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A MULTILEVEL MODEL OF TEAM GOAL ORIENTATION, INFORMATION EXCHANGE, AND CREATIVITY

YAPING GONG
The Hong Kong University of Science and Technology

TAE-YEOL KIM
China Europe International Business School

DEOG-RO LEE
Seowon University

JING ZHU
The Hong Kong University of Science and Technology

Adopting a multilevel approach, we examined how team goal orientation may relate to team creativity and individual creativity. We also theorized and examined the bottom-up process linking individual creativity and team creativity. Multisource data were collected from 485 members and their leaders within 100 R&D teams. The results indicated that a team learning goal and team performance approach goal were positively related—whereas a team performance avoidance goal was negatively related—to both team creativity and individual creativity through team information exchange. Furthermore, a trust relationship with a team leader played a moderating role: when the trust was stronger, the indirect positive relationship with team creativity and individual creativity was stronger for the team learning goal but weaker for the team performance approach goal. We also found that average individual creativity within a team was positively related to team creativity (going above and beyond the effect of team information exchange) through a supportive climate for creativity.

There is an increasing interest in understanding how to enhance creativity (i.e., the generation of novel and useful ideas [Amabile, 1988]) in organizations (for reviews, see Shalley, Zhou, and Oldham [2004] and Zhou and Shalley [2008]). In seeking to understand creativity, scholars have recently embraced goal orientation theory (Gong, Huang, & Farh, 2009; Hirst, van Knippenberg, & Zhou, 2009; Janssen & Van Yperen, 2004). Three distinct individual goal orientations have been examined: a learning goal orientation (hereafter, "individual learning goal"), focusing on competence development; a performance approach goal orientation (hereafter, "individual performance approach goal"), focusing on gaining favorable evaluations and outperforming others; and a performance avoidance goal orientation (hereafter, "individual performance avoidance goal"), focusing on avoiding mistakes and negative evaluations (Elliot & Church, 1997; VandeWalle, 1997). Research has generally shown that the individual learning goal has a positive relationship with individual creativity, but the individual performance approach goal and individual performance avoidance goal do not.

Despite all of this accumulated knowledge, none of the studies has examined the relationship between a particular goal orientation and creativity at the team level. The team learning goal orientation (hereafter, "team learning goal"), team performance approach goal orientation (hereafter, "team performance approach goal"), and team performance avoidance goal orientation (hereafter, "team performance avoidance goal") refer to a shared understanding of the extent to which a team emphasizes learning, gaining favorable evaluations and outperforming other teams, and avoiding negative evaluations and failures, respectively (Bunderson & Sut-

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cliffe, 2003; Gully & Phillips, 2005). Team creativity refers to the generation of novel and useful ideas by a team of employees working together (Shin & Zhou, 2007). So our first research question is, Does the team goal orientation relate to team creativity, and if so, then how? This question pertains to the issue of the multilevel generalization of theory, one that has received little attention in creativity research (Zhou & Shalley, 2008). "The level of generalization is important because it specifies the focal unit to which the theoretical and empirical statements of the research apply" (Drazin, Glynn, & Kazanjian, 1999: 288). In a rare study, Bunderson and Sutcliffe (2003) found that the team learning goal (team performance approach and team performance avoidance goals were not included) relates to efficiency-based unit performance in a *nonlinear* fashion. In an important departure, we propose a *linear* relationship between the team learning goal and team creativity and thus identify the outcome domain as a boundary condition for the nature of the relationship between the team learning goal and team outcomes.

Team goal orientation is a team-level property, which begs the question of whether it relates to individual creativity, and if so, how (i.e., the top-down relationship in multilevel theory [Kozlowski & Klein, 2000; Zhou & Shalley, 2008]). Team properties provide ambient inputs for and/or exert motivational influences on individual performance (Chen & Kanfer, 2006; Deshon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Research is rapidly emerging on the cross-level relationships that team/unit properties have with individual creativity (Liao, Liu & Loi, 2010; Shin, Kim, Lee, & Bian, 2012). Much of prior research tended to examine creativity at a single level, despite the recognition that creativity occurs at multiple levels (Anderson, De Dreu, & Nijstad, 2004; Woodman, Sawyer, & Griffin, 1993). As a result, the question of whether the same antecedent similarly predicts creativity at different levels remains unanswered (Zhou & Shalley, 2008). As individuals may respond differently to a team context, it is premature to assume that a team-level property would have the same relationship with individual creativity as it has with team creativity (Drazin et al., 1999; Shin et al., 2012). In this study, we examine the relationships that team goal orientation may have with both team creativity and individual creativity. Overall, we aim to extend goal orientation theory and research to both team- and cross-level relationships.

The inclusion of both team creativity and individual creativity raises yet another critical research question: Does individual creativity relate to team creativity, and if so, then how? This question pertains to the bottom-up relationship in multilevel theory (Kozlowski & Klein, 2000; Rousseau, 1985). Individual creativity reflects how creatively individual members perform their roles and tasks. Drazin et al. stated that "group creativity requires that individuals first choose to engage in individual-level creativity" (1999: 291). Team creativity, however, is not simply the average of individual creativity; it is the product of social influences arising from the creative acts of individuals (Drazin et al., 1999; Morgeson & Hofmann, 1999). Although it has been posited that individual creativity contributes to team creativity (Woodman et al., 1993), the mechanism by which this occurs has not been clearly theorized and demonstrated. This lack is problematic because any multilevel theory of creativity will be incomplete and imprecise as long as the bottom-up process remains a black box. In this study, we aim to advance the multilevel theory of creativity with respect to the bottom-up process.

To explicate whether and how team goal orientation relates to creativity, we adopt the information exchange perspective (Mesmer-Magnus & DeChurch, 2009; Williams & O'Reilly, 1998). The information exchange perspective is highly relevant to knowledge exchange and combination, which have been shown to enhance innovation (i.e., the generation and implementation of creative ideas [Kanter, 1988; Smith, Collins, & Clark, 2005]). Information exchange—the sharing of work-related data, ideas, and knowledge among team members (Johnson, Hollenbeck, Humphrey, Ilgen, Jundt, & Meyer, 2006)—is a critical team process linking team properties and outcomes, particularly creativity (van Knippenberg, De Dreu, & Homan, 2004). Integrating the goal orientation and information exchange perspectives, we argue that team goal orientation either motivates or inhibits information exchange, because the nature of the shared goals influences collective goal-striving behaviors (Chen & Kanfer, 2006; Deshon et al., 2004) such as communication and exchange (De Dreu, Nijstad, & van Knippenberg, 2008; Weingart, 1992). Also, by articulating the nature of creativity as "requiring information and knowledge," we make the case for information exchange being the mediator between team goal orientation and creativity.

The exchange of ideas and creative behaviors involves risk, because it is unknown how supervi-

sors will react to and evaluate those ideas and activities (George & Zhou, 2007). The information exchange perspective and related research suggest that a trust relationship is critical for such exchange behaviors and subsequent innovation (Collins & Smith, 2006; Tsai & Ghoshal, 1998). Because the team leader often has the most power in a team and is ultimately responsible for evaluating its members, a trust relationship with the team leader constitutes the critical relational context within which members engage in information exchange and creative activities. Trust influences the extent to which the motivation to engage in risk-taking behaviors will lead to such behaviors (Dirks & Ferrin, 2001). We expect that a trust relationship with a team leader will moderate the relationship that team goal orientation has with information exchange and subsequently creativity, because it facilitates or hinders the motivational tendency for information exchange associated with a particular team goal orientation (Dirks & Ferrin, 2001).

To explicate the process linking individual creativity and team creativity, we adopt social information processing theory (Salancik & Pfeffer, 1978), which focuses on acquiring expectations, norms, and attitudes rather than knowledge and ideas. Individual members' creative behaviors send cues to others as to expected behaviors and performance and, through the informational social influence process, give rise to a supportive climate for creativity (i.e., the norms of creativity or the expectation of and approval and practical support for developing new and improved ways of doing things [Anderson & West, 1998; Siegel & Kaemmerer, 1978]). The supportive climate, in turn, enhances collective creative endeavors and heightens team creativity. We test these ideas using R&D teams from high-technology firms.

