01; **** p = .005 (or lower).

To reveal the pattern behind the interaction, I followed up with three separate (for each reward condition) two-tailed partial Pearson correlation analyses between aggregate I-C and group creativity; the same variables that were entered in the regression prior to entering the interaction were controlled for. The results indicated that while in the PNR and IR conditions there was no correlation between I-C and creativity, $r = .03$, $p = .80$, and $r = .08$, $p = .47$, respectively, in the GR condition the correlation was negative, $r = -.22$, $p = .04$. This means that in GR teams higher mean team collectivism resulted in somewhat lower creative team performance. That is, when the rewards were group based, teams who were more individualistic produced more creative slogans than teams who were more collectivist. Thus, although the interaction of I-C and rewards had a significant effect on one of the three creativity measures, its pattern was contrary to what I expected.

DISCUSSION

The present study examined factors affecting performance of ad-hoc simulated project teams. I started by extending the debate around the effects of rewards on intrinsic motivation and creative performance to include group-based rewards and group performance as well as potential mediators (cohesiveness) and moderators (I-C, task type) to explain variation in previous findings. Then, I presented a model (see Figure 1) of individual and small group creativity that integrated individual (motivation, Individualism-Collectivism), group (cohesiveness and aggregate I-C), and contextual (reward type, task interdependence) variables. The study tested several hypotheses—some were presented as sets of alternative hypotheses, pertaining directly to the debate reviewed above, while other hypotheses tested additional parts of the model presented.

In general, the hypotheses offered in this study were partially supported. While most of the variables included in the model (Figure 1) played some role in predicting creativity, effect sizes and statistical significance differed across the various outcome variables. Overall, the model succeeded in predicting four out of the five creativity outcome variables, and was especially effective in predicting group creativity. The following sections discuss in detail the results of the hypotheses testing.

I start the hypothesis testing discussion by reviewing the effects of rewards, I-C and their interaction on individual and group creativity; I follow with reviewing the effects that the interactions of rewards and I-C with task-interdependence had on creativity. I

than turn to review interaction effects and main effects on the mediators and discuss the results of the mediation tests performed. I proceed to discuss exploratory analyses, multilevel issues, and methodological contributions, ending the discussion section with some applied implications this study may have along with suggestions for future studies, and acknowledgment of its limitations.

Effects on Creative Performance

Ryan and Deci (2000) described several mechanisms through which the process of the detrimental effects of rewards on creative performance occurs. Self Determination Theory (SDT) is the most general framework used to relate the motivational concepts to each other. SDT emphasizes the importance of humans' inner resources for self-development and behavioral self-regulation. It identifies three basic human needs that guide this process: need for competence, need for relatedness, and need for autonomy (Ryan & Deci). During the past two decades, the need for autonomy dimension has received most of the theoretical and empirical attention. In the heart of the SDT is intrinsic motivation (IM), which is "...the prototypic manifestation of the human tendency toward learning and creativity." (Ryan & Deci, 2000, p. 69).

Cognitive Evaluation Theory (CET) is a subtheory within SDT and aims at specifying the social and environmental factors that affect IM. CET specifies that internal locus of causality of one's actions, or sense of autonomy, is necessary for optimal development, learning, and complex performance. Most of the research around SDT and CET focused on the issue of autonomy versus control and the latter effects on IM. Deci and Ryan (1985, 2000) have claimed and demonstrated that externally administered rewards, almost invariably, decrease individuals' IM because rewards lead individuals to

perceive their behavior (e.g., engagement in an interesting game) as externally caused. Amabile demonstrated in a series of experiments that promise of rewards and external evaluation decrease participants' creative performance on a variety of tasks (Amabile, 1996).

While according to SDT/CET rewards are typically detrimental to IM and creative performance, there are types of rewards that are more detrimental than others. Deci, Ryan, and Amabile--all suggest that the stronger the contingency between the reward and performance on a task (that is relatively interesting to start with), the lower the IM and task performance will be. If we apply the SDT/CET to the present experiment, this theory predicts that making rewards clearly contingent on performance should result in lower IM and lower creativity than if the rewards are not performance contingent.

On the other side of the motivational fence, is Eisenberger and colleagues who, following a neo-behaviorist tradition, reject the conclusions of CET and insist that rewards, appropriately administered, increase subsequent motivation and performance on any type of task (e.g., Eisenberger and Cameron, 1996). In a series of experiments, Eisenberger et al. (1998, 1999) demonstrated that rewards (as well as promised rewards), both tangible and intangible, increased IM and creativity on a variety of tasks. Furthermore, they claim that the only time that rewards do not lead to enhanced motivation and performance is when rewards are not contingent on performance. Thus, it is clear that the two "theoretical camps" would derive very different sets of predictions in the present study.

Beyond merely testing the contrasting predictions of these theories, I also sought to contribute further to the discussion by introducing new factors, which have not been

attended to before. While all of the aforementioned psychologists have their roots in social psychology, surprisingly, little attention had been given to group-level factors. Thus, almost all the studies performed by Deci, Ryan, Amabile, Eisenberger and their colleagues focused on the individual level of analysis and examined individual rewards and individual motivation and performance. I suggested to examine motivation and performance in a group task context and that we need to attend to potential moderators of the relationship between rewards and task performance. In the present study, I focused on personality aspects, type of reward, and task structure as potential moderators.

Effects of Rewards on Creativity

Hypotheses 1A and 1B reflected the opposing views of the theorists above: according to CET, PNR should have resulted in the highest creativity; according to neo-behaviorism, PNR should result in the lowest creativity, and IR in the highest. Results show that while rewards had no significant effects on the originality of product ideas (the IND task), they had a significant effect on the number of product ideas suggested. Both PNR and IR resulted in significantly larger numbers of ideas than the GR condition. PNR participants produced more ideas than IR participants, but the difference was not significant. This pattern does not support the predictions made on the basis of either of the two theories. All that can be concluded is that group rewards were relatively less effective in producing product ideas. This conclusion is offered with caution though, since the differences were marginally significant and the effect size was rather small.

Next, I discuss the effects on group creative performance (the GRP task). Before turning to the main outcome of interest—slogans' creativity—I briefly discuss the effects on individual creativity during the GRP task. As explained earlier, peer rated individual

creativity was used as a proxy for individuals' creativity during the GRP (slogan generation) task. Reward type had no effect on rated originality but had a significant effect on rated fluency. Participants in GR teams were rated as suggesting marginally significantly more slogan ideas than participants in the IR and PNR teams; the latter two did not differ significantly from each other. The effect size (just over 4% of the variance) was small but meaningful.

While it is clear that team members in the GR condition received higher creativity ratings, we cannot be sure to what degree these peer ratings indeed reflect actual numbers of ideas contributed. It is possible, for example, that group rewards team members felt stronger commitment and sympathy to their teammates than team members in the other two conditions, and hence inflated their ratings.

Two findings suggest that the "inflation" scenario may not be accurate. First, rewards had no effects on cohesiveness, a measure that taps on some aspects of sympathy and group-commitment. Secondly, there was a small but highly significant positive correlation between rated fluency and slogans' creativity. If peer ratings were arbitrary, or not related to actual group performance, we would not expect them to correlate significantly with the more objective measures (derived from a completely separate source) of group creativity.

