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Motivating Interdependent Teams: Individual Rewards, Shared Rewards, or Something in Between?

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The primary purpose in this study was to extend theory and research regarding the motivational process in teams by examining the effects of hybrid rewards on team performance. Further, to better understand the underlying team level mechanisms, the authors examined whether the hypothesized benefits of hybrid over shared and individual rewards were due to increased information allocation and reduced social loafing. Results from 90 teams working on a command-and-control simulation supported the hypotheses. Hybrid rewards led to higher levels of team performance than did individual and shared rewards; these effects were due to improvements in information allocation and reductions in social loafing.

Keywords: teams, reward structure, motivation, transactive memory, performance

Reliance on action and project teams for complex tasks has become a popular strategy within organizations (see Sundstrom, 1999). Such teams are highly adaptable and allow organizations to take advantage of the diverse knowledge of skilled team members (Keller, 2001; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Smith-Jentsch, Mathieu, & Kraiger, 2005). However, the interdependent nature of these teams presents a unique challenge to organizations, as facilitating the effective performance of team members requires managers to find ways to motivate both individual effort and the coordination of diverse expertise.

Organizational interventions aimed at influencing individual employee motivation have been extensively examined, but the motivation process in teams has not received much attention (Chen & Kanfer, 2006; Kozlowski & Bell, 2003). Motivating teams adds a level of complexity to the choice of managerial interventions, as team members often have diverse goals and different levels of commitment to the team and the shared task. Further, attempts by managers to increase effort in one area may reduce attention in another, as team members' motivational focus may be split between individual and team goals (DeShon, Kozlowski, Schmidt, Milner, & Weichmann, 2004). Although motivation stems from many sources, the most commonly available tool for managers is the use of incentives (Rynes, Gerhart, & Parks, 2005).

Incentives motivate workers by creating a link between employee effort and reward. When valued rewards align with clear performance goals, workers will tend to exert a sustained, focused cognitive and behavioral effort toward the attainment of those objectives (Latham & Pinder, 2005; Rynes et al., 2005). For work within teams, organizations have generally relied on either shared or individual rewards to motivate workers to attain team goals (DeMatteo, Eby, & Sundstrom, 1998), and there are positive and negative consequences associated with each reward type. Shared, or cooperative, rewards cue prosocial motivation, focusing attention and effort toward interaction between team members (De Dreu, Nijstad, & Van Knippenberg, 2008), but lead to reduced member accountability and effort. Individual rewards, on the other hand, result in higher member satisfaction and a stronger connection between behavior and outcomes but do not encourage members to focus attention toward helping their teammates (De Dreu, 2007; Shea & Guzzo, 1987).

The choice between them depends primarily on level of team task interdependence, which is the degree to which the team's task performance depends on the coordinated efforts and skills of all the members (Wageman & Baker, 1997). Cooperative rewards have been consistently shown to be more effective for interdependent teams, which require extensive knowledge sharing and high levels of interaction, and individual structures benefit more loosely affiliated groups, for which individual contribution outweighs collective focus (DeMatteo et al., 1998; Wageman, 2001). Recently, researchers have suggested that, for teams with high levels of task interdependence, hybrid rewards might provide the benefits of both individual and shared rewards and avoid many of the pitfalls (e.g., Johnson et al., 2006; Siemsen, Balasubramanian, & Roth, 2007).

Therefore, our primary purpose in this study was to expand our understanding of team motivation through the use of incentives by examining the effects of different reward structures. We focused our study on hybrid rewards as an alternative incentive structure that may be particularly advantageous in highly interdependent teams with diverse expertise. Utilizing Chen and Kanfer's (2006) multilevel theory of team motivation as an explanatory framework, we examined how these three types of reward structure differentially influence team motivation and here argue that hybrid rewards simultaneously influence both individual- and team-level motivation. In this way, they focus member attention toward both

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individual task completion and the collective integration of expertise that is essential for performance in interdependent teams.

The second purpose in this study was to examine the motivational mechanisms that can help explain why hybrid rewards outperform individual and cooperative structures, an area that is currently underdeveloped in the literature (Beersma et al., 2003). Our focus, based on Chen and Kanfer's (2006) framework, was on two mediating processes: information allocation, defined as expertise-specific information sharing (see Ellis, 2006), and social loafing, defined as the reduction in effort and motivation that tends to occur when individuals work collectively on a task (Karau & Williams, 1993).

Individual and Cooperative Reward Structures

At the individual level, incentives are expected to stimulate sustained and directed effort toward attaining a valued goal. When a reward is attainable and valued by workers, they should increase their individual attention and effort toward attaining the goal (Locke, Feren, McCaleb, Shaw, & Denny, 1980; Staw, 1977). However, at the team level, motivational states are influenced by both individual- and team-level factors. In their multilevel theory of motivation in work teams, Chen and Kanfer (2006) suggest that the motivation process in teams is homologous at the individual and team levels. That is, just as individuals respond to motivational influences with directed, sustained striving to attain a valued goal, teams will collectively work toward accomplishing a shared objective. Therefore, because team-level motivation is based on shared interactions among team members, Chen and Kanfer (2006) defined it as "the collective system by which team members coordinate the direction, intensity and persistence of their efforts" (p. 233).