THEORY AND HYPOTHESES

In this study, we adopt the three-dimension typology of goal orientation (i.e., the learning goal, performance approach goal, and performance avoidance goal). This typology has been used in prior research on individual goal orientation and individual creativity (Hirst et al., 2009; Hirst, van Knippenberg, Chen, & Sacramento, 2011). Adopting the same typology makes the current study comparable to earlier research and thus helps to achieve the aim of extending prior research to also cover team-level relationships.

Goal orientation can exist at the team level (Bunderson & Sutcliffe, 2003; Gully & Phillips, 2005). Team goal orientation captures the "shared understanding of the extent to which a team emphasizes learning or performance goals, and, consequently, helps to facilitate group decision making, collaborative problem solving, and intragroup coordination that maintain the group's emphasis on learning or performance goals" (Bunderson & Sutcliffe, 2003: 553). Goal orientation can be "cued" by situational factors such as leadership, assigned goals, and an evaluation focus (i.e., learning or performance) (Bunderson & Sutcliffe, 2003; Gully & Phillips, 2005). These situational cues "signal the goals and behaviors that are desired, emphasized, or rewarded in the context of a particular group or collective" (Bunderson & Sutcliffe, 2003: 553). Because team members often encounter the same situational cues and consult each other for interpretations of these cues, their perceptions will often converge. As team members are integrated into a team, they form a shared goal perception in the form of a team goal orientation.

In a study of management teams, Bunderson and Sutcliffe (2003) found evidence of homogeneity within teams and heterogeneity among teams in terms of the team learning goal. Their study did not empirically examine the team performance approach goal and the team performance avoidance goal. Once developed, the shared perception of a team goal orientation has important implications for team processes and outcomes (Deshon et al., 2004). In the present study, we argue that team goal orientation promotes or inhibits team information exchange, which in turn facilitates team creativity and individual creativity.

Team Goal Orientation, Team Information Exchange, and Creativity

Team goal orientation and team information exchange. Knowledge is a building block for creativity (Amabile, 1988). Information exchange among team members is an important way of acquiring and creating knowledge (Bunderson & Sutcliffe, 2002a; Johnson et al., 2006). A concept related to team information exchange is team learning behavior, which refers to "an ongoing process of reflection and action, characterized by asking questions, seeking feedbacks, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmondson, 1999: 353). Team learning behavior involves the process

through which individuals acquire, share, and combine information, but it also entails testing assumptions, reflecting on or discussing errors, and experimenting (Edmondson, 1999), and is therefore a broad concept. Team information exchange is more focused on the giving and receiving of information.

Scholars are increasingly viewing teams as information processors which share knowledge, information, ideas, or cognitive resources on the basis of, and to achieve, goals (De Dreu et al., 2008; Hinsz, Tindale, & Vollrath, 1997). Goal choice (i.e., what a team intends to achieve) and goal striving (i.e., the strategies by which a team achieves a goal) constitute the fundamentals of a team's motivation process (Chen & Kanfer, 2006), and team members communicate and exchange information with each other (i.e., goal striving) when this would help to achieve the team goals (Deshon et al., 2004; Weingart, 1992). A team learning goal is characterized by the desire to achieve a thorough, rich, and accurate understanding of the team's tasks, a desire that motivates systematic information search, exchange, and processing (De Dreu et al., 2008). With the shared goal of competence development, team members may seek out information and learn from others (Bunderson & Sutcliffe, 2003; Gong & Fan, 2006). They may also share their own information with other team members, because these other members provide a sounding board for testing and improving their own knowledge and ideas.

Although, at first sight, it might appear that a team performance approach goal does not benefit creativity because it focuses on external evaluation rather than on learning, deeper reflection reveals that it may in fact facilitate information exchange and thus indirectly contribute to creativity. Specifically, information exchange among interdependent team members is critical if a team is to tap into the information held by its members and thus perform well. The team performance approach goal, the collective goal of gaining favorable external evaluation, draws team members together and motivates them to share task-related information so as to maintain a focus on and achieve their goal (Chen & Kanfer, 2006). A shared team performance approach goal produces outcome interdependence among team members and generates a preference for a positive joint outcome (Weldon, Jehn, & Pradhan, 1991). Research suggests that such a goal is positively related to the quality of the group's planning and cooperation, which involves, but is not limited to, effective communication among its members (Weingart, 1992; Weldon et al., 1991). Similarly, research on motivated information processing suggests that a preference for joint success increases information sharing (De Dreu et al., 2008).

Additional support for the relationship between the team performance approach goal and information exchange comes from the social capital literature. This body of research highlights shared representations, interpretations, and systems of meaning among members. Examples include shared goals and visions (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998), which represent a bonding mechanism between team members. Members who place a greater emphasis on the shared goal of performing well are more likely to exchange resources to maintain their focus on this goal. It has been found that a shared vision and goal enhances the exchange of resources, including, but not limited to, knowledge and ideas (Tsai & Ghoshal, 1998).

Conversely, a team performance avoidance goal, the collective goal of avoiding mistakes and negative evaluation, may discourage team members from exchanging information. Here, the overarching team goal is to avoid making mistakes and being criticized rather than to actively strive to perform well. Such an orientation leads to a tendency to avoid challenges or uncertainties that pose the risk of error and instead favor actions with a high chance of success (VandeWalle, 1997). Information exchange involves risk. Seeking input from others is a risk to one's image, because it could be perceived as a sign of incompetence. Sharing one's ideas may also pose a risk because of potential errors and possible negative reactions to those ideas. When team members share a tendency to avoid risks and errors, a collective perception may emerge that sharing information and ideas is undesirable and consequently information exchange behaviors will decrease.

Information exchange and creativity. Information exchange is a central team process that influences team outcomes (Mesmer-Magnus & DeChurch, 2009; van Knippenberg et al., 2004; Williams & O'Reilly, 1998). In particular, information exchange is vital to innovation (Ebadi & Utterback, 1984). Innovation requires different resource inputs (Kanter, 1988). Particularly for R&D teams, which tackle complex problems and develop new products and services, regular, high-quality information exchange "is indispensable in that it allows team members to share their knowledge and past

experiences and exchange and discuss ideas" (Hülsheger, Anderson, & Salgado, 2009: 1132). The literature on knowledge management suggests that through the exchange of knowledge and ideas, employees connect previously unconnected knowledge and ideas or recombine previously connected ideas, and thus create new knowledge (Kogut & Zander, 1993; Nahapiet & Ghoshal, 1998). Empirical research suggests that the exchange of information and knowledge increases the rate of product innovation (Smith et al., 2005).

While innovation is not the same thing as creativity, it includes both idea generation (i.e., creativity) and idea implementation (Kanter, 1988). There is no reason, therefore, to believe that information exchange has a different relationship with creativity. Through information exchange, members not only improve their own competence, but also bring different bodies of knowledge and skills to bear upon team tasks. Both the enhanced competence of the team members and the broader pool of information provide cognitive resources for team creativity.

Team information exchange should also benefit individual creativity. Individual creativity is often enacted in teams, the context of which provides important inputs that influence the creative behaviors of individuals (Shin et al., 2012). First and foremost, individuals obtain ideas, perspectives, and knowledge from others (Bandura, 1986), and team information exchange provides a platform through which this may occur. The acquisition of new ideas provides the raw materials for recombinations or syntheses that generate newness (Amabile, 1988). Second, through exchanges with others, an individual team member is also exposed to diverse ideas that may enhance his or her divergent thinking that is conducive to creativity.

The current consensus is that a significant direct relationship between independent (i.e., team goal orientation) and dependent (team creativity and individual creativity) variables is not necessary for testing potential mediators between them (MacKinnon, Lockwood, & Williams, 2004; Shrout & Bolger, 2002). The theoretical development so far suggests that team goal orientation influences team information exchange. Team information exchange, in turn, benefits team creativity and individual creativity and thus mediates the relationships that team goal orientation has with team creativity and individual creativity. To sum up, we hypothesize:

Hypothesis 1. The team learning goal has an indirect positive relationship, via team information exchange, with team creativity and individual creativity, respectively.

Hypothesis 2. The team performance approach goal has an indirect positive relationship, via team information exchange, with team creativity and individual creativity, respectively.

Hypothesis 3. The team performance avoidance goal has an indirect negative relationship, via team information exchange, with team creativity and individual creativity, respectively.