As for group creativity, PNR and GR were clearly superior to IR in affecting teams' creativity on the slogans task. No differences were detected in group creativity between PNR and GR teams. Thus, it seems that individual-performance rewards were detrimental for group creativity. One possibility was suggested earlier—that individual rewards result in individual goals, which may conflict with group goals, especially when the task

requires rigorous cooperation in order to be performed well. I return to the issue of rewards and task interdependence later in the discussion. The conclusions regarding the effects of reward on group creativity have to be somewhat qualified, though, in light of the significant reward X aggregate I-C interaction effects, discussed below.

Rewards X I-C Effects on Creativity

One of the original contributions of this research project is the investigation of a potential interaction between individualism-collectivism and rewards in affecting motivation and creativity. I reasoned that I-C would moderate the relationship between reward type, IM and creativity and that this moderating function may explain some of the differential findings reported on the effects of rewards on IM and creativity. While previous studies found some interaction effects of I-C and rewards on various precursors of cognitive performance such as attitudes, efficacy and behavioral intentions (e.g., Early, 1994; and Triandis, 1994), the present work is novel and distinct in several aspects. First, very few studies examined actual performance as a dependent variable and, furthermore, previous studies did not look at the effects on neither IM nor on creative performance. Secondly, it is the first study that looks at the effects of rewards combined with I-C as a personality, or a within-culture (rather than a cross-cultural) variable.

When I tested this interaction hypothesis in several separate multiple regression analyses, that is, entering only I-C and rewards as predictors, I failed to detect significant interaction effects. However, when the full model was tested (see Table 9), while the rewards x I-C interaction had no significant effects on any of the predicted variables, the reward x aggregate I-C interaction had a significant effect on group creativity. The effects

size (almost 6%) was small, but meaningful, especially considering the typical challenges of statistical power in testing interactions.

Follow up analysis indicated that the GR condition drove this interaction. Contrary to expected, the correlation between group I-C and group creativity under GR was negative, while the correlation between group I-C and creativity under the PNR and IR conditions was close to zero. These results mean that for individuals who were promised group-based rewards, higher group collectivism resulted in lower group creativity (less creative slogans). In groups where individuals were promised individual rewards (IR and PNR), there was no relation between group collectivism and group creativity. It should be noted though that the magnitude of the correlation was rather small.

This result seems counter-intuitive and there is little in the literature to explain it. One possible direction is offered by James and Eisenberg (2000a) who suggest that some combinations of situational identity priming and personality may have paradoxical effects on creativity. James and Eisenberg review a series of studies where tasks that required creative thinking were affected differently than non-creative thinking tasks by interaction of factors affecting situational and dispositional identity.

Specifically, James and Eisenberg (2000b) present findings pointing that when participants' collectivist identity was salient (either due to dispositional or situational factors) and they performed in a context that emphasized group goals or collective efforts, participants performed less creatively than when they were acting in a context that made personal or individual aspects of the goal/task salient (generally, a reversed pattern was observed for participants whose salient identity was individualistic).

Following James and Eisenberg's (2000a) model, we can extend the argument to the group level. Thus, one explanation of the reward X I-C interaction finding above is that for groups that were highly collectivist, group rewards, which lead to focus on group goals, lead to better performance on non-creative tasks. However, for task requiring high creativity (as the slogans generation task did), members of collectivist groups tend to fall back on more routine solutions, while groups that are more individualistic act as "non-expert" units and generate more novel ideas.

An alternative possibility is that there was some type of groupthink effect (Janis, 1982). Groups that were both high on collectivism and acting under group rewards may have had an atmosphere that discouraged constructive disagreement and debate that generally contributes to creative quality of group decisions (see also Paulus, 2000). In highly individualistic groups, the atmosphere may have been less conducive to groupthink process.

Effects of Task Type on Creativity

Participants in the present study performed two tasks that required creativity. These tasks differed on several attributes, most importantly on their degree of interdependence. The first task, generating ideas to improve an office chair (Product Improvement or IND), was carried out individually and did not require any cooperation among the team members. Thus, the PI task was low on interdependence (or independent in its structure). The second task, slogans generation (or GRP), required team members to interact and to go through a process which resulted in a single, group-product—the marketing slogan. This task therefore was highly-interdependent. Results of the manipulation check clearly supported this characterization.

I reasoned that group rewards would result in a commonly shared goal for the team and lead to relatively better performance on the GRP task compared to individual rewards that would direct team members' attention to more individual goals. This pattern was not expected to occur for the IND task, where task demands did not necessitate group goals or group communication.

Findings partially supported this pattern: the effects of task X reward interaction on fluency were significant, but the effects on originality were not. Participants in the two individual type rewards (IR and PNR) indeed produced more ideas than GR participants in the IND task. On the other hand, GR participants were rated as generating significantly more ideas on the GRP task than either IR or PNR participants.

Different patterns for quality (or originality) vs. quantity (or fluency) of creative ideas are not uncommon in creativity research (for review see Amabile, 1996). Often, it is easier to detect effects on fluency than on originality of ideas. Number of ideas contributed is believed to be more directly representing the effects of motivational forces, such as level of effort invested (e.g., Harkins & Szymanski, 1989). Originality of ideas, on the other hand, depends less directly on motivational factors and more so on cognitive ones (e.g., Amabile, 1996, Ch. 4). I suggest that these differences account, at least partially, for the lack of interaction effects on originality measures. Rewards affected effort depended measures, but not measures that are unaffected by effort.

According to this rationale, group rewards lead to higher efforts and number of ideas on a task that clearly demanded group processes, but individual rewards lead to more ideas produced during a task that did not depend on group processes. Additional variables that may have mediated the effects of rewards and task interdependence on

number of ideas generated are group process factors that were not assessed here, but could be assessed in future research. These include communication, cooperation, and trust, which were found to facilitate group performance on conceptual or problem solving tasks (e.g., Guzzo & Shea, 1993; West, 1996).

A related issue was recently examined by Stewart and Barrick (2000). Their research looked at team structure and team performance. Based on a few previous studies (e.g., Wageman, 1995) they suggested that task interdependence and team performance would have curvilinear, U shaped, relation: that performance would be higher in low or high interdependence groups, but lower in moderate interdependence groups. They found that for teams whose main task was conceptual (e.g., generating and discussing ideas, negotiating, planning) this relationship indeed held. In these teams, when interdependence was either relatively high or low, performance was higher than in moderate interdependence teams. This relationship did not hold for teams whose main work involved behavioral tasks.

Stewart and Barrick's (2000) explanation for the U shaped relation was that both high interdependence and low interdependence offered some advantages that facilitated positive team processes, which mediated the relationship between task interdependence and performance. They suggested that when interdependence is low, team members pursue their personal interests and goals, with little need for communication and low potential for conflict. This facilitates flexibility and optimization of individual contributions.

When interdependence is high, teams cooperate and communicate more extensively, leading to better clarification of norms and goals, and higher cohesiveness.