Team motivation consists of two elements: individual effort toward the attainment of individual tasks and the collective orientation toward helping the team as a whole succeed (e.g., DeShon et al., 2004). Researchers note that organizational interventions typically focus on one of the two elements and can be classified as either discretionary, defined as "person oriented stimuli directed or presented to specific team members, rather than the team as a whole," or ambient, defined as "team oriented stimuli that pervade the team as a whole" (Chen & Kanfer, 2006, p. 243; Hackman, 1992). Discretionary stimuli act to influence the members of the group individually, and ambient stimuli are designed to affect proximal motivational states related to team-level attention and interaction. Although these two types of stimuli exert "bottom-up" or "top-down" influences on collective and individual motivation respectively, their primary effect is felt at the targeted level. In other words, discretionary stimuli primarily direct attentional focus toward individual achievement, whereas ambient stimuli primarily direct team member attentional focus toward the achievement of team goals. In teams, individual rewards act as discretionary stimuli, influencing individual attention and effort. In contrast, cooperative rewards are ambient stimuli, as they affect the team as a whole and create environments that "predispose the individuals within them to act and react in similar ways" (Chen & Kanfer, 2006, p. 244).

Proponents of cooperative reward structures suggest that ambient incentives motivate members to focus on mutual interaction (e.g., Harrison, Price, Gavin, & Florey, 2002) and lead to higher levels of performance. By creating a prosocial motivation and perceived cooperative outcome interdependence, ambient incentives lead teams to avoid or better manage conflict, learn more, and perform more effectively (De Dreu, 2007). However, cooperative reward structures have several potential pitfalls (Latané & Nida, 1981), as they reduce personal accountability and create dispensability of effort, leading team members to withhold effort (e.g., Karau & Williams, 1993).

The most common alternative is to reward individual effort, thereby focusing attention on the members' own tasks rather than the team's overall mission, with the hope that the sum of the individual inputs will lead to overall goal attainment. However, this type of discretionary influence generates a proself motivation in which members attempt to maximize their own outcomes without regard for the outcomes of the team as a whole (De Dreu et al., 2008), leading to less cooperation and fewer teamwork behaviors. For example, Johnson et al. (2006) found that teams with individual reward structures engaged in reduced levels of information sharing. They suggested that one means of resolving the tradeoffs between reward structures is the adoption of hybrid incentives, in which both individual and team performance are rewarded.

Hybrid Reward Structures

In teams with high levels of task interdependence, hybrid reward structures should act simultaneously as both discretionary and ambient stimuli. Such structures allow organizations to direct the focus of attentional and motivational resources of team members toward both their own effort and their team responsibilities. The cooperative aspect of hybrid rewards serves as an ambient stimulus that motivates effective team action processes by directing attention and effort toward shared responsibilities (Chen & Kanfer, 2006), providing similar benefits to shared rewards, and leading to higher levels of performance when compared with individual structures.

At the same time, by introducing the individual, discretionary motivation of individual rewards, hybrid rewards should act to spur team members to accomplish their task. This may alleviate many of the drawbacks of cooperative rewards, as members are held accountable for their work and see their efforts leading to measurable performance improvements. Though the bottom-up effects of discretionary stimuli on team performance are weaker than the top-down effects of ambient stimuli (Kozlowski & Klein, 2000), heightened individual effort addresses the major weakness of collaborative reward structures and offers a significant performance advantage over shared rewards alone.

When team task interdependence is low, combining individual and collective rewards may present mixed signals that distract group members from their primary individual focus (Wageman, 1995) and harm performance. However, we expected that in teams with high levels of task interdependence, where both individual effort and high levels of collective interaction are required, hybrid rewards would provide a performance advantage by acting simultaneously as both an ambient and a discretionary stimulus, thus focusing motivational attention at both the individual and team level (e.g., Siemsen et al., 2007). Therefore, we hypothesized that

> *Hypothesis 1:* Hybrid rewards will result in higher team performance than (a) individual and (b) cooperative rewards.

Mediating Mechanisms

The proximal motivational states resulting from ambient and discretionary stimuli lead to individual and collective goal-striving behaviors in teams. Chen and Kanfer (2006) suggested that these actions include activities such as team monitoring, backing up, and coordination behaviors that lead directly to the accomplishment of specific team goals and convey the effects of various inputs onto team performance (Marks, Mathieu, & Zaccaro, 2001). Because hybrid rewards act as both an ambient and a discretionary input, they have the advantage of motivating behaviors related to both collective orientation and sustained effort. In terms of the benefits of hybrid over individual rewards, the focus of this study was on the team's ability to share and utilize knowledge through information allocation, a team behavioral process that reflects cooperative expertise coordination (Ellis, 2006). In terms of the benefits of hybrid over cooperative rewards, the focus was on team members' goal-striving behaviors that are reflected in reduced levels of social loafing.