The Moderating Role of a Trust Relationship with a Team Leader

It has been proposed above that team goal orientation influences information exchange behaviors. The motivational potential for information exchange associated with a particular team goal orientation, however, can be brought out more or constrained by the relational context within which team members operate. Because exchanging ideas and creative behaviors involve risk, trust, which captures the willingness to take risk (Mayer, Davis, & Schoorman, 1995; Rousseau, Sitkin, Burt, & Camerer, 1998), is critical if such behavior is to occur (Collins & Smith, 2006; Madjar & Ortiz-Walters, 2009; Tsai & Ghoshal, 1998). Team leaders often have the most power, since they evaluate members and determine the consequences within teams. A trust relationship with a team leader thus constitutes a critical relational context within which team members function. We focus on the affect-based trust relationship or the emotional bonds with the team leader (hereafter, the trust relationship with a team leader) (McAllister, 1995). As McAllister stated, "People make emotional investments in trust relationships, express genuine care and concern for the welfare of partners, believe in the intrinsic virtue of such relationships. . . . Ultimately, the emotional ties linking individuals can provide the basis for trust" (McAllister, 1995: 26).

We expect that the team learning goal will motivate information exchange behaviors, but this potential can be released more when a trust relationship with a team leader is stronger. A strong trust relationship with the team leader means a low perceived vulnerability on the part of team members (Mayer et al., 1995). Such a relationship provides a safe context in which teams with a learning goal

can engage in activities such as an exchange of ideas. Team members are likely to perceive their leader to be facilitative of their efforts to be creative and feel more comfortable directing their attention and efforts toward such activities (Dirks & Ferrin, 2001). This safe relational context can thus better bring out the potential for idea exchange activities associated with a team learning goal (Dirks & Ferrin, 2001), leading to a stronger relationship between the team learning goal and information exchange. Greater information exchange, in turn, positively relates to creativity, leading to a stronger indirect relationship between the team learning goal and creativity. On the other hand, when the trust relationship with the team leader is weak, the motivational tendency to engage in idea exchange activities associated with the team learning goal is constrained, because team members feel more vulnerable and less comfortable about doing so under this condition. Reduction in activities such as idea exchange will, in turn, decrease creativity. The above reasoning suggests that the trust relationship with the team leader moderates the indirect relationship between the team learning goal and creativity (via information exchange), in that it is stronger at a higher level of trust. To summarize, we hypothesize:

Hypothesis 4. A trust relationship with a team leader positively moderates the indirect relationship that the team learning goal has with team creativity and individual creativity, respectively, via team information exchange, in that the indirect relationship is stronger when the trust relationship with the team leader is stronger.

A team performance approach goal is characterized by an externally oriented motivation (Bunderson & Sutcliffe, 2003; Gully & Phillips, 2005). Team members exert a collective effort, because they are motivated by the goal of gaining a positive evaluation by their leader. The team leader is therefore instrumental in activating and enhancing the motivational potential associated with the team performance approach goal. We expect that the trust relationship with the team leader will also moderate the relationship between the team performance approach goal and information exchange, but in a negative way.

Three key tenets are critical for predicting the negative moderating role of trust for a team performance approach goal. First, a strong trust relationship reduces the perceived vulnerability of team members in the event that they do not perform. Second, as discussed earlier, the team performance approach goal is characterized by an externally oriented motivation. Third, a trust relationship reduces the levels of monitoring, as found in prior research (Langfred, 2004). Trust also leads to a greater degree of complacency, and to acceptance of less-than-satisfactory outcomes (Gargiulo & Ertug, 2006). More specifically, with a strong trust relationship in place, a team leader may engage in less monitoring in a team. Because a trust relationship engenders a benign interpretation of the leader, team members may also come to perceive that there will be no, or only low, consequences if they do not perform. This, together with externally driven motivation and reduced monitoring by the team leader, may lead to a lower level of goal striving activities such as information exchange. The above reasoning suggests that a trust relationship with the team leader will moderate the relationship between the team performance approach goal and information exchange, whereby the relationship is constrained (weaker) at a higher level of trust. Lower information exchange among team members in turn reduces creativity, leading to a weaker indirect relationship between the team performance approach goal and creativity. To summarize, we hypothesize:

Hypothesis 5. A trust relationship with a team leader negatively moderates the indirect relationship that the team performance approach goal has with team creativity and individual creativity, respectively, via team information exchange, whereby the indirect relationship is weaker when the trust relationship with the team leader is stronger.

The team performance avoidance goal reflects a shared goal of avoiding mistakes. On the one hand, a trust relationship with a team leader may alleviate the concern of team members about the negative consequences of errors, because the leader is not expected to react negatively when members expose their vulnerability. The team members may therefore take on greater challenges and collectively engage in more creative activities such as idea exchanges to solve problems. On the other hand, similar to teams with a performance approach goal, teams with a performance avoidance goal are driven by externally oriented motivation. A trust relationship with the team leader reduces this kind of motivation, as discussed earlier. Given these two counteracting forces, we do not expect that the trust

relationship with the team leader will moderate the relationship between the team performance avoidance goal and information exchange or the indirect relationship that the former has with creativity.

Bottom-Up Process Linking Individual Creativity and Team Creativity

So far, we have focused on team goal orientation and team information exchange as explanatory variables for team creativity. The multilevel theory of creativity suggests that individual creativity is the building block for team creativity (Drazin et al., 1999) and may exert a unique bottom-up influence on it that goes above and beyond that exerted by team processes (e.g., information exchange) (Taggar, 2002; Woodman et al., 1993). So the next step is to conceptualize a mechanism that may explain this bottom-up relationship.

Multilevel theory and research suggest that the elementary unit of analysis for a social system (e.g., teams) is often the individual behavioral act (Kozlowski & Klein, 2000; Morgeson & Hofmann, 1999). Individual acts meet in space and time, resulting in social interaction. The systems of actions and reactions among individuals give rise to collective phenomena such as climate (Morgeson & Hofmann, 1999). Climate refers to the shared perception of "the events, practices and the kinds of behaviors that get rewarded, supported, and expected in a setting" (Schneider, 1990: 384). Multiple climates may exist in a single organization, and climate has often been conceptualized in relation to a specific outcome (e.g., safety or creativity) and/or unit of analysis (e.g., team or department) (Katz-Navon, Naveh, & Stern, 2005; Schneider, Smith, Taylor, & Fleenor, 1998). In particular, Anderson and West (1998) developed four dimensions for their Team Climate Inventory (TCI). Of the four dimensions, the supportive climate for innovation, defined as "the norms of innovation or the expectation, approval and practical support of attempts to introduce new and improved ways of doings things" (West, 1990: 315), directly targets the outcome domain of innovation. This study embraces the social information processing theory that focuses on the development of norms and expectations. A supportive climate for innovation captures the norms or expectations of creativity and thus fits the theory well. Empirically, Anderson and West (1998) found that, of the four dimensions, the supportive climate for innovation is the only significant predictor of overall innovation and innovation novelty as rated by independent experts. Because innovation involves both idea generation (i.e., creativity) and idea implementation, and this study targets only creativity, we focus on the support-for-creativity aspect of Anderson and West's (1998) climate construct.

According to social information processing theory (Salancik & Pfeffer, 1978), individuals look to their immediate social environment for cues to construct and interpret reality, and for appropriate attitudes and behaviors. Social cues (e.g., behavioral cues and observations) serve as a form of direct social influence, whereby the overt behaviors of others shape one's own perceptions, attitudes, and behaviors (i.e., the direct influence pathway). Social cues structure the attentional processes, making certain aspects of the environment more or less salient and providing expectations concerning individual behavior and the logical consequences of such behavior (i.e., the attentional influence pathway). Social cues can also help individuals to "learn what their needs, values and requirements should be" (Salancik & Pfeffer, 1978: 230) (i.e., the learning influence pathway). In a team setting, interdependent team members provide an important source of social cues for each other. As the explanatory variable individual creativity would suggest, when individual team members engage in creative acts and demonstrate creativity, they convey expectations of creative performance to others and influence them to adopt similar behaviors. The creative acts of individual members also direct the attention of other members to the creative aspect of their work and to the importance of creativity. Through these informational social influence processes, a shared perception of the norms or expectations of creativity emerges from the creative acts of individual members.