The closer interaction facilitates agreement and minimizes conflict. In contrast, teams with moderate interdependence tend to experience more process difficulties. Interaction is not extensive enough to develop mutual understanding of goals, work styles, and trust. The dependence on others, though, results in some compromise of individual interests and preferences, leading to less optimal group processes. Ultimately, "moderate interdependence also diffuses responsibility but fails to develop cohesion and team identity..." (Stewart and Barrick, 2000, p. 138) leading to lower performance.

To test these ideas, I performed an exploratory analysis with group level data and followed the methodological procedures employed by Stewart and Barrick (2000) to test their hypotheses. I created square terms of the two aggregated task interdependence (TI) variables (originally, used as the manipulation check). I then regressed group creativity on reward, TI, TI^2, and their cross-products.

The TI^2 accounted for 6.3% variance in group creativity beyond TI, but the change in R^2 did not reach significance ($p = .16$). Of the two TI variables (pertaining to the IND task and the GRP task), TI-IND^2 reached marginal significance ($p = .08$) in the equation. The TI-IND X Reward interaction was significant ($p = .045$) and the unique variance accounted for by the two TI X Reward interaction variables was 7.3%. Follow up analysis indicated that the relationship of TI-IND to group creativity is indeed curvilinear and approximates a U shape: the lowest group creativity was in moderate TI groups, the highest in low and high TI teams.

The TI X Reward interaction was brought by differential TI-IND—performance relations in the reward conditions. With IR, the correlation was significant and negative ($r = -.64$, $p = .006$), with PNR it was negative ($r = -.15$) but n.s., and with GR the correlation

was positive (r = .16) and n.s. All tests were two-tailed and N ranged from 15-17. This result loans additional support for the inferior performance of moderately interdependent teams. The combination of three reward conditions and interdependence self-reports (TI) provide for a classification of very low, very high, and intermediately interdependent team work conditions. In this way, the present study resembles more Wageman's study where interdependence was the result of combining two separate dimensions—one of task interdependence (corresponding to TI in the present study) and the other 'outcome interdependence" (corresponding to reward type). In contrast, in Stewart and Barrick (2000) study interdependence was assessed by a questionnaire and was a unidimensional construct.

Following Wageman (1995), the teams in the present study can be classified into high interdependence—when rewards are group and TI is high; low interdependence—when rewards are individual and TI is low; and moderate interdependence—when IR are combined with high TI, or GR with low TI (since it does not involve outcome dependence among team members, PNR is seen as closer to IR than to GR on the outcome interdependence dimension). The results generally follow Wageman's findings: from the correlational analysis above we see that when rewards were IR, high TI lead to low group creativity and low TI lead to higher group creativity. The results for the GR and PNR conditions are weaker but in the same theoretical direction. Altogether, this exploratory analysis results indicate that at least for teams engaged in creative tasks, moderate task interdependence results in lower performance than either high or low interdependence.

Another two-way interaction effect I hypothesized about was between I-C and task type. Following somewhat similar rationale as in hypothesizing about the interaction effects of rewards and task, I also suggested that I-C would interact with task type to affect creative performance differentially on the two tasks. I hypothesized that collectivists would perform better when there is a higher focus on and opportunity for group interdependence, and individuals would prefer and perform better on a task that emphasizes independence. Based on past research (e.g., Early, 1989; Early and Gibson, 1998; Triandis, 1994) I reasoned that collectivists, but not individualists would prefer a context that allows them to interact in a more cooperative manner and that the slogan generation task would satisfy this preference. No support was found for this hypothesis, however—there were no differences in performance between collectivists and individualists on either of the tasks.

It is possible that, differential preferences for task interdependence, if they exist at all, manifest themselves only when strong and culturally based differences exist between individualists and collectivists. Indeed, almost all the aforementioned research was performed with cross-cultural samples; maybe these differences cannot be found in a fairly homogenous sample. In the present study, over 80% of participants were from the Southwest (mainly Colorado), and only 1% of participants came from outside the U.S. Thus, a more culturally and geographically heterogeneous sample may be required to detect effects of task type on collectivists vs. individualists.

Finally, following the previous two hypotheses, I also speculated about a potential three-way interaction of reward type by I-C by task type. Results indicated that, as many other 3-way hypotheses, this hypothesis too was rejected.

Effects of Rewards on Motivation

I turn now to discussing the effects on intrinsic motivation. First, I attend to hypotheses 1A and 1B that contrasted two distinct models of the effects that rewards, as extrinsic motivators, would have on intrinsic motivation. As reviewed above, a considerable number of psychologists hold that extrinsic motivators, as much as they have controlling characteristics, lead to lower intrinsic motivation (IM) and, subsequently, to lower performance on tasks in which IM is crucial, first and foremost, tasks requiring creativity.

In the present study, according to CET, we should expect that the highest IM would be in the PNR condition and the lowest in the IR condition, where the contingency of rewards on individual performance is the strongest. GR would be 'intermediate' in terms of IM levels. According to the neo-behaviorist, IR would result in the highest IM and PNR in the lowest, since the latter does not make rewards tied to task performance.

The pattern of effects on IM was quite different, in fact almost reversed, compared to the pattern of effects rewards had on creativity. The results indicate that individual rewards resulted in higher intrinsic motivation for the slogans task than either group rewards or performance non-contingent rewards.

These results fit most closely the neo-behaviorist predictions and clearly run against the CET expectations. Furthermore, since the IM for the slogans task was relatively high, a condition most in accord with the CET typical experimental paradigm, it loans further support for the neo-behaviorist position. One argument that CET supporters may make is that in order to gain a complete understanding of how reward types affected IM, we would need to assess participants' IM for a similar task, but without promising any

rewards whatsoever. While this is a valid claim, conditions where rewards are absolutely absent may not be applicable to many organizational performance settings. Moreover, it is not clear if neo-behaviorist would dispute that IM may be lower if rewards are not offered for future tasks. According to their approach, rewards indicate which behavior is desirable; if no rewards are offered, individuals may interpret this as an indication that low performance, or low effort are as desirable as high performance and effort.

There are several additional interesting aspects of these results we should pay attention to. First, participants' IM for the product improvement task did not differ significantly across the three reward conditions. That rewards affected only IM for slogan generation but not IM for PI, suggests that task type may indeed be a moderator of rewards effects on IM.

This may be a good point to recap some of the main differences between these two tasks. One difference is that for the slogans task participants had to work together as a group, at least to some degree; in contrast, in the PI task they produced ideas individually, without any direct interdependence on their teammates. Second, the PI task was more straightforward while the slogans task seemed somewhat more complex. Related is the finding that, based on comparison of the IM scores for each of the two tasks as well as the experimenters' observations during participants' work, participants were more engaged and interested in the slogans task compared with PI. Third, temporally, slogans were always generated after the product improvement ideas were, and we cannot rule out that this may have had some unaccounted for effects on group processes and individuals' motivation and performance.

None of these features can be traced in the literature to help explain differential effects of rewards on motivation. One possible explanation is that the slogans task, being more complex and involving, required participants to invest more effort than the PI task. Thus, we may speculate that as much as perceived difficulty and invested effort mediate the effects of rewards on IM, the higher the demanded effort and involvement in the task, the stronger are the effects of rewards on IM.