Information Allocation

Highly interdependent teams are considered superior at complex tasks because members are able to share work and contribute their unique expertise (e.g., Mathieu et al., 2000; Smith-Jentsch et al., 2005). Researchers have described this ability of teams to develop, distribute, and share expertise as transactive memory, defined as a cooperative division of labor for learning, remembering, and communicating relevant team knowledge (e.g., Hollingshead, 2001; Lewis, 2003; Wegner, 1987). Team members can develop deep, discrete areas of expertise and gain access to each other's knowledge, when needed, without increasing their cognitive load. Transactive memory allows team members to focus on their specific area of the team's mission, increasing their task-relevant expertise while relying on teammates for information outside their own domain. Additionally, it allows team members to allocate information to the responsible team member without having to store it themselves (e.g., Hollingshead & Fraidin, 2003), which leads to higher levels of coordination (e.g., Austin, 2003; Ellis, 2006; Lewis, 2003).

Through *information allocation*, expertise-specific knowledge is communicated from one member of the team to another member who possesses the relevant area of expertise needed to store or apply such knowledge (Wegner, 1995). In order to allocate critical task information to the appropriate teammate, a team member must be fully engaged in understanding the interconnections between team members, what information teammates need to complete their tasks, and how he or she can best help the team reach its collective goal. The allocation of information may not help the performance of the team member distributing the information. In fact, it may detract from that performance, as it takes time away from the individual's duties, making it a clear marker of team-focused behavior.

The cooperative motivation implicit in hybrid reward structures will encourage team members to actively share information with their teammates, in the recognition that they will be more successful if their teammates have the resources they themselves need. Team members with such prosocial motivation are more likely to transfer information conducive to the group's goal (De Dreu et al., 2008), and their focus on the smooth integration of expertise will result in higher levels of team performance. Therefore, we hypothesized that

> *Hypothesis 2:* Teams operating under hybrid rewards will outperform teams operating under individual rewards, due to increased information allocation.

Social Loafing

Social loafing refers to the reduction in effort and motivation that tends to occur when individuals work collectively on a task (see Karau & Williams, 1993). This phenomenon, also known as "free riding" (e.g., Albanese & Van Fleet, 1985; Jones, 1984), results from the decreased perceived accountability and increased dispensability of effort that members experience in groups (e.g., Harkins, 1987; Kerr, 1983; Price, Harrison, & Gavin, 2006). First, members of a group feel that they can "hide in the crowd" (Davis, 1969) when they are not held accountable for their individual performance. Second, dispensability of effort leads team members to believe that they cannot significantly affect the team's overall outcomes, regardless of their contributions (e.g., Harkins & Petty, 1982; Latané, Williams, & Harkins, 1979). Although highly cohesive teams are able to resist these effects due to high levels of member identification with the team, short-term action and project teams lack the same history of shared experiences and identity and remain prone to team member reductions of effort (Karau & Hart, 1998).

Because they do not reward individual effort directly, cooperative reward structures in such teams lead to a low sense of accountability, which reduces evaluation potential (George, 1992; Harkins, 1987; Harkins & Jackson, 1985; Shea & Guzzo, 1987), and to an increase in dispensability of effort (Latané & Nida, 1981; Price et al., 2006). Conversely, hybrid rewards, which place an emphasis on individual contribution, reduce social loafing by increasing accountability through individual evaluation potential and at the same time decrease dispensability of effort by creating a clear link between member effort and reward attainment. By focusing team members' motivational attention on individual as well as team responsibilities, hybrid reward structures encourage members to direct their attention and effort toward meeting their responsibilities; this reduces the extent to which social loafing occurs within the team and enhances performance. Therefore, we hypothesized that

> *Hypothesis 3:* Teams operating under hybrid rewards will outperform teams operating under cooperative rewards, due to reduced social loafing.

Method

Sample

Participants included 360 students from several introductory management courses at a large university in the United States who were arrayed into 90 four-person teams. Teams were randomly assigned to one of three reward conditions (i.e., cooperative, individual, or hybrid), with 30 teams in each condition. In exchange for participation, participants earned class extra credit and were eligible for cash prizes ($40) based on their individual or team performance.

Task

Participants engaged in a modified version of the Distributed Dynamic Decision-Making (DDD) Simulation (see Miller, Young, Kleinman, & Serfaty, 1998). The DDD is a computerized, dynamic command-and-control simulation requiring team members to monitor a geographic region and defend it against invasion from unfriendly targets. Depending on the reward condition, the objective in the task is to maximize the number of individual or team points, which can be accomplished by identifying targets; determining whether they are friendly or unfriendly; and, if unfriendly, keeping them out of the restricted zones by engaging them. In general, the DDD is an interdependent task, in which team members must coordinate their efforts to accomplish their objective (e.g., Beersma et al., 2003). Our modifications to the task enhanced this interdependence by distributing the vehicle assets among the team members, so that each member had unique capabilities and weaknesses, and by distributing knowledge about the power level of targets, so that each team member possessed information about only one type of target.

Bases and vehicles. All team members had a home base of operations located in their assigned quadrant; a detection ring allowed them to detect the presence or absence of targets within its radius. To detect targets outside of their base's detection ring, team members had to rely on their teammates or the vehicles located at their base. Each team member was assigned four vehicles to defend the space. There were four types of vehicles: AWACS (surveillance planes), tanks, helicopters, and jets. Assets varied on five capabilities, which were distributed among the assets so that each had both strengths and weaknesses. All team members, therefore, possessed unique capabilities that could not be substituted for by their teammates.