Once it emerges, a climate has a reality that is partly independent of the individual actions that gave rise to it, and, as a collective property, it guides individual and collective actions (Morgeson & Hofmann, 1999). In a supportive climate for creativity, team members make the development of new and improved ways of working their priority, strive hard to achieve creativity, and facilitate each other in developing new ideas (West, 1990). In line with this prediction, the Pygmalion model (Eden, 1992; McNatt, 2000) would suggest that the expectation of creative performance can produce higher creativity. With a supportive climate in place,

members are also better able to build on and relate to each other's creative ideas. The ideas of some team members will serve as inputs to the creative performance of others, and individual inputs will combine and integrate to determine team creativity. These collective endeavors engendered by the norms or expectations of creativity elevate team creativity. In their multilevel model of human capital resource emergence, Polyhart and Moliterno (2011) posited that the climate is part of the process through which individual-level knowledge, skills, and abilities become unit-level human capital resources. In the domain of creativity, a supportive climate for creativity may enhance team creativity and thus act as the process linking individual creativity and team creativity. To summarize, we hypothesize:

Hypothesis 6. Average individual creativity in a team is positively related to team creativity via a supportive climate for creativity. This relationship exceeds that explained by team information exchange.

Figure 1 depicts the theoretical model hypothesized in this study.

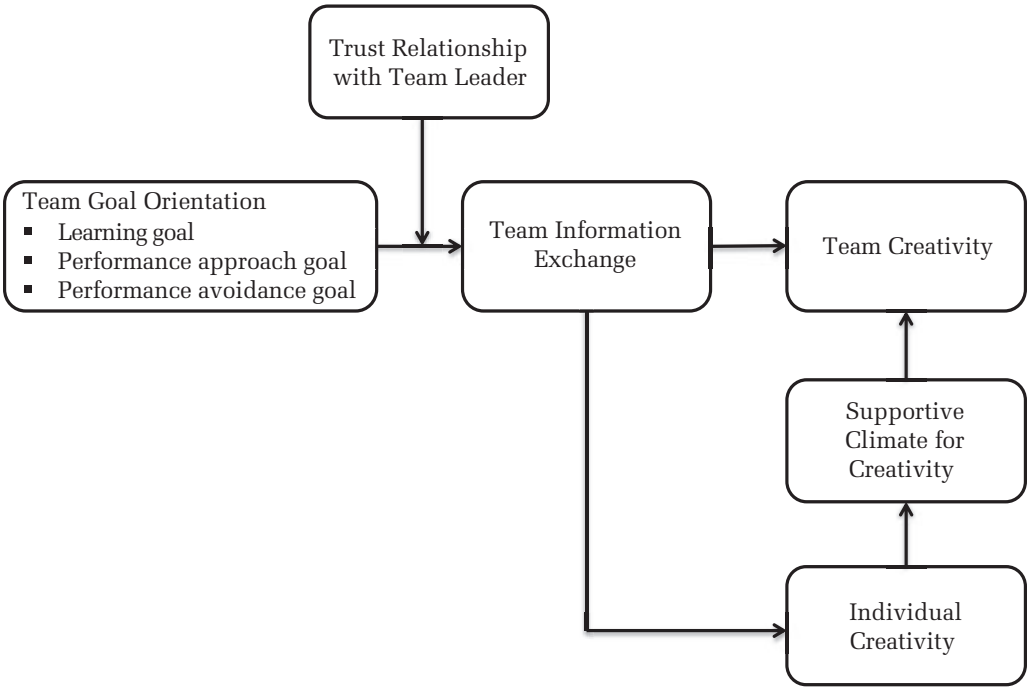
METHOD

Sample

We collected data from 100 R&D teams in 19 Korean companies involved in the telecommunication, electronics, chemical, aerospace, information technology, and pharmaceutical industries. One of the authors contacted the top management of each company to introduce the study. The companies agreed to participate on condition that they received a copy of the findings. All members of these R&D teams were invited to complete a survey. Participation was voluntary, and respondents were assured of the confidentiality of their responses. The surveys were completed during working hours. To minimize potential common method biases, we collected data from two different sources. Team members reported on the team goal orientation, the trust relationship with the team leader, team information exchange, and the supportive climate for creativity, while team leaders reported on both team creativity and individual creativity.

Of the 564 member-leader pair surveys distributed, 485 complete surveys were returned, giving a response rate of 86 percent. Of the team members, 25 percent were female, the average age was 34.07 years

FIGURE 1
Overall Theoretical Model



(s.d. = 5.78), and the average team tenure was 3.31 years (s.d. = 2.87). Of the team leaders, 9 percent were female, the average age was 42.68 years (s.d. = 4.28), and the average team tenure was 6.03 years (s.d. = 5.78).

Measures

The survey items were originally in English and translated into Korean following the commonly used back-translation procedure (Brislin, 1986).

Team goal orientation. To measure team goal orientation, we used the adapted version of VandeWalle's (1997) scale, which was generated based on the referent shift model (i.e., the basic meaning of the construct remains unchanged, but the referent is shifted to the team level; Chan, 1998; Chen, Mathieu, & Bliese, 2004). Bunderson and Sutcliffe (2002b, 2003) had already adapted VandeWalle's (1997) five-item individual learning goal measure to assess the team learning goal by changing the referent from the individual to the team (sample item: "Our team likes challenging and difficult assignments that teach new things"). Team members rated each item on a scale from 1, "strongly disagree," to 7, "strongly agree." (α = .92).

Bunderson and Sutcliffe (2002b, 2003) did not include the team performance approach goal and the team performance avoidance goal. So we adapted VandeWalle's (1997) four-item individual performance approach goal measure to assess the team performance approach goal (sample item: "Our team is concerned with showing that it can perform better than other teams") and his four-item individual performance avoidance goal measure to assess the team performance avoidance goal (sample item: "Our team would avoid a show of low performance rather than learning new skills"). The coefficient alphas for the team performance approach goal and the team performance avoidance goal were .90 and .87, respectively.

To examine the factor structure of the team goal orientation items, we conducted confirmatory factor analyses. The three-factor model provided a good fit to the data (χ^2 = 34.72, df = 24, n.s.; root-mean-square error of approximation [RMSEA] = .03, comparative fit index [CFI] = .99, and a Tucker-Lewis index [TLI] = .99). The three-factor model fit the data significantly better than did the one-factor model (χ^2 = 1002.99, df = 27, $p < .01$; RMSEA = .27, CFI = .57, and TLI = .43), supporting the discriminant validity of the team goal orientation scales.

Team information exchange. As the theoretical development was focused on internal team process, we measured within-team information exchange among members. Gong, Cheung, Wang, and Huang (2012) developed a four-item individual-level information exchange scale based on an established measure that captures the flow of information and knowledge resources through a network of contacts (Youndt, Subramaniam, & Snell, 2004), and provides reliability and validity evidence for the measure through coefficient alpha, factor analysis, and hypotheses testing. We used the two items from this scale that focus on information exchange with contacts within the unit and adapted them to the team level. Specifically, team members responded to the following items: (a) "Team members exchange information with and learn from each other" and (b) "Team members exchange ideas with each other to analyze and solve problems" (1 = "strongly disagree," 7 = "strongly agree"; α = .90).

To further assess the validity of the information exchange measure, we collected separate data from 206 team members in 45 R&D teams in ten Korean companies. We measured team information exchange (the two items used in this study), team information sharing (Bunderson & Sutcliffe, 2002a), and team learning behavior (Edmondson, 1999). We conducted factor analyses for team information exchange and team learning behavior. The results indicated that the two-factor model fit the data well (χ^2 = 4.21, df = 4, n.s.; RMSEA = .04, CFI = .99, TLI = .99), and better than the one-factor model (χ^2 = 79.56, df = 5, n.s.; RMSEA = .17, CFI = .81, TLI = .42), providing evidence of discriminant validity. The two measures were only moderately correlated (r = .41, $p < .01$). On the other hand, the team information exchange measure was highly correlated with Bunderson and Sutcliffe's (2002a) three-item team information sharing measure (r = .85, $p < .01$), providing evidence of convergent validity. CFA results also showed that the one-factor model fit the data well (χ^2 = 16.97, df = 4, n.s.; RMSEA = .04, CFI = .98, TLI = .96) and was more parsimonious than the two-factor model (χ^2 = 19.26, df = 5, n.s.; RMSEA = .07, CFI = .98, TLI = .96). The coefficient alpha was .91 for the team information exchange measure.