That GR resulted in lower IM than IR is somewhat surprising, in light of the fact that the slogans task was highly group-interdependent. Possible explanation is that the reward manipulation served also as an implicit goal-setting mechanism. Goal-setting theories postulate that individual goal-setting is in most situations more motivating than more "diffused" and general goal-setting such as group-level goal setting (e.g., Locke & Latham, 1990). If so, at least in individualist cultures (see Early, 1989, for interaction effects of I-C and type of goal on effort), individual based rewards may affect IM more than group-rewards through individual goal-setting processes.

The hypothesis that I-C and rewards interact such that collectivists would be more motivated under GR and individualists under IR was not supported. While evidence from cross-cultural studies suggests the plausibility of this hypothesis (e.g., Early, 1989; 1993), it may not necessarily hold in a population that is fairly culturally homogeneous, such as the participants' population of the present study was. Individual (or personality) differences on I-C may not be potent enough to result in effects on participants' motivation under various reward conditions. In retrospect, it would have been beneficial to assess effort exerted by participants, since it is possible that reward and I-C interacted to affect effort invested in, but not motivation for, a certain task.

The Relationship between Motivation and Creativity

Proponents of both the neo-behaviorist theoretical direction as well as the SDT/CET acknowledge the importance of IM and the crucial role it plays in contributing to successful cognitive performance in general, and on task requiring creativity and exploration, in particular. Thus, based on a host of previous research, it was expected that IM would be significantly and positively related to creativity on both tasks.

IM-IND was positively (though not strongly) correlated with performance on the individual task: participants with higher IM produced more, as well as more original product ideas. IM-GRP was positively correlated with rated originality and rated fluency on the group task. All these effects, though small in size (accounting for 1%-2.6% variance), were according to the theoretical expectations.

A surprising result was obtained from the correlation of IM with group creativity (actual creativity of slogans): IM-IND was uncorrelated with group creativity and IM-GRP was negatively related to group creativity. Because of the nature of the slogans task, this result cannot be interpreted in an individual context. Rather, it means that in groups where the average team members' IM was relatively high, less creative slogans were produced. The direction of Beta coefficients in the overall multiple regression model of group creativity converges with this result.

This is quite an anomalistic finding in light of the vast literature pointing to the beneficial effects of IM on almost any type of observed performance (e.g., Ryan & Deci, 2000; Vallerand, 1997). What can be the reasons for the differential effects of IM on individual versus group creativity? One possible explanation is that underlying high IM is a strong sense of autonomy; when autonomy is too dominant it may interfere with group

efforts that depend not only on individual motivation but also on the ability of group members to coordinate well their individual efforts and motivations and to channel them towards productive ends.

Another possibility is that groups with many high-IM members were "over-engaged" in the activity and maybe exerted too much effort. Creativity differs from most other cognitive skills and abilities in several respects (e.g., Amabile, 1983; James & Asmus, in press). One of them may be that it does not necessarily benefit from very high levels of effort. Evidence for this process can be found in the artistic creativity area (see Eisenberg, 1996 for a review). Some scholars suggested that too high arousal might in fact lead to lower performance on some cognitive tasks (e.g., McCullers, 1978). However, since arousal was not assessed in this study, we cannot determine how applicable this is to the results presented here.

Results from two recent studies may help to shed light on the negative correlation of group creativity with IM. Wood, Kakebeeke, Debowski, and Frese (2000) examined the effects of enactive exploration training, intrinsic motivation, and self-efficacy on electronic media search strategy and performance. They found that contrary to their expectations, IM was negatively related to the quality of search strategies (moderate size effect) and unrelated to search performance. The authors suspected that the relationship between IM and strategy quality may be curvilinear. Their tests revealed that, indeed, the relationship was curvilinear: participants with higher levels of IM used less systematic and more exploratory search strategies (which were relatively ineffective for the task). Wood et al. conclude that while IM has been shown to exert a strong influence on

exploratory behavior and persistence, no direct evidence exist that IM indeed has a positive influence on the cognitive processes underlying such behavior.

I performed an exploratory test for non-linear relations using curve estimation regression analysis. The analysis reveled that IM^3 (or cubic) had the best fit in predicting group creativity scores and increased the explained variance from 1.4% to 2.3%. The shape of the curve suggests the relationship is complex: moderate and very high IM levels related to higher creativity, low and moderate-high IM levels lead to lower creativity. Thus, while Wood et al. (2000) results and interpretation fit the 'optimal arousal' explanation, the data from the present study fits only partially with that explanation.

The second relevant study, conducted by Seijts, Latham, and Whyte (2000) reported that self-efficacy for individual performance had a negative effect on small groups' performance on a highly-interdependent money investment simulation task. Self-efficacy and intrinsic motivation are clearly distinct constructs, but they are conceptually related—both being individual motivational characteristics that function to mobilize one into action. They are empirically related as well, often having very similar effects on performance and typically being highly correlated (e.g., Locke, 2000). Seijts et al. explain their finding as may be due to individuals with high self-efficacy believing that they were able to get money at the expense of others. This explanation follows the rationale that some individual characteristics that are conducive of individual performance, may in times conflict with group performance, especially under high task-interdependence conditions (see also Crown & Rosse, 1995).

If indeed the negative correlation between IM and group creativity is due to a conflict between individual and group goals and motivations, then it is plausible that

there would be differences in correlations among the three reward conditions. The strongest conflict should occur when team members are promised rewards as individuals while performing as a group. The relationship of IM to group performance is rather neutral under the PNR condition, where no strong contingency exists between individual or group performance and rewards. Lastly, when the rewards are group based, there should be no conflict between individual goals and group goals, and thus we would expect a positive correlation between IM and group creativity.

I conducted three separate correlation analysis (all one tailed) under each of the reward conditions. For IR, the correlation between IM and group creativity was negative and significant; for PNR, IM was negatively but non-significantly correlated with group creativity; lastly, under GR, IM and group creativity were positively correlated and marginally significant. These results seem to support the suggestion that goal conflict is at least partially responsible for the negative correlation found between IM and group creativity.

Effects on Cohesiveness

I expected that higher cohesiveness would result in higher individual and group creativity. My model also suggested that the main effects of rewards and I-C on creativity would be partially mediated by cohesiveness. First, I review the effects of I-C and rewards on cohesiveness and then I discuss the effects of cohesiveness on motivation and creativity.

Rewards had significant effects on cohesiveness, but somewhat differently than expected. I hypothesized that group rewards, promoting shared group goals and norms of equity among team members, would lead to the highest levels of cohesiveness and that

individual rewards, potentially creating within-group competition would result in the lowest cohesiveness (see also Honeywell-Johnson & Dickinson, 1999; Stewart & Barrick, 2000). The highest cohesiveness was reported in the PNR groups, whose members reported significantly higher cohesiveness than the other two conditions. While IR teams reported the lowest mean cohesiveness, they did not differ significantly from the GR teams. In the group level analysis, no significant effects of reward type were detected. These results suggest that rewards that de-emphasize individual or group competitiveness (i.e., PNR) result in greater cohesiveness than rewards that encourage 'best performance' (as both IR and GR did). A possible explanation is that when participants have a strong focus on task aspects, they invest less attention and energy in social and interpersonal processes. This task focus, which is expected when rewards are contingent on task performance, may serve to minimize "process losses" (see McGrath, 1984) but may also result in less cohesive feeling of team members. The overall effect size of rewards on cohesiveness, though, was small.