Targets. When targets entered a detection ring, they showed up as unidentified. Once the target had been identified by an AWACS plane, a team member could engage it with a tank, helicopter, or jet, depending on the power level of the target and the vehicle engaging it. If the vehicle had the correct level of power, the target could be disabled. In this study, teams faced four types of targets: E, F, G, H. Each target had a power of 0 (friendly), 1, 3, or 5.

Procedure

Immediately after entering the lab, participants were randomly assigned to one of four computer stations (e.g., DM1, DM2, DM3, or DM4) within a four-person team. Participants were then trained on the declarative and procedural knowledge necessary for successful task completion for approximately 30 min. Participants then completed a 30-min training task, during which they learned how to launch and move the vehicles and to identify and attack targets. During training, team members possessed completely overlapping roles and responsibilities.

After training, the teams were randomly assigned to one of the three reward conditions, and they performed a 40-min experimental task with specific areas of expertise. For the experimental task, team members' roles were distinct, as each team member controlled one type of vehicle and was responsible for one type of target. For example, DM2 was in charge of all four tanks and was the only one who could engage the F targets. During the experimental task, information allocation behaviors were coded. At the end of the task, team members completed the social loafing measure and manipulation checks, and team performance was assessed.

Manipulations

Reward structure. Teams were randomly assigned to one of three reward conditions. Teams in the "cooperative" condition operated under a shared reward structure. They were told that the four teams with the highest overall combined offensive and defensive score of all the teams entering the lab that semester would receive a cash award of $160, with the members sharing equally ($40 each) regardless of their individual contribution. Members of the "individual" teams, however, were instructed that they were competing with all other participants in their specific role in other teams and that participants with the highest individual offensive and defensive scores would receive an award of $40, regardless of how well their team performed as a whole (e.g., the top four participants in the DM2 role across all teams would all receive the bonus). Further, to reduce internal competition, they were reminded that because they were being assessed against members of other teams, all four members of their team could still potentially win the cash award if they were top performers for their positions.

"Hybrid" teams operated under a reward structure with both cooperative and individual aspects. Like participants in the individual condition, they were told that they were competing with their role counterparts in other teams, not their teammates. However, they were instructed that the $40 cash award would be based on a combination of their individual offensive score and their team's defensive score, as suggested by Johnson et al. (2006). This combination was designed to focus the attention of team members on both their personal and team-level responsibilities by rewarding their contribution to both.

Measures

Information allocation. To measure information allocation, we employed direct measures of verbal behavior based on the team members' areas of expertise (see Ellis, 2006; Hollingshead 1998a, 1998b). Consistent with Ellis (2006), an additive index (i.e., sum) was used to represent information allocation at the team level (Chan, 1998). Information allocation occurs when team members send information to the person who has the correct target or vehicle specialty to apply it. Some examples include: "DM3, there are several G targets in the restricted zone," "DM2, please send a tank into my quadrant to destroy this F target," and "DM4, there are three H targets for your jets entering DM1's quadrant from the south." The lead researcher and an experienced graduate student, who was blind to the experimental conditions, were in charge of coding. To ensure the accuracy and consistency of the coding, both coders participated in a 2-hr training session, which included a review of the construct definitions for each dimension as well as the coding of several practice teams. They then coded 14 (16%) of the experimental teams together. Cohen's (1960) kappa provided an index of interrater agreement. In this study, κ = .78 for information allocation, which indicated acceptable levels of agreement (see Landis & Koch, 1977). The remaining 76 teams were divided between the two coders.

Social loafing. Social loafing was measured by an 8-item scale adapted from Liden, Wayne, Jaworski, and Bennett (2004) and George (1992). Example items include "There are members of this team that do not do their share of the work" and "There are members of this team that put forth less effort than others." Coefficient alpha was .90. As social loafing was assessed by a referent shift consensus (see Chan, 1998), we calculated the level of agreement within the team. An ICC(1) of .32 and an ICC(2) of .70 supported the aggregation of scores to the team level (see Bliese, 2000).

Team performance. The measure of team performance in this study was adapted from previous research (e.g., Ellis et al., 2003; Pearsall & Ellis, 2006) and focused on the ability of the team to maximize its offensive and defensive scores. Offensive scores went up by 5 points every time an enemy target was disabled within one of the restricted zones and dropped by 25 points every time an enemy target was disabled in the neutral space or a friendly target was disabled. Defensive scores decreased 1 point for every second an enemy resided within the restricted zone and 2 points for every second an enemy resided within the highly restricted zone. Team performance was assessed by standardizing and combining offensive and defensive scores.

Results

Manipulation Checks

To examine the effectiveness of the reward manipulations in directing team member motivational focus, we asked participants to complete two three-item scales adapted from Beersma et al. (2003) that were designed to assess their individual orientation (e.g., "During the task I was too busy with my own responsibilities to help my teammates") and collective orientation (e.g., "During the task my teammates and I worked together to improve all our scores"). Participants responded to each item on a scale from 1 (*Not at all true*) to 5 (*Very true*). The individual orientation scale had a coefficient alpha of .75, and the cooperative scale had an alpha of .72. Team members in the individual condition (M = 3.13, SD = 1.20) reported higher levels of individual motivational focus than did team members in the cooperative condition (M = 2.57, SD = 1.03), $t(236) = -3.86$, $p < .01$, Cohen's $d = 0.50$, and the hybrid condition (M = 2.83, SD = 1.21), $t(236) = -2.08$, $p < .05$, Cohen's $d = 0.25$. Though the individual focus was higher in the hybrid condition than in the cooperative condition, the difference was not significant, $t(237) = 1.68$.