Trust relationship with the team leader. All 19 companies had an appointed team leader on an ongoing basis for each team. To measure the trust relationship with a team leader, we used McAllister's (1995) five-item affect-based trust scale. Team members responded to each item (sample item:

"We have both made considerable emotional investments in our working relationship"; 1 = "strongly disagree," 7 = "strongly agree"). The coefficient alpha was .89.

Supportive climate for creativity. We measured supportive team climate for creativity using Anderson and West's (1998) eight-item scale. The team members responded to each item (sample item: "The team is always moving toward the development of new answers"; 1 = "strongly disagree"; 7 = "strongly agree"). The coefficient alpha was .95 for the scale.

Anderson and West (1998) originally developed the scale for supportive climate for innovation. However, five items from the scale cover support for the development of ideas (i.e., creativity) only. Supplementary analyses based on the five items (α= .91) generated substantively identical results. The correlation between the truncated scale and the full scale was .96. To stay true to the original measure, we conducted analyses and reported results based on the full scale.

Team creativity. We measured team creativity using Shin and Zhou's (2007) four-item scale. Team leaders assessed the creativity of their teams, which was defined in the instruction as the generation of novel and useful ideas by their teams. Team leaders rated their own teams (1 = "poorly," 7 = "very much") in relation to other similar R&D teams by responding to four questions: (a) "How well does your team produce new ideas?" (b) "How useful are those ideas?" (c) "How creative do you consider your team to be?" and (d) "How significant are those ideas to your organization?" The coefficient alpha was .82.

Individual creativity. To alleviate potential common method bias, we measured individual creativity using a different scale—Zhou and George's (2001) scale of creativity—with a different response format (1 = "not at all characteristic," 5 = "very characteristic") (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This scale is one of the most widely used scales in the creativity literature (Zhou & Shalley, 2003). The team leaders assessed each team member's creativity, which was defined in the instruction as the generation of novel and useful ideas by an individual team member. Sample items include "Suggests new ways to increase quality" and "Comes up with creative solutions to problems." The coefficient alpha was .97.

Control variables. We included several control variables at both the individual and team levels. Following previous research, we controlled for gender, organizational tenure, and educational level at the individual level (Amabile, 1988; George & Zhou, 2007; Madjar, Oldham, & Pratt, 2002), and for team size and average team tenure at the team level (Harrison, Price, Gavin, & Florey, 2002). Secondly, we controlled for team task interdependence (rated by team members), as this might influence the creative process (Van der Vegt & Janssen, 2003). We measured this variable using a single item from Shin and Zhou (2007): "The work I usually do is a group project rather than an individual project" (1 = "strongly disagree," 7 = "strongly agree"). Thirdly, we controlled for the potential effects of task requirements by including the type of R&D tasks performed by the teams. We created three dummy variables using Keller's (1992) categorizations of R&D tasks: "Basic or non-mission research," "Applied or mission-oriented research," "New product or process development," and "Technical service or existing product development." In addition, in keeping with Shin and Zhou (2007), we controlled for face saving to partial out any potential cultural effects on team creativity. We measured face saving using two items ("I'm embarrassed when my weaknesses or mistakes are revealed to others" and "I'm embarrassed when I hear someone talk about bad things about me") (1 = "strongly disagree," 7 = "strongly agree"). Finally, we controlled for the variance in individual creativity within teams when we tested the bottom-up relationship that average individual creativity has with team creativity, because this relationship could potentially be driven by one or two very creative members of a team.

Analytic Strategies

Given the multilevel nature of the data, we conducted hierarchical linear modeling (HLM) using HLM 6.08 to test our hypotheses (Raudenbush, Bryk, Cheong, & Congdon, 2004). Given that the teams were from different organizations, we included an intercept-only model at the organization level in all of the analyses in order to control for any possible confounding effects of company-level factors on the relationships we tested. Thus, for team-level relationships, we used two-level models with teams at level 1 and organizations at level 2; for analyses involving individual creativity, we used three-level models with individual members at level 1, teams at level 2, and organizations at level 3.

To test the indirect relationships that team goal orientation has with team creativity and individual creativity through team information exchange, we applied the product of coefficients test recommended by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002). Specifically, as recommended by MacKinnon et al. (2004), we used the bootstrap sampling method (bootstrap sample size = 5,000) to generate asymmetric confidence intervals (CIs) for the indirect relationship. The bootstrapped CIs approach generates a more accurate estimation of the indirect relationship than traditional methods such as the Sobel test, because it produces asymmetric CIs for the indirect relationship using the respective distribution of the two regression coefficients making up the product term (MacKinnon et al., 2004). In addition, we applied Edwards and Lambert's (2007) procedure to test whether the trust relationship with a team leader moderates the indirect relationships that the team learning goal and team performance approach goal have with creativity via team information exchange.

RESULTS

We tested within-team agreement for team learning goal, team performance approach goal, team performance avoidance goal, team information exchange, trust relationship with team leader, supportive climate for creativity, team face saving, and work interdependence by computing within-group interrater agreement (r_{wg}). This test yielded mean values of .95. 93. 88. 85. 91. 92. 78, and .85, respectively. Although we found high levels of mean r_{wg} for team learning goal (.95; range = .66–1.00), team performance approach goal (.93; range = .57–1.00), and team performance avoidance goal (.88; range = .25–1.00), it was possible that some teams might have low r_{wg}. After checking, we found that 99 percent of the teams on the learning goal and performance approach goal and 93 percent of the teams on the performance avoidance goal had an r_{wg} value higher than .70. Although a small number of teams had r_{wg} values lower than the .70 threshold, we retained all of the available cases for analysis following Chen et al. (2004). We tested hypotheses related to team goal orientation after deleting teams with low r_{wg} values on a case-by-case basis and obtained substantively identical results.

The ICC1 estimates were .24 for team learning goal, .26 for team performance approach goal, .19 for team performance avoidance goal, .15 for team information exchange, .23 for trust relationship with team leader, .18 for supportive climate for creativity, .23 for team face saving, and .16 for work interdependence. The ICC2 estimates were .66, .69, .60, .52, .64, .64, .66, and .50, respectively. Overall, these statistics met or exceeded the levels found in prior research dealing with aggregation (e.g., see Campion, Medsker, & Higgs, 1993; Kirkman, Chen, Farh, Chen, & Lowe, 2009). Thus, we aggregated team members' responses to the team level. Descriptive statistics, reliability estimates, and correlations are shown in Table 1. Eighty-four percent of the team members had a masters or doctoral degree, and 45 percent of the teams were working on new products or process development. In all of the teams, the members were highly interdependent (mean = 5.01). The team learning goal and team information exchange were significantly correlated to team creativity ($r = .23$, $p < .05$; and $r = .29$, $p < .01$, respectively). Average individual creativity and supportive climate for creativity were significantly correlated to team creativity ($r = .30$, $p < .01$; and $r = .41$, $p < .01$, respectively).

Indirect Relationships between Team Goal Orientation and Creativity

Hypothesis 1 predicted that the team learning goal would have an indirect positive relationship, through team information exchange, with team creativity and individual creativity. The result of model 1 in Table 2 shows that the team learning goal was significantly related to team information exchange ($\gamma = .54$, $p < .01$). Team information exchange was significantly related to team creativity (model 2, Table 3: $\gamma = .40$, $p < .01$) and individual creativity (model 2, Table 4: $\gamma = .22$, $p < .05$). The bootstrapping test based on MacKinnon et al.'s (2004) procedure indicated that the indirect relationships that the team learning goal had with creativity via team information exchange were significant. Specifically, for team creativity, the 99% CI of the indirect relationship was (.19, .28), not containing zero; for individual creativity, the 99% CI of the indirect relationship was (.06, .17), which also excluded zero. These results supported Hypothesis 1.