Cohesiveness was also affected by individual differences in I-C. The effects were apparent both in the individual and the group level. Participants higher on collectivism tended to report higher cohesiveness, and groups that had higher mean collectivism were more cohesive than more individualistic groups. This relationship, which was not strong, is in accord with the hypotheses and is expected, based on the literature. Collectivists tend to be more oriented towards and interested in group-goals, and may also 'project' their desire for higher group relatedness into the group they are working with (e.g., Triandis, 1985).

Relationship Between Cohesiveness and Motivation and Creativity

Cohesiveness and Intrinsic Motivation: Generally, cohesiveness and IM were positively and significantly correlated, though this correlation was quite small in magnitude. Performing separate analysis by reward type allowed detecting some differences between the three conditions. With PNR and IR, the correlation of cohesiveness with IM displayed almost an identical pattern: the correlation with IM-IND was not significant, the correlation with IM-GRP was positive but relatively small and reached only marginal significance. With GR, the correlation with both IM-IND and IM-GRP was positive, significant, and somewhat larger in magnitude.

The differences among the conditions are not large, but sufficient to warrant future investigation of how reward type affect the relationship between cohesiveness and IM. While ample evidence exists in the literature for the causal direction between cohesiveness and performance, (i.e., generally, cohesiveness affects performance, and less so vice-versa), literature on the relationship between IM and cohesiveness is relatively scarce. One main reason for this is that IM was mostly assessed in studies that focused on individual performance and rarely with group performance in mind.

It is quite plausible that individuals who feel that their group is more cohesive would show higher interest in the task, especially if it is performed as a group task, which fits with the generally stronger cohesiveness-performance relations found when the task was interdependent. Thus, to the extent that team members perceive a connection between their attitude and attraction towards the work-group and the task this group performs as an interdependent unit, higher cohesiveness should lead to higher intrinsic interest in performing well. In other words, I suggest that identification with one's group

(or team-mates) may affect one's interest and motivation to engage in activities that involve this group.

However, an alternative causal route is also conceivable. Maybe team members, who have higher IM for the group-task, feel more involved in the group processes and more attracted to the group as a whole. In this line of explanation, the interest in the task precedes and engulfs the interest in the group. Finally, it is possible that both processes operate at the same time. Whichever the causal nature of the cohesiveness-IM relationship is, it seems to be stronger when the task is interdependent in structure and when rewards are contingent on group, rather than individual performance. These findings suggest that cohesiveness is especially important when the task facing the group is both structurally (task) and outcome (reward) interdependent.

Cohesiveness and Creative Performance

In general, cohesiveness correlated stronger with individual creativity than with group creativity. Individual-level cohesiveness did not correlate significantly with group creativity, group-level cohesiveness did. Both cohesiveness measures, however, were not significant predictors of group creativity when entered in the full regression model (see Tables 9). This pattern further reinforces the importance of matching levels of predictors with the level of observed dependent variables. The significant effects of the reward x cohesiveness interaction and the series of correlation analyses that followed shed more light on the relationship between cohesiveness and creative performance.

Overall, the results indicate that the cohesiveness-creativity relationship depends both on the type of creative performance examined (individual vs. group) as well as on the type of rewards group members were promised. Across all reward conditions,

cohesiveness correlated positively with individual fluency. This correlation was quite significant, but weak. No correlation however, was detected between cohesiveness and individual originality.

In the individual creativity task, individuals in the PNR condition who reported higher cohesiveness had a trend of producing more ideas than individuals who reported low cohesiveness. With IR, there was no relationship at all between cohesiveness and fluency. With GR, the correlation was positive and medium in strength: individuals who reported higher cohesiveness produced more ideas.

Turning to group creativity, we see that in the general analysis, there a significant but weak positive correlation between how cohesive a team was and how creative its slogans were. Analysis of separate reward conditions presents a much richer picture. With PNR, no correlation was found between cohesiveness and group creativity. With IR, the relationship was negative, while with GR, this relationship is positive. The magnitude of both effects is fairly small.

These findings are interesting since they suggest that the type of reward significantly moderates the relationship between cohesiveness and team performance. Rarely does one find in the literature, field and experimental alike, that cohesiveness has negative effects on performance. The present study indicates that there may be exceptions to the cohesiveness-performance link. While cohesiveness did not play a significant role in teams' performance when rewards were non-contingent on performance, when teams were operating with group rewards, more cohesive teams produced more creative slogans, and when the rewards were based on individual performance, more cohesive teams produced less creative slogans.

Unlike with the cohesiveness-motivation link, there are more theoretical reasons to assume that the causal direction was from cohesiveness to creativity and not the vice versa. Beyond the fact that this point is strongly supported by past research (e.g., Evans & Dion, 1991; Hogg, 1992), it is hard to explain how, in the present study, the quality of slogans produced affected perceived cohesiveness, especially since the slogans task was quite ambiguous in terms of criteria, making it unlikely that team members had very accurate perception of how creative was their team's slogan compared to other teams in the study. It is possible of course, that a third variable, such as quality of group communication affected both factors, such that better intergroup communication lead both to higher cohesiveness and to more ideas shared between members, resulting in more creative slogans. It is noteworthy that the effect size of the reward X cohesiveness interaction was not trivial: it added close to 10% of explained variance in group creativity.

Assuming that cohesiveness indeed affected creativity, how can we explain the findings presented above? It is interesting to note that while the differences in strength and direction of the relationship between cohesiveness and either individual motivation or individual creativity were fairly small across the three reward conditions, these differences were quite pronounced for the group creativity task. I suggest that one possible explanation for the moderation effects of rewards on the relationship between cohesiveness and group creativity is that for cohesive teams, group vs. individual rewards send different messages about the goals of their group. When rewards are based on group performance, there is congruence between the goals of the group as a whole and the goals of its individual members. Team members who feel attached to their group are inclined

to share ideas and build on other team members' ideas without being overly concern if their own ideas prevail, but rather how to optimize the teamwork. This orientation, which we may label ego-less, leads to better teamwork and to more creative group products. In the group level, there was a match between the socio-emotional orientation and the task orientation of team members.

Members in cohesive groups who worked under individual reward conditions, faced a sort of conflict between the desire to maximize their own (individual) performance on the task, and the socio-emotional bonding they experienced with their teammates. This conflict may have resulted in team processes that are not conducive for optimal group creative performance. This may be due to stress or other emotionally distracting states experienced by team members who perceive a contradiction between the team's socio-emotional and task orientations.

Relationship between Individual Creativity and Group Creativity

Part of my model (see Figure 1) suggests that individual creativity would affect group creativity. Previous research using group creative performance is not abound, but the few studies performed suggest that groups who have more creative members will be more creative as a group as well (e.g., Paulus, 2000; Pirola-Merlo, 1998; West, 1996). As can be seen by the correlation pattern, both measures of fluency—one for the IND task and the other for the GRP task—significantly relate to group creativity. Similar analysis in the group level (N=48) was virtually similar although, due to the small N, the correlation with fluency only approached marginal significance. The number of ideas suggested by individual members during the IND and the GRP tasks, both predicted the quality of slogans generated by the teams. Quantity of generated new ideas has been seen

as a good indicator of creative ability (for a review, see Amabile, 1996). The correlation with group creativity was considerably stronger for rated fluency during the slogans task than for fluency during PI (IND), suggesting that while both tasks tapped on somewhat similar creativity skills, they may have demanded some different skills as well.