Similarly, team members in the individual condition (M = 3.38, SD = 1.15) reported lower levels of collective motivational focus than did members of teams in the cooperative condition (M = 4.20, SD = .82), $t(235) = 5.33$, $p < .01$, Cohen's $d = 0.82$, or the hybrid condition (M = 4.06, SD = .77), $t(236) = 5.69$, $p < .01$, Cohen's $d = 0.69$. Although the collective focus was slightly higher for participants in the cooperative condition than the hybrid condition, the difference was not significant, $t(237) = 1.11$. Together, these results support the proposed ambient and discretionary effects of cooperative and individual rewards on team member motivational focus. Individual rewards directed team member attention and effort toward individual responsibilities, and cooperative rewards directed team member attention toward collective interaction.

Tests of Hypotheses

Means, standard deviations, and intercorrelations among all the variables included in the hypotheses tests are included in Table 1. To test our mediation hypotheses, we coded our three experimental conditions as dummy variables, with hybrid rewards as the reference group. This enabled us to compare each condition to the hybrid structure and to differentially examine mediators of the relationship between both pairs of conditions, as shown in Table 2.

Hypothesis 1 proposed that a hybrid reward structure would result in higher levels of team performance than would either a cooperative or an individual structure. To test this hypothesis, we first conducted a one-way analysis of variance of team performance across the experimental conditions. Duncan post hoc tests indicated that mean performance differed significantly for all three conditions, with teams in the hybrid condition performing better than teams in the cooperative condition ($p < .05$), which in turn performed better than teams in the individual condition ($p < .05$). We then followed up with planned contrasts to test the specific hypothesized relationships between the experimental conditions. Results indicated that teams in the hybrid condition (M = 0.36, SD = 0.68) evidenced higher levels of performance than did those in the individual condition (M = −0.42, SD = 0.75), $t(57) = 5.03$, $p < .01$, Cohen's $d = 1.09$, and the cooperative condition (M = 0.06, SD = 0.77), $t(57) = 2.40$, $p < .05$, Cohen's $d = 0.41$. In sum, these results support Hypothesis 1.

Hypothesis 2 and 3 proposed that the benefits of hybrid rewards over individual and cooperative rewards would be mediated by the team's level of information allocation and social loafing respectively. To test these hypotheses, we conducted a hierarchical linear regression in which the dummy variables for the cooperative and individual conditions were included as independent variables, with

Table 1
Means, Standard Deviations, and Intercorrelations Between Variables of Interest

Variable	1	2	3
1. Information allocation	—		
2. Social loafing	.08	—	
3. Team performance	.46**	−.26*	—
Descriptive statistics			
Totals			
M	2.72	2.40	0.00
SD	1.77	0.41	0.82
Cooperative condition			
M	3.33	2.56	0.06
SD	1.58	0.42	0.77
Individual condition			
M	1.20	2.30	−0.42
SD	1.21	0.32	0.75
Hybrid condition			
M	3.63	2.35	0.36
SD	1.43	0.45	0.68

Note. N = 90 (30 in each condition).
* $p < .05$. ** $p < .01$.

Table 2
Regression Results for the Direct and Mediated Effects of Individual and Cooperative Rewards in Comparison to Hybrid Rewards

	Team performance			Team performance	
Variable	Step 1	Step 2	Variable	Step 1	Step 2
Cooperative rewards	−.26*	−.23*	Cooperative rewards	−.26*	−.18
Individual rewards	−.54**	−.33*	Individual rewards	−.54**	−.55**
Information allocation		.31**	Social loafing		−.29**
Total R^2	.22	.28	Total R^2	.22	.31
ΔR^2		.06**	ΔR^2		.09**

Note. Cooperative and individual rewards are coded as dummy variables with hybrid rewards as the reference group.
* $p < .05$. ** $p < .01$.

team performance as the dependent variable. We followed Baron and Kenny's (1986) steps for testing mediation. First, the independent variable significantly predicted the dependent variable, as individual rewards were negatively related to team performance when compared to hybrid rewards ($\beta = -.54$, $p < .01$). Second, the mediator, information allocation, was significantly related to team performance in the presence of the reward conditions ($\beta = .31$, $p < .01$). Finally, the effects of individual rewards on team performance were significantly reduced ($\beta = -.33$, $p < .05$) when controlling for the mediator. The reduction in variance and the indirect path were significant by Sobel's (1982) test (Z = −2.06, $p < .05$). Therefore, Hypothesis 2 was supported.

Hypothesis 3 proposed that the performance benefits of hybrid over cooperative rewards would be mediated by the degree of social loafing in the team. First, cooperative rewards were negatively related to team performance when compared to hybrid rewards ($\beta = -.26$, $p < .05$). Second, social loafing was significantly related to team performance ($\beta = -.29$, $p < .01$) in the presence of the reward conditions. Finally, after controlling for social loafing, the effects of cooperative rewards on team performance were significantly reduced ($\beta = -.18$, *ns*). The reduction in variance and the indirect path were significant by Sobel's (1982) test (Z = 1.76, $p < .05$, one-tailed). Therefore, Hypothesis 3 was supported.