Although not hypothesized, the team learning goal had a significant positive relationship with team creativity (model 1, Table 3: $\gamma = .57$, $p < .05$) and individual creativity (model 1, Table 4: $\gamma = .57$, $p < .01$), while the team performance approach and avoidance goals did not. In a supplementary anal-

TABLE 1
Means, Standard Deviations, and Correlations

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Among individual-level variables[a]																	
1. Gender	0.25	0.43															
2. Organizational tenure	7.17	5.16	−.16														
3. E1	0.12	0.32	.03	.03													
4. E2	0.53	0.50	−.03	−.06	−.38												
5. E3	0.31	0.46	−.06	−.06	−.24	−.71											
6. Individual creativity	4.14	1.03	−.19	.16	−.08	.13	−.04	(.97)									
Among team-level variables[b]																	
1. Team size	6.64	2.32															
2. D1	0.24	0.43	−.14														
3. D2	0.45	0.50	.18	−.51													
4. D3	0.21	0.41	−.10	−.29	−.47												
5. Teamwork interdependence	5.01	0.77	−.04	.13	.16	−.25											
6. Team tenure	4.24	3.24	.11	−.19	.14	−.04	−.06										
7. Team face saving	5.00	0.68	.07	.01	.05	−.04	.05	.11	(.88)								
8. Team learning goal	4.91	0.64	−.09	.15	−.12	.02	.62	−.12	.03	(.92)							
9. Team performance approach goal	4.90	0.65	.06	.14	−.10	.03	.49	−.03	.07	.77	(.90)						
10. Team performance avoidance goal	4.20	0.74	.20	.10	−.11	−.01	−.02	−.06	.08	−.12	.10	(.87)					
11. Team information exchange	5.05	0.67	−.08	.11	−.08	.05	.53	−.11	.13	.79	.66	−.25	(.90)				
12. Trust relationship with team leader	4.79	0.71	−.20	.06	−.16	.18	.39	−.11	.07	.73	.57	−.19	.71	(.89)			
13. Averaged individual creativity	4.27	0.84	−.03	.08	−.01	.05	.41	−.26	−.03	.53	.43	.08	.49	.50	(.97)		
14. Supportive climate for creativity	4.90	0.63	−.21	.10	.02	−.02	.53	−.02	.01	.79	.69	−.21	.76	.69	.53	(.91)	
15. Team creativity	5.25	0.78	.00	.04	.25	−.15	.18	.13	.06	.23	.13	−.07	.29	.26	.30	.41	(.82)

[a] $n = 485$. For E1: 0 = "others," 1 = "undergraduate"; E2: 0 = "others," 1 = "master's"; E3: 0 = "others," 1 = "doctorate." Reliabilities are in parentheses. For all correlations above $|.12|$, $p \leq .05$; and above $|.15|$, $p \leq .01$.

[b] $n = 100$. Reliabilities are in parentheses. For all correlations above $|20|$, $p \leq .05$; and above $|25|$, $p \leq .01$. For D1: 0 = "others," 1 = "applied research"; D2: 0 = "others," 1 = "new project"; D3: 0 = "others," 1 = "modifying a current project."

ysis, we tested whether the team goal orientation had any nonlinear relationship with team creativity by adding the three quadratic terms of the former. The results showed that the nonlinear relationship was not significant for the team learning goal, team performance approach goal, or team performance avoidance goal.

Hypothesis 2 predicted that the team performance approach goal would have an indirect positive relationship, through information exchange, with team creativity and individual creativity. As shown above, team information exchange was significantly related to team creativity and individual creativity. In addition, the result of model 1 in Table 2 shows that the team performance approach goal was significantly related to team information exchange ($\gamma = .21$, $p < .01$). The bootstrapping test indicated that the indirect relationships that the team performance approach goal had with creativity via team information exchange were significant. Specifically, for team creativity, the 99% CI of the indirect relationship was (.06, .13), not containing zero; for individual creativity, the 99% CI of the indirect relationship was (.01, .10), which also excluded zero. Therefore, Hypothesis 2 was supported.

Hypothesis 3 predicted that the team performance avoidance goal would have an indirect negative relationship, through information exchange, with team creativity and individual creativity. The result of model 1 in Table 2 shows that the team performance avoidance goal was significantly related to team information exchange ($\gamma = -.20$, $p < .01$). As shown earlier, team information exchange was significantly related to team creativity and individual creativity. The bootstrapping test indi-

TABLE 2
Hierarchical Linear Modeling Results for Team Information Exchange[a]

Variables	Team Information Exchange		
	Model 1	Model 2	Model 3
Intercept	5.04**	5.05**	5.03**
Control variables			
Team size	.00	.01	.00
D1	.08	.09	.09
D2	.08	.06	.06
D3	.16*	.11	.09
Team face saving	.12**	.10**	.09**
Teamwork interdependence	.09	.10	.07
Team tenure	−.01	−.01	.00
Team learning goal: Learning	.54**	.38**	.39**
Team performance approach goal: Approach	.21**	.20**	.19**
Team performance avoidance goal: Avoidance	−.20**	−.18**	−.16**
Trust relationship with team leader: Trust		.23**	.24**
Learning × trust			.30*
Approach × trust			−.32*
Avoidance × trust			−.06
$\Delta R^2_{\text{within-organization}}$[b]	.64	.07	.07
$\Delta R^2_{\text{between-organization}}$[b]	.22	.84	.93
Deviance	129.80	127.67	125.48

[a] n = 100 teams and 19 organizations. For D1: 0 = "others," 1 = "applied research"; D2: 0 = "others," 1 = "new project"; D3: 0 = "others," 1 = "modifying a current project."
[b] These are R^2 difference compared to the previous model. Model 1 was compared to the null model.
* $p < .05$
** $p < .01$
Two-tailed tests.

cated that the indirect relationships that the team performance avoidance goal had with creativity via team information exchange were significant. Specifically, for team creativity, the 99% CI for the indirect relationship was (−.11, −.07), not containing zero; for individual creativity, the 99% CI for the indirect relationship was (−.07, −.02), which also excluded zero. These results supported Hypothesis 3.

Indirect Relationships Moderated by the Trust Relationship with the Team Leader

Hypothesis 4 predicted that the trust relationship with the team leader would positively moderate the indirect relationship that the team learning goal has with creativity via team information exchange, whereby the relationship would become stronger when the trust is higher. As discussed above, the team learning goal was significantly related to creativity via team information exchange. Also, the interaction between the team learning goal and the trust relationship with the team leader was significantly related to team information exchange (model 3, Table 2: $\gamma = .30$, $p < .05$). Edwards and Lambert's (2007) procedure was used to examine whether the moderated indirect relationships (i.e., the first-stage moderation model) were significant. The moderated path analytic procedure showed that the link from the team learning goal to team information exchange and then to creativity varied significantly as a function of the trust relationship with the team leader (i.e., the first stage moderation). Specifically, the simple slope of the indirect relationship that the team learning goal had with team creativity via team information exchange was significant (simple slope = .60, $p < .05$) when the trust relationship with the team leader was high, but nonsignificant (simple slope = .42, n.s.) when it was low. The difference in the simple slopes was significant ($\Delta\gamma = .18$, $p < .01$). In addition, the simple slope of the indirect relationship that the team learning goal had with individual creativity via team information exchange was significant

TABLE 3
Hierarchical Linear Modeling Results for Team Creativity[a]

Variables	Team Creativity			
	Model 1	Model 2	Model 3	Model 4
Intercept	5.25**	5.25**	2.68*	2.03*
Control variables				
Team size	.00	−.01	−.01	.02
D1	.71*	.67*	.63*	.56*
D2	.90**	.88**	.79**	.66*
D3	.40	.34	.28	.27
Team face saving	.02	−.02	−.02	.00
Teamwork interdependence	−.11	−.14	−.19	−.18
Team tenure	.04	.05*	.06*	.04
s.d. of individual creativity			−.15	−.16
Team learning goal	.57*	.35	.23**	.01
Team performance approach goal	−.21	−.32	−.29	−.42*
Team performance avoidance goal	.04	.11	.08	.13
Team information exchange		.40*	.35	.20
Averaged individual creativity			.26*	.19
Supportive climate for creativity				.61**
$\Delta R^2_{\text{within-organization}}$[b]	.13	.01	.03	.07
$\Delta R^2_{\text{between-organization}}$[b]	.82	.99	.99	.96
Deviance	236.23	235.08	232.76	224.47

[a] n = 100 teams and 19 organizations. For D1: 0 = "others," 1 = "applied research"; D2: 0 = "others," 1 = "new project"; D3: 0 = "others," 1 = "modifying a current project."

[b] These are R^2 difference compared to the previous model. Model 1 was compared to the null model.

* $p < .05$

** $p < .01$

Two-tailed tests.