The model (Fig. 2) also proposes that individual creativity would mediate the effects of rewards and I-C on group creativity. Rated fluency and originality partially mediated the effects of rewards on group creativity, as well as partially mediated the effects of the aggregated I-C X rewards interaction on group creativity. Both effects were rather small in magnitude, accounting for 1% or less of the variance. These results indicate that the process, through which rewards, as well as their interaction with I-C, affect group creativity, can be only partially explained by their effects on individual level creativity. Results also indicate that individual fluency played a greater mediating role than individual originality. The partial mediation tells us that to some degree, team members were more creative under certain rewards and reward X aggregated I-C interactions and, in turn, this individual creativity contributed to their group's creativity. However, as the weak effect size indicates, we should look for explaining most of the variance elsewhere, since some of the effects on group creativity were independent from the effects on individual creativity.

Interestingly, and contrary to what we may expect, IM did not mediate the effects of individual creativity on group creativity. It also appears that while IM for slogans generation related positively to individual fluency and individual originality, and while the latter two related positively to group creativity, intrinsic motivation and group creativity were negatively related.

Demographic and Individual Differences Effects on Motivation and Creativity

This section describes in brief some of the effects that individual characteristics had on motivation and creativity. These effects are secondary as they are not paramount for the theoretical framework of the present study. Nevertheless, they are sufficiently interesting and relevant for the general issues of individual and team performance to merit brief summary.

Initially, the task interdependence scale was included to serve as a manipulation check and support the analyses that included task type as a within-subjects variable. I ended up including the task interdependence factor in the regression models for creative performance, since it was the only variable that directly captured the interdependence aspect of the work. Task interdependence emerged as a significant predictor of both individual and group creativity.

Here, it is also instructive to examine the relationship between task interdependence and creativity separately for each of the reward conditions. Doing so, a correlational analysis shows that while in the PNR and GR conditions there was no relation between task interdependence and creative performance, in the IR condition, higher TI lead to smaller number of ideas generated during the IND task and less creative slogans generated during the GRP task. These findings are generally consistent with the other findings reported above about the interaction between reward types and group/task factors to affect creativity. It seems that individuals who worked under individual rewards and perceived that there was high work interdependence between them and other team members, came up with fewer ideas even when the task itself was fairly independent in structure, as was the case with the PI task. The effects of task interdependence were even

more pronounced in the group level work. Interestingly, while there was no group level effect whatsoever of rewards on task interdependence, IR teams that had high TI performed significantly and markedly less creatively than low TI teams.

Moving to examine the effects of some demographic variables, we find that parents' education had some effects on creativity. Specifically, father's education level was positively correlated with originality of product ideas: students with higher educated fathers came up with more original ideas. The other two demographic variables that affected dependent variables are:

Sex: Females were more intrinsically motivated than males in performing both tasks (marginal significance for effects on IM-IND and significant effects on IM-GRP). No gender differences in creativity were found.

Place of living: The type of place participants came from affected how original their ideas were. Effect sizes were generally small, with the most pronounced differences between participants from rural areas and large cities, both of which produced significantly more original ideas than those who grew up in small towns who produced the least original ones.

Methodological Contributions

SIMS

The Situational Motivation Scale is a fairly new scale, developed recently by Guay et al. (in press). The present study is one of only few that have used this scale (while the focus of the present study was on the IM subscale, I have administered the full scale and found that the other three subscales had adequate levels of reliability). More importantly, SIMS was used in a novel way in the present study, which to my knowledge did not

appear previously in the IM literature. I used it as a within-subjects assessment of IM, which enables a more powerful comparison across different tasks and conditions and specifically, assessing participants' IM when working alone versus in a group. Most social psychological investigations of IM have used only between subjects measures, and few studies (if any) measured IM for team-performed task. The present study suggests that IM interacts with task type and that it is important to assess IM in group settings as well.

Cohesiveness

While cohesiveness has been an extensively utilized variable in group process and group performance studies, I found it necessary to construct a new measure of cohesiveness. Though several good measures exist, there was no scale that could be adequately used for work-team simulation study. The cohesiveness scales used in previous studies of work teams in organizations (e.g., Seashore, 1954) relied substantially on aspects that are not relevant for short-lived, ad-hoc, or simulated teams. Mainly, the relationship-over-time aspect, which includes both group history as well as members' expectations for future interactions, is not relevant for such groups.

The other cohesiveness measures most commonly used were constructed for sport teams or for groups in a psychotherapeutic context, and thus, were not adequate for the present study. I constructed a new scale, based in part on a modification of a widely used sport team scale (Widmeyer et al., 1985), and in part on items used by Hogg (1993) to assess cohesiveness in laboratory settings. After minor revisions, the new scale, used in the present study, displayed good reliability and validity properties (for example, it correlated well with other measures of cohesiveness, and with several related constructs

assessed in the study). Of course, more extensive testing of the scale properties and validity is needed in various settings before its full utility can be appropriately assessed. Tentatively at least, the new cohesiveness scale could be quite useful in assessing cohesiveness of teams that do not work together for long time. This is true mainly for experimentally simulated teams, but also for a growing number of actual (intact) teams operating under unique organizational conditions (e.g., see Engwall & Svensson, 2000; Keller, 1986).

Task Interdependence

Task interdependence is emerging as an important contextual feature in organizational psychology literature (e.g., Stewart & Barrick, 2000;Wageman, 1995). In the present study, I successfully manipulated interdependence by using two different tasks. To assess whether this manipulation worked, I constructed a three-item scale that functioned well as a manipulation check. The scale, derived from a previously field-validated larger scale (Chen, 1995) could prove very useful to assess task interdependence perceptions both in laboratory as well as in field settings.

Group Creativity

Most previous studies of creative performance have used individual performance measures as their outcome measure. I constructed a new task that results in a group-level outcome of creative performance. This task, which simulates advertising agency work, taps into group dynamics involved in group creativity and would be quite useful to any scholars interested in studying group creativity in experimental settings.

Multilevel Issues

Considering effects at different levels is increasingly important in organizational studies in general, and in studies of group processes and performance, in particular (Gavin, 2000). The present study had two contributions. One is in the theoretical model level: The model related individual level variables (IM, creativity, I-C) to group level processes (cohesiveness) and outcomes (group creativity). Thus, it specified that certain variables are expected to affect only individual level creativity, while others are expected to affect both individual and group level creativity.

Multilevel issues were also addressed through the analytical framework employed by including factors that captured the function of variables in the group level. The results showed that including aggregate variables when assessing group creative performance is important because some factors have much stronger effects when assessed in the group level. One example is the interaction effect of reward types and I-C on creativity, which was not significant in the individual level but was highly significant when the group level I-C factor was included in the regression.