Discussion

Evidence supporting the value of shared reward plans for highly interdependent teams has lead forward-thinking organizations to reward team members on the basis of the team's overall performance, in the hope that such plans will motivate cooperative behaviors (e.g., DeMatteo et al., 1998; Merriman, 2009). However, by doing so, organizations may be inadvertently squandering the valuable discretionary motivation stimulated by individual rewards and creating the potential for social loafing and dissatisfaction (e.g., Ezzamel & Willmott, 1998). Recognizing the potential pitfalls of relying on either purely individual or cooperative rewards, some organizations have begun adopting hybrid reward schemes for their teams. For example, British Telecom provides performance bonuses to network service team members that are based on a combination of individual contributions to the team and overall team performance across multiple effectiveness categories (e.g., customer satisfaction and network team efficiency (Quader & Quader, 2008). Our results suggest that this choice of structure may prove most advantageous for such highly interdependent teams, as teams operating under a hybrid reward structure performed better than teams with either cooperative or individual rewards (effects that were due to differences in information allocation and social loafing, respectively).

Chen and Kanfer (2006) suggested that external interventions may act as either discretionary or ambient stimuli, directly influencing the proximal motivational states of the individual team members or the team as a whole. Although Chen and Kanfer focused on discretionary inputs, such as individual experience and feedback, and ambient inputs, such as climate and norms, this study extends their framework by clearly placing incentives within these two categories. As we have demonstrated, individual rewards are discretionary, influencing individual motivational focus toward personal goals, and cooperative rewards are ambient, pervading the team as a whole and focusing motivational attention toward collective goal attainment.

Although highly interdependent teams clearly benefit from ambient incentives that encourage a prosocial focus (e.g., De Dreu, 2007; DeMatteo et al., 1998), such rewards activate only a single level of motivational attention. To fully realize the benefits of incentives in highly interdependent teams, teams must be aligned with the multiple motivational foci required for the completion of complex tasks (e.g., Siemsen et al., 2007). We further extend the team motivation literature by introducing a hybrid incentive structure that functions at both levels. Rather than splitting team member attention between two disparate demands, hybrid rewards operate as both an ambient and a discretionary stimulus, focusing team member motivation on working collaboratively while maintaining a sustained, directed effort toward their responsibilities.

This study adds to the incentives literature by uncovering two important variables that underlie motivational differences between reward structures, an issue that represents a linchpin in the advancement of theory regarding reward structures and motivation in teams (Beersma et al., 2003). The proximal motivational states resulting from ambient and discretionary reward stimuli led to specific behaviors—the allocation of expertise-specific information and the goal striving reflected in reduced social loafing—which convey the effects of inputs into team performance. By identifying these critical motivational markers, our findings offer insight into how team processes may act to transmit the influence of external stimuli on team outcomes.

Finally, these findings also offer a practical, alternative reward structure for organizations employing highly interdependent teams with diverse areas of expertise to work on complex tasks. Hybrid rewards motivate members of such teams to direct their attention, effort, and knowledge toward helping each other attain their collective goal and at the same time allow them to see, and be held accountable for, the direct effects of their continued effort. Therefore, organizations attempting to motivate highly interdependent teams with rewards should utilize a hybrid plan rather than more traditional individual or shared structures.

Limitations

We recognize that our reliance on a sample of undergraduate students performing a computerized command-and-control simulation rather than a sample of organizational teams could be seen as a limitation. However, while the use of a laboratory context comes at the cost of direct application to a specific organizational setting, it provides an optimal venue to test and build theory (Driskell & Salas, 1992). In this case, the DDD task is particularly suited to testing multilevel motivation theory in teams, as it enables us to isolate the effects of rewards within teams in a context with high task interdependency, with both individual and collective outcomes. Further, it provides a venue for capturing team member communications, interactions, and perceptions during the process of completing collective tasks. Consequently, we are able not only to examine the main effects of rewards but also to identify critical behavioral mediators that extend previous theoretical findings on team incentives that used this platform (e.g., Beersma et al., 2003; Johnson et al., 2006). Simulations such as the DDD, therefore, "bridge the gap between field operations (applied research) and university-based theoretical research" (Humphrey, Hollenbeck, Ilgen, & Moon., 2004, p. 201) by allowing us to make theoretical advances that future research can apply to real-world settings.

Nevertheless, although this type of task is particularly effective for examining action and project teams whose members are brought together for a relatively short period of time and possess distinct areas of expertise (Sundstrom, 1999), there are many other types of teams in which the employment and effects of rewards may be very different. For example, in decision-making and creative teams, implementing the individual component of a hybrid reward may be difficult, as distinguishing the individual contributions toward the formulation of an idea or decision may not be possible. Further, such teams rely on the free exchange of ideas and the generation of alternatives (Amabile, Conti, Coon, Lazenby, & Herron, 1996), and the inclusion of an individual reward might actually detract from a team's prosocial focus or cause team members to tailor the information they do share to support their own agenda at the expense of the team (e.g., De Dreu et al., 2008). Further, in teams with longer tenures, such as production or assembly teams, greater cohesion and member identification may diminish, or even reverse, the effects of shared rewards on social loafing (Hertel, Kerr, & Messe, 2000; Karau & Hart, 1998).