(simple slope = .54, $p < .01$) when the trust relationship with the team leader was high, but became weaker (simple slope = .44, $p < .05$) when it was low. Again, the difference in the simple slopes was significant ($\Delta\gamma = .10$, $p < .01$). Furthermore, the bootstrapping test based on MacKinnon et al. (2004) confirmed the significance of the indirect relationship that the interaction term (team learning goal × trust relationship with team leader) had with team creativity (99% CI = [.08, .19], not containing zero) and individual creativity (99% CI = [.01, .13], not containing zero). Therefore, Hypothesis 4 was supported. These moderated indirect relationships are plotted in Figures 2A and 2B.

Hypothesis 5 predicted that the trust relationship with the team leader would negatively moderate the indirect relationship that the team performance approach goal has with creativity via information exchange, whereby the relationship would become weaker when the trust is higher. As discussed above, the team performance approach goal had a significant indirect relationship with creativity via team information exchange. Also, the interaction between the team performance approach goal and the trust relationship with the team leader had a significant relationship with team information exchange (model 3, Table 2: $\gamma = -.32$, $p < .05$). In addition, the moderated path analytic procedure (Edwards & Lambert, 2007) showed that the link from the team performance approach goal to team information exchange and then to creativity varied significantly as a function of the trust relationship with the team leader. The simple slope of the indirect relationship that the team performance approach goal had with team creativity via team information exchange was nonsignificant (simple slope = −.02, n.s.) when the trust relationship with the team leader was high, but was significant (simple slope = .18, $p < .05$) when it was low. The difference in the simple slopes for the indirect relationships at high and low trust levels was significant ($\Delta\gamma = .20$, $p < .01$). Furthermore, the bootstrapping test based on MacKinnon et al. (2004) confirmed the significance of the indirect relationship that the interaction term (team performance approach goal × trust relationship with team

TABLE 4
Hierarchical Linear Modeling Results for Individual Creativity[a]

Variables	Individual Creativity	
	Model 1	Model 2
Intercept	4.27**	4.38**
Level 1 control variables		
Gender	−.26**	−.26**
Organizational tenure	.01**	.01**
E1	.04	.05
E2	.00	.01
E3	.03	.04
Level 2 control variables		
Team size	−.03	−.03
D1	.06	.06
D2	.16	.17
D3	−.03	−.04
Teamwork interdependence	−.05	−.08
Team tenure	.01	.01
Team learning goal	.57**	.45*
Team performance approach goal	.01	−.03
Team performance avoidance goal	.06	.10
Team information exchange		.22*
$\Delta R^2_{\text{within-team}}$ [b]	.14	.04
$\Delta R^2_{\text{between-team}}$ [b]	.78	.93
$\Delta R^2_{\text{between-organization}}$ [b]	.76	.94
Deviance	1,073.84	1,072.56

[a] $n = 485$ individuals for level 1, 100 teams for level 2, and 19 organizations for level 3. For E1: 0 = "others," 1 = "college undergraduate"; E2: 0 = "others," 1 = "master's"; E3: 0 = "others," 1 = "doctorate." For D1: 0 = "others," 1 = "applied research"; D2: 0 = "others," 1 = "new project"; D3: 0 = "others," 1 = "modifying a current project."

[b] These are R^2 difference compared to the previous model. Model 1 was compared to the null model.

* $p < .05$

** $p < .01$

Two-tailed tests.

leader) had with team creativity (99% CI = [−.37, −.01], not containing zero). For individual creativity, the simple slope for the indirect relationship for the team performance approach goal was not significant, whether the level of trust was high or low (simple slope = −.01, n.s., and .10, n.s., respectively). However, the difference in the simple slopes was significant ($\Delta\gamma = .11$, $p < .05$). Furthermore, the bootstrapping test confirmed the significance of the indirect relationship that the interaction term (team performance approach goal × trust relationship with team leader) had with individual creativity (99% CI = [−.12, −.01], not containing zero). These results partially supported Hypothesis 5. These moderated indirect relationships are plotted in Figures 3A and 3B.

The Bottom-Up Relationship between Individual Creativity and Team Creativity

Hypothesis 6 predicted that the average level of individual creativity in a team would be positively related to team creativity, above and beyond information exchange, through the supportive climate for creativity. The result of model 3 in Table 3 shows that averaged individual creativity was significantly related to team creativity ($\gamma = .26$, $p < .05$) above and beyond team information exchange. In addition, averaged individual creativity was significantly associated with the supportive climate for creativity ($\gamma = .38$, $p < .01$, not shown in the tables), and supportive climate for creativity was significantly related to team creativity (model 4, Table 3: $\gamma = .61$, $p < .01$), after controlling for team information exchange. The bootstrapping test indicated that the indirect relationship that averaged individual creativity had with team creativity via the supportive climate for creativity was significant (99% CI = [.04, .42], not containing zero). Therefore, Hypothesis 6 was supported.

We also conducted the same test using the maximum of team members' creativity scores (hereafter, the maximum). The maximum was significantly related to supportive climate for creativity ($\gamma = .10$, $p < .05$), and was significantly related to team creativity ($\gamma = .32$, $p < .01$). When supportive climate for creativity and the maximum were in the same equation, the coefficient for the maximum was reduced but remained significant ($\gamma = .27$, $p < .01$), and supportive climate for creativity was significant ($\gamma = .59$, $p < .01$). The relationship between the maximum and team creativity was therefore partially through supportive climate for creativity. The bootstrapping test indicated that the indirect relationship was significant (99% CI = [.02, .09], not containing zero).

DISCUSSION

In our study, we found that the team learning goal and the team performance approach goal were positively related to team information exchange, which in turn was positively related to team creativity and individual creativity. The team performance avoidance goal, on the other hand, was negatively related to team information exchange and subsequently to team creativity and individual creativity. Furthermore, the trust relationship with the team leader played a moderating role: when the trust was stronger, the indirect positive relation-

FIGURE 2A

Indirect Relationship of Team Learning Goal with Team Creativity via Team Information Exchange at Low and High Levels of Trust

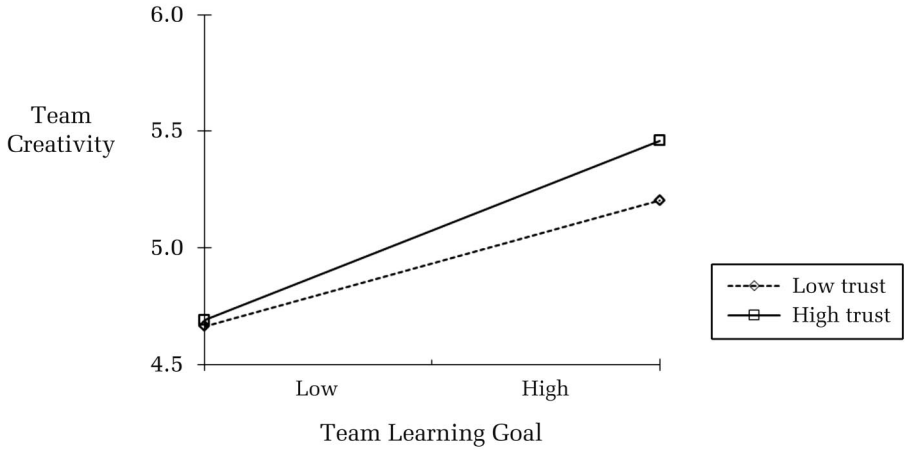
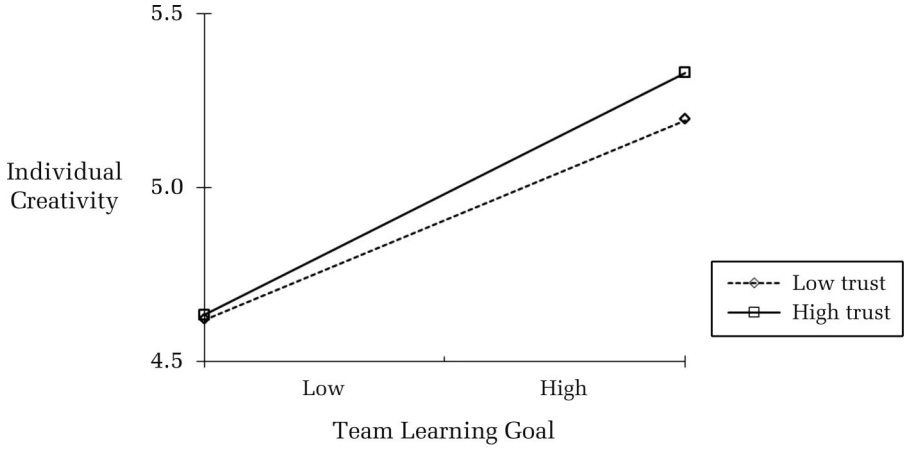


FIGURE 2B

Indirect Relationship of Team Learning Goal with Individual Creativity via Team Information Exchange at Low and High Levels of Trust



ship with team creativity and individual creativity (via team information exchange) was stronger for the team learning goal but weaker for the team performance approach goal. Finally, we also found that averaged individual creativity was positively related to team creativity via the supportive climate for creativity.