Applied Implications

Due to issues of reduced ecological validity, it is always harder to draw concrete applied implications from laboratory studies. Given this limitation, the present study has nevertheless some important contributions for applied settings. This is largely due to the fact that so few studies, field or lab, addressed the issues of motivation and creativity in teams. In this section, I limit my discussion only to effects that were large enough in size to warrant applied relevancy.

Following its design characteristics, the findings of this study are most relevant for ad-hoc or specific problem solving project teams, which have become more commonplace in many organizations, especially those that are R & D based (Engwall & Svensson, 2000; Keller, 1986). In this context, the most important finding is that group performance-based rewards work better than individual performance-based rewards for problem solving or creative project teams. The sizable magnitude of this effect suggests that reward type may play an important role in other settings as well. GR were also superior to both PNR and IR in affecting peer rated fluency of team members. Since performance non-contingent rewards resulted in virtually similar group creative performance, as did GR, one basic compensation structure for creative project teams may combine fixed remuneration with a group based bonus for performance. There is some evidence from the field that increasing the role of group-based rewards in R & D workers' compensation is desirable (e.g., Chen et al., 1999). Based on the reward X task type interactions, it seems that employing some elements of group based rewards is especially important when the task is very interdependent, that is, when team members need to cooperate and communicate extensively to reach good performance.

Another finding that would hold interest for work teams is that cohesiveness was especially important for motivation and performance when both rewards and task structure encourage interdependence among team members. Thus, fostering cohesiveness in project groups that have group reward components is much more important than fostering creativity in teams where the rewards are individual-based and the task does not require strong cooperation. In fact, when using individual performance rewards with

highly cohesive teams, it may even result in lower creativity given high task interdependence.

Limitations

One important limitation that this study shares with most other studies that simulate, in laboratory conditions, complex social phenomena, is a limited ecological validity. The study simulated the work of teams and did so in controlled conditions and for a short amount of time. Some important characteristics of real teams that were missing from the design include the time element (effects of group work over time on teams' dynamics and productivity), history (both among members of each group, as well as its existence in the larger inter-group and organizational context), the complexity and significance (for the team members) of the task performed, as well as the relevance of its outcomes (i.e., how important was it for members to get the promised rewards/prizes?).

Another limitation of this study is that while some of the hypotheses referred to existing theoretical models (specifically those relating IM to creativity and extrinsic motivators) there is still a need to create a more comprehensive theoretical framework to account for the factors affecting creativity of teams at both individual and group levels of analysis. While there are several models of creativity in groups, they are fairly incomplete and hardly related to each other. Thus, there is still a need to integrate findings from the general creativity literature and from the group performance literature into a comprehensive theoretical model of group creativity.

Future Studies

Following the limitations on ecological validity, it would be desirable to perform future tests of the hypotheses in field settings, looking at existing incentive systems, real

group tasks and, most importantly, look at intact work groups working within organizations.

While the present study found little evidence for the impact of I-C on reward-motivation and creativity relationship, it does not preclude the possibility that such effects do indeed exist in other contexts. The present study looked at a fairly homogenous within-national sample. Examining the propositions of the study cross-nationally will enable us to assess whether I-C plays a different role in affecting motivation and creativity across nations than within nations.

As was aforementioned in the limitations section, there is a need to further relate the variables and findings of the present study to recent theories on creativity. While no comprehensive model of group creativity has been offered, several scholars offered partial models of factors affecting group creativity (e.g., Paulus, 2000; West, 1996). In future studies that will examine effects of reward type on motivation and creativity in teams, it would be helpful to try to incorporate some of these models to explain the differential effects of incentives on IM and group creativity. Following the findings of the study that IM and cohesiveness may relate negatively to group creativity, new integrative models are needed to explain under which contextual conditions (including reward types) IM and cohesiveness are conducive to creative performance in groups.

A related impetus for follow up studies is identifying some of the "missing links" between rewards and creativity. Following the several aforementioned theories on the nature of relationship between intrinsic motivation, extrinsic motivators, and creative performance (e.g., Eisenberger et al., 1998; Ryan & Deci, 2000), we should expect that as much as rewards affect creativity, these effects should be mediated by the effects of

rewards on IM. The findings generally did not support this proposed process. IM did not mediate the effects of rewards on individual creativity, and played only as small role in mediating the effects of rewards on group creativity. This presents an interesting theoretical challenge, especially in the case of group creativity, where reward type was clearly important, accounting for 25% of the variance.

Future studies may look for alternative mediators, which include group process variables such as communication and trust, not assessed in the present study. Another direction to investigate is of potential effects of reward types on shared mental models, which were found to affect teams' problem solving abilities (e.g., Guzzo & Shea, 1992). It is possible that group-based rewards or rewards non-contingent on performance facilitate better communication and information sharing among team members, resulting in more aligned shared mental models. Free flow of ideas and their relatively uninhibited synthesis is especially important for good performance on such a task as slogan generation was, characterized by high levels of ambiguity, open-ended creativity, and interdependence.

Conclusion

Individual rewards resulted in the highest intrinsic motivation; group rewards and performance non-contingent rewards resulted in equal levels of IM. PNR and GR also did not differ in their effects on group creativity, but PNR participants produced more ideas than GR participants in the product improvement task. Both PNR and GR teams created considerably more creative slogans than those created by IR teams.

These results partially support both theoretical camps. Specifically, the effects on IM are closest to what neo-behaviorist would have predicted; the effects on creativity, however, fit better predictions of SDT researchers.

I found only partial evidence in support for individualism-collectivism moderating the effects of rewards on motivation and creativity. The effect suggests that high collectivism may lead to higher group creativity under individual, rather than group, rewards. As for main effects, participants who were more collectivist showed higher IM on both tasks, especially on PI. Higher cohesiveness related to higher IM on both tasks, lead to more PI ideas suggested, and had a positive but weaker effect on creativity of slogans.

Reward type played an important part in affecting motivation and creativity. The results indicate that the effectiveness of various rewards depends on both the creativity measure and the task type. In general, individual rewards worked best for outcome variables that did not demand group interdependence, such as intrinsic motivation and individual fluency. When team characteristics (cohesiveness) or task characteristics (single group product) emphasized interdependence, IR teams did not perform as well. Overall, the concept of task interdependence was found to be an important dimension to consider when predicting creative performance of individuals working in nominal and interactive teams.

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Appendix I: Materials used (in order of administration)

- Individualism-Collectivism (Triandis et al., 1985)
- The Situational Motivation Scale (Guay et al., in press)
- Peer Creativity Evaluation Sheet (Eisenberg, ad-hoc for present study).
- Group Environment Questionnaire (measuring cohesiveness; adaptation of Widmeyer et al., 1985).
- Task Comparison Questionnaire (includes manipulation check items adopted by Eisenberg from Chen, 1995).

Personality Questionnaire

We want all information you provide to be anonymous and confidential. But, in case some of the forms you complete get separated from each other, we would like you to put some common code number on all of them. Please place the last four digits of your telephone number or any other four-digit number you choose to use in the space that follows and at the top of **each other questionnaire part** you fill out in this session. ID #_____

For each of the 17 items that follow, please circle the number that best reflects how true each statement **generally** is of you.