Finally, although this study examines team motivation, we did not explicitly measure individual team members' motivational states. Such scales are commonly used to determine an individual's perceived level of directed effort toward completing a task. However, in this study we argued that each reward structure affects team member motivation differentially, with the benefit of the cooperative reward component stemming from the directional focus of the effort, rather than its mean level. That is, ambient stimuli do not result in higher levels of motivation in interdependent teams; rather, they benefit performance by more effectively directing member motivational attention toward critical collective behaviors. Therefore, we focused instead on the collective or individual orientation of team members and the behavioral indicators of team-level (information allocation) and individual-level (social loafing) motivational effort and focus to better understand the motivational process in teams.

References

Albanese, R., & Van Fleet, D. D. (1985). Rational behavior in groups: The free-riding tendency. *Academy of Management Review, 10,* 244–255.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal, 39,* 1154–1185.

Austin, J. (2003). Transactive memory in organizational groups: The effects of content, consensus, specialization, and accuracy on group performance. *Journal of Applied Psychology, 88,* 866–878.

Baron, R. M., & Kenny, D. A. (1986). The mediator–moderator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Beersma, B., Hollenbeck, J. R., Humphrey, S. E., Moon, H., Conlon, D. E., & Ilgen, D. R. (2003). Cooperation, competition, and team performance: Toward a contingency approach. *Academy of Management Journal, 46,* 572–590.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 349–381). San Francisco, CA: Jossey-Bass.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology, 83,* 234–246.

Chen, G., & Kanfer, R. (2006). Toward a systems theory of motivated behavior in work teams. *Research in Organizational Behavior, 27,* 223–267.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20,* 37–46.

Davis, J. H. (1969). *Group performance.* Reading, MA: Addison-Wesley.

De Dreu, C. K. W. (2007). Cooperative outcome interdependence, task reflexivity, and team effectiveness: A motivated information processing approach. *Journal of Applied Psychology, 92,* 628–638.

De Dreu, C. K. W., Nijstad, B. A., & Van Knippenberg, D. (2008). Motivated information processing in group judgment and decision-making. *Personality and Social Psychology Review, 12,* 22–49.

DeMatteo, J. S., Eby, L. T., & Sundstrom, E. S. (1998). Group rewards and group effectiveness: A critical review. *Research in Organizational Behavior, 20,* 141–183.

DeShon, R. P., Kozlowski, S. W. K., Schmidt, A. M., Milner, K. R., & Weichmann, D. (2004). A multiple goal, multilevel model of feedback effects on the regulation of individual and team performance in training, *Journal of Applied Psychology, 89,* 1035–1056.

Driskell, J. E., & Salas, E. (1992). Can you study real groups in contrived settings? The value of small groups research to understanding teams. In R. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 101–124). Norwood, NJ: Ablex.

Ellis, A. P. J. (2006). System breakdown: The role of shared mental models and transactive memory in the relationship between acute stress and team performance. *Academy of Management Journal, 49,* 576–589.

Ellis, A. P. J., Hollenbeck, J. R., Ilgen, D. R., Porter, C. O. L. H., West, B. J., & Moon, H. K. (2003). Team learning: Collectively connecting the dots. *Journal of Applied Psychology, 88,* 821–835.

Ezzamel, M., & Willmott, H. (1998). Accounting for teamwork: A critical study of group-based systems of organizational control. *Administrative Science Quarterly, 43,* 258–296.

George, J. M. (1992). Extrinsic and intrinsic origins of perceived social loafing in organizations. *Academy of Management Journal, 35,* 191–202.

Hackman, J. R. (1992). Group influences on individuals in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (Vol. 3, pp. 1455–1525). Palo Alto, CA: Consulting Psychologists Press.

Harkins, S. G. (1987). Social loafing and social facilitation. *Journal of Experimental Social Psychology, 23,* 1–18.

Harkins, S. G., & Jackson, J. M. (1985). The role of evaluation in eliminating social loafing. *Personality and Social Psychology, 11,* 575–584.

Harkins, S. G., & Petty, R. E. (1982). Effects of task difficulty and task uniqueness on social loafing. *Journal of Personality and Social Psychology, 43,* 1214–1229.

Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task performance: Changing effects of diversity on group functioning. *Academy of Management Journal, 45,* 1029–1045.

Hertel, G., Kerr, N. L., & Messe, L. A. (2000). Motivation gains in groups: Paradigmatic and theoretical advances on the Koehler effect. *Journal of Personality and Social Psychology, 79,* 580–601.

Hollingshead, A. B. (1998a). Communication, learning, and retrieval in transactive memory systems. *Journal of Experimental Social Psychology, 34,* 423–442.

Hollingshead, A. B. (1998b). Retrieval processes in transactive memory systems. *Journal of Personality and Social Psychology, 74,* 659–671.

Hollingshead, A. B. (2001). Cognitive interdependence and convergent expectations in transactive memory. *Journal of Personality and Social Psychology, 81,* 1080–1089.

Hollingshead, A. B., & Fraidin, S. N. (2003). Gender stereotypes and assumptions about expertise in transactive memory. *Journal of Experimental Social Psychology, 39,* 355–363.