1. I would rather struggle through a personal problem by myself than discuss it with my friends.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

2. The most important thing in my life is to make myself happy.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

3. I tend to do my own thing, and others in my family do the same.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

4. One does better work working alone than in a group.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

5. When faced with a difficult personal problem, it is better to decide what to do yourself, rather than follow the advice of others.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

6. What happens to me is my own doing.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

7. If the group is slowing me down, it is better to leave it and work alone.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

8. If the child won the Nobel Price, the parents should not feel honored in any way.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

9. Children should not feel honored even if the father were highly praised and given an award by a government official for his contributions and services to the community.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

10. In most cases, to cooperate with someone whose ability is lower than yours is not as desirable as doing the thing on your own.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

11. One should live one's life independently of others as much as possible.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

12. It is important to me that I perform better than others on a task.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

13. Aging parents should live at home with their children.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

14. Children should live at home with their parents until they get married.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

15. I would help within my means, if a relative told me that s(he) is in financial difficulty.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

16. I like to live close to my good friends.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

17. Individuals should be judged on their own merits, not on the company they keep.

1	2	3	4	5	6	7
Completely Disagree			Moderately Agree			Completely Agree

The Situational Motivation Scale (SIMS)

Dear participant,

Please read each item carefully. Using the scale below, please circle the number that best describes the reason why you were currently engaged in the product improvement activity [or "slogan generation", when administered after the second task] that you just completed. Answer each item according to the following scale: 1 = correspond not all; 2 = correspond a very little; 3 = correspond a little; 4= correspond moderately; 5 = correspond enough; 6 = correspond a lot; 7= correspond exactly.

Why were you currently engaged in this activity?							
1. Because I think that this activity is interesting	1	2	3	4	5	6	7
2. Because I am doing it for my own good	1	2	3	4	5	6	7
3. Because I am supposed to do it	1	2	3	4	5	6	7
4. There may be good reasons to do this activity, but personally I don't see any	1	2	3	4	5	6	7
5. Because I think that this activity is pleasant	1	2	3	4	5	6	7
6. Because I think that this activity is good for me	1	2	3	4	5	6	7
7. Because it is something that I have to do	1	2	3	4	5	6	7
8. I do this activity but I am not sure if it is worth it	1	2	3	4	5	6	7
9. Because this activity is fun	1	2	3	4	5	6	7
10. By personal decision	1	2	3	4	5	6	7
11. Because I don't have any choice	1	2	3	4	5	6	7
12. I don't know; I don't see what this activity brings me	1	2	3	4	5	6	7
13. Because I feel good when doing this activity	1	2	3	4	5	6	7
14. Because I believe that this activity is important for me	1	2	3	4	5	6	7
15. Because I feel that I have to do it	1	2	3	4	5	6	7
16. I do this activity, but I am not sure it is a good thing to pursue it	1	2	3	4	5	6	7

Peer Creativity Evaluation Sheet

This evaluation sheet is intended to help us assess how much each team member contributed to the slogan generation task you just completed. Please circle the number that best describes your impression. The letters on the sheet correspond to the letters on each team member's nametag. It is important that your ratings reflect, as much as possible, the **relative** contributions of the team members. Your answers will be strictly confidential and not shared with any of the other participants. Please do not include yourself in this evaluation.

- Your letter: _____

Using the scale below, please circle the number that describes your opinion best. Leave blank the row that corresponds to your letter or to letters that were not present in your team. Answer each item according to the following scale:

1 very little 2 below average 3 about average 4 above average 5 very much

1. How **original** were the ideas contributed by each of the following team members?

A	**1**	**2**	**3**	**4**	**5**
B	**1**	**2**	**3**	**4**	**5**
C	**1**	**2**	**3**	**4**	**5**
D	**1**	**2**	**3**	**4**	**5**
E	**1**	**2**	**3**	**4**	**5**
F	**1**	**2**	**3**	**4**	**5**
G	**1**	**2**	**3**	**4**	**5**
H	**1**	**2**	**3**	**4**	**5**

2. How **many** ideas were contributed by each of the following team members?

A	**1**	**2**	**3**	**4**	**5**
B	**1**	**2**	**3**	**4**	**5**
C	**1**	**2**	**3**	**4**	**5**
D	**1**	**2**	**3**	**4**	**5**
E	**1**	**2**	**3**	**4**	**5**
F	**1**	**2**	**3**	**4**	**5**
G	**1**	**2**	**3**	**4**	**5**
H	**1**	**2**	**3**	**4**	**5**

3. How much **leadership** did each of the following team members demonstrate?

A	**1**	**2**	**3**	**4**	**5**
B	**1**	**2**	**3**	**4**	**5**
C	**1**	**2**	**3**	**4**	**5**
D	**1**	**2**	**3**	**4**	**5**
E	**1**	**2**	**3**	**4**	**5**
F	**1**	**2**	**3**	**4**	**5**
G	**1**	**2**	**3**	**4**	**5**
H	**1**	**2**	**3**	**4**	**5**

Group Environment Questionnaire

Dear participant,

The following questionnaire refers to the team you worked in during the study. Please think of the team as a whole, its performance today, and its characteristics. Read each item carefully. Using the scale below, please circle the number that best describes how you feel towards the team you worked in. Answer each item according to the following scale: 1 = Strongly agree; 3 = Moderately agree; 5 = Neither agree nor disagree; 7= Moderately disagree: 9 = Strongly disagree.

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1. I am not going to miss the members of this team when the study ends	1	2	3	4	5	6	7	8	9
2. The team did not give enough opportunities to contribute my ideas	1	2	3	4	5	6	7	8	9
3. I did not like the style of work in this team	1	2	3	4	5	6	7	8	9
4. Our team was united in trying to reach its goals for performance	1	2	3	4	5	6	7	8	9
5. We all took responsibility for any poor performance by our team	1	2	3	4	5	6	7	8	9
6. Our team members did not communicate freely about each member's responsibilities during work	1	2	3	4	5	6	7	8	9
7. As a whole, I liked the members in my team	1	2	3	4	5	6	7	8	9
8. I feel attached to the team	1	2	3	4	5	6	7	8	9
9. Compared to other teams in this study, my team had performed relatively well	1	2	3	4	5	6	7	8	9
10. I felt quite similar to others in my team in terms of general attitudes and opinions	1	2	3	4	5	6	7	8	9
11. Compared to other teams in this study, my team was relatively cohesive (united)	1	2	3	4	5	6	7	8	9

Task Comparison Questionnaire

Think back to the two different tasks that you were asked to perform: A. The product improvement idea generation, and B. The marketing campaign slogan generation. The following items ask how you felt when performing each of these tasks. Read each of the following statements and indicate how much the statement applies to you by putting a number between 1 and 5 next to each of the statements. Please use the following scale to indicate your level of agreement:

1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree;
4 = Agree; 5 = Strongly disagree.

- Remember, **Task A** was Product Improvement and **Task B** was Slogan Generation

	Task A	**Task B**
1. My task performance was affected by the different levels of my team members' performance.	___	___
2. My team members' work depended directly on my performance	___	___
3. Most of my task activities were affected by the task activities of my team members.	___	___
4. I did not depend on others to do my tasks.	___	___