Humphrey, S. E., Hollenbeck, J. R., Ilgen, D. R., & Moon, H. (2004). The changing shape of large scale programs of research: MSU-DDD as an illustrative example. In S. G. Schiflett, L. R. Elliott, E. Salas, & M. D. Coovert (Eds.), *Scaled worlds: Development, validation and applications* (pp. 200–219). Aldershot, England: Ashgate.

Johnson, M. D., Hollenbeck, J. R., Humphrey, S. E., Ilgen, D. R., Jundt, D., & Meyer, C. J. (2006). Cutthroat cooperation: Asymmetrical adaptation to changes in team reward structures. *Academy of Management Journal, 49,* 103–119.

Jones, G. R. (1984). Task visibility, free riding, and shirking: Explaining the effect of structure and technology on employee behavior. *Academy of Management Review, 9,* 684–695.

Karau, S. J., & Hart, J. W. (1998). Group cohesiveness and social loafing: Effects of a social interaction manipulation on individual motivation within groups. *Group Dynamics: Theory, Research, and Practice, 2,* 185–191.

Karau, S. J., & Williams, K. D. (1993). Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology, 65,* 681–706.

Keller, R. T. (2001). Cross-functional project groups in research and new product development: Diversity, communications, job stress, and outcomes. *Academy of Management Journal, 44,* 546–555.

Kerr, N. L. (1983). Motivation losses in small groups: A social dilemma analysis. *Journal of Personality and Social Psychology, 45,* 819–828.

Kozlowski, S. J. W., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. Klimoski (Eds.), *Comprehensive handbook of psychology: Vol. 12. Industrial and organizational psychology* (pp. 333–376). New York, NY: Wiley.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In S. W. J. Kozlowski & K. J Klein (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). San Francisco, CA: Jossey-Bass.

Landis, J., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33,* 159–174.

Latané, B., & Nida, S. (1981). Ten years of research on group size and helping. *Psychological Bulletin, 89,* 308–324.

Latané, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology, 37,* 822–832.

Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology, 56,* 485–516.

Lewis, K. (2003). Measuring transactive memory systems in the field: Scale development and validation. *Journal of Applied Psychology, 88,* 587–604.

Liden, R. C., Wayne, S. J., Jaworski, R. A., & Bennett, N. (2004). Social loafing: A field investigation. *Journal of Management, 30,* 285–304.

Locke, E., Feren, D., McCaleb, V., Shaw, K., & Denny, A. (1980). The relative effectiveness of four methods of motivating employee performance. In K. Duncan, M. Gruenberg, & D. Wallis (Eds.), *Changes in working life* (pp. 363–388). New York, NY: Wiley.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review, 26,* 356–376.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85,* 273–283.

Merriman, K. K. (2009). On the folly of rewarding team performance, while hoping for teamwork. *Compensation and Benefits Review, 41,* 61–66.

Miller, D. L., Young, P., Kleinman, D., & Serfaty, D. (1998). *Distributed Dynamic Decision-Making Simulation Phase I, release notes and user's manual.* Woburn, MA: Aptima.

Pearsall, M. J., & Ellis, A. P. J. (2006). The effects of critical team member assertiveness on team performance and satisfaction. *Journal of Management, 32,* 575–594.

Price, K. H., Harrison, D. A., & Gavin, J. H. (2006). Withholding inputs in team contexts: Member composition, interaction processes, evaluation structure, and social loafing. *Journal of Applied Psychology, 91,* 1375–1384.

Quader, S. Q., & Quader, R. Q. (2008). A critical analysis of high performing teams: A case study based on the British telecommunications (BT) PLC. *Journal of Services Research, 8,* 175–216.

Rynes, S. L., Gerhart, B., & Parks, L. (2005). Performance evaluation and pay for performance. *Annual Review of Psychology, 56,* 571–600.

Shea, P., & Guzzo, A. (1987). Group effectiveness: What really matters? *Sloan Management Review, 28,* 25–31.

Siemsen, E., Balasubramanian, S., & Roth, A. (2007). Incentives that induce task-related effort, helping, and knowledge sharing in workgroups. *Management Science, 53,* 1533–1550.

Smith-Jentsch, K. A., Mathieu, J. E., & Kraiger, K. (2005). Investigating linear and interactive effects of shared mental models on safety and efficiency in a field setting. *Journal of Applied Psychology, 90,* 523–535.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology 1982* (pp. 290–312). San Francisco, CA: Jossey-Bass.

Staw, B. M. (1977). Motivation in organizations: Towards synthesis and reduction. In B. Staw & G. Salancik (Eds.), *New directions in organizational behavior.* Chicago, IL: St. Clair Press.

Sundstrom, E. (1999). *Supporting work team effectiveness.* San Francisco, CA: Jossey-Bass.

Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly, 40,* 145–180.

Wageman, R. (2001). How leaders foster self-managing team effectiveness: Design choices versus hands-on coaching. *Organization Science, 12,* 559–577.

Wageman, R., & Baker, G. (1997). Incentives and cooperation: The joint effects of task and reward interdependence on group performance. *Journal of Organizational Behavior, 18,* 139–158.

Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185–208). New York, NY: Springer-Verlag.

Wegner, D. M. (1995). A computer network model of human transactive memory. *Social Cognition, 13,* 319–339.

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