Implications for Theory and Research

This study departs from the common scholarly practice of studying creativity at a single level and examines the relationships that team goal orientation has with both team creativity and individual creativity. The team learning goal has a *direct* positive relationship with team creativity, while the team performance approach goal and team performance avoidance goal do not. Moreover, the same team goal orientation relates to both team creativity and individual creativity (both in terms of direct and indirect relationships) in a similar way. Overall, this study extends goal orientation theory and research to the team- and cross-level relationships with creativity.

It is important to highlight that these team-level findings enrich the emerging research on team goal orientation. In an important departure from Bunderson and Sutcliffe (2003), who found an inverted U-shaped relationship between the team learning goal and efficiency-based unit perfor-

FIGURE 3A

Indirect Relationship of Team Performance Approach Goal with Team Creativity via Team Information Exchange at Low and High Levels of Trust

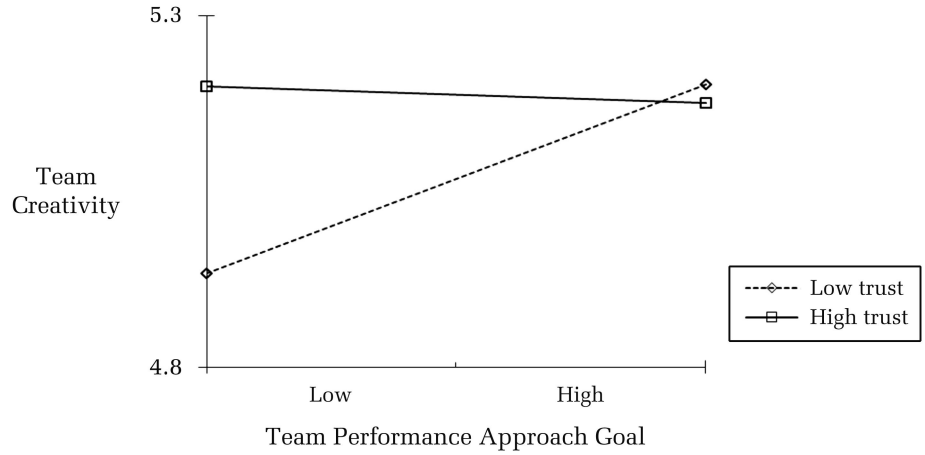
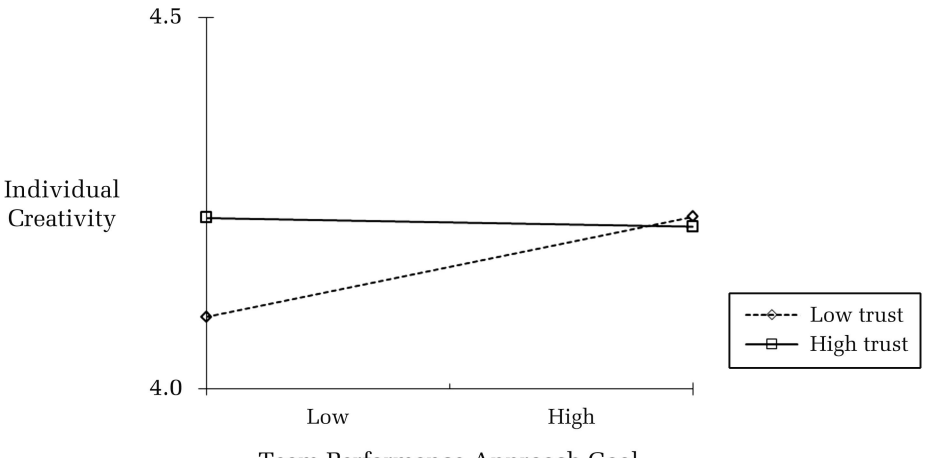


FIGURE 3B

Indirect Relationship of Team Performance Approach Goal with Individual Creativity via Team Information Exchange at Low and High Levels of Trust



mance, this study shows that the team learning goal has a positive linear relationship with both team creativity and individual creativity. While too much emphasis on the team learning goal is detrimental to efficiency-based performance, this does not seem to be the case for creativity. This study, together with that of Bunderson and Sutcliffe (2003), suggests that the team learning goal may have differential relationships with different team or unit outcomes. Team goal orientation theory and research therefore would benefit from consideration of the type of team outcome as a boundary condition.

It should be noted that this study finds a direct linear relationship between the team learning goal and team creativity. Hirst et al. (2009) hypothesized and found an overall positive linear relationship between the individual learning goal and individual creativity. The nonlinear term for the individual learning goal was not significant in their study. So, the overall relationship found in this study is consistent with that found in Hirst et al. (2009). However, they did find one nonlinear relationship between an individual learning goal and individual creativity that occurred only at a high level of team learning behavior. As evidenced in their study, an

overall positive linear relationship (the big-picture relationship) and a nonlinear relationship under a particular contextual condition can coexist. It is possible that organizational level learning behavior may play a moderating role in the relationship between the team learning goal and team creativity, producing a nonlinear relationship only when it is at a high level. It may be the case that emphasis on learning at one level does not produce a diminishing return. Rather, it is the simultaneous emphasis on learning at multiple levels that produces such a diminishing return.

Integrating team goal orientation and information exchange perspectives, this study posits team information exchange as a process linking team goal orientation and team creativity. Given the novelty of the team goal orientation approach to creativity, no prior research has theorized and empirically examined any potential explanatory mechanism for it. In particular, this study finds that the team performance approach goal has a positive—while the team performance avoidance goal has a negative—*indirect* relationship with creativity via team information exchange. At first glance, a team performance approach goal does not seem to be directly relevant to creativity, given its focus on external evaluation rather than on the development of competencies. The examination of team information exchange as the process, however, revealed an indirect benefit for creativity. The demonstration of this indirect benefit is important, because the team performance approach goal could be in danger of fading into obscurity if scholars simply focus on its nonsignificant, direct relationship with creativity. This study thus provides a novel and more complete view of the potential roles of the team performance approach goal in creativity.

Moreover, we have found that the indirect relationships that the team learning goal and team performance approach goal have with creativity vary as a function of the trust relationship with the team leader. Prior research has not conceptualized and examined when team goal orientation may be related more closely to creativity. This study therefore advances the team goal orientation approach to creativity by identifying the trust relationship with the team leader as a novel boundary condition. It is interesting that this trust relationship strengthens the indirect relationship for the team learning goal but weakens the indirect relationship for the team performance approach goal. The implication is that the same trust relationship with the team leader is enacted differently by team members, depending on the nature of the shared team goal. These findings also advance the information exchange perspective and the associated research that generally holds a positive view of trust. Although prior research suggests that trust is positively related to information exchange and creativity, the strength of this relationship may depend on the team goal orientation. Moreover, departing from the dominant positive view, this study suggests that trust may actually play a negative moderating role when teams adopt a performance approach goal. It therefore provides a new insight into the negative side of the trust relationship in the information exchange and creativity literature.

Importantly, this study offers novel contributions to a multilevel theory of creativity. Team creativity scholars have generally focused on the roles of team-level variables rather than on individual creativity. One noteworthy finding of this study is that individual creativity is positively related to team creativity, even when team information exchange—a team process variable—is controlled for. This finding is consistent with the notion that creativity is a multilevel phenomenon that involves bottom-up relationships across levels. The implication is that individuals must be brought back into the study of team creativity. As team creativity was related to both team information exchange and averaged individual creativity, this study supports the notion that team creativity does not equate to the simple average of the individual creativity of team members. Therefore, a multilevel theory of creativity requires a conceptualization of team creativity at the team level rather than as an aggregation of individual creativity.

Furthermore, this study theorizes and empirically examines, for the first time, the bottom-up process between individual creativity and team creativity. Specifically, it is found that individuals' creative behaviors positively relate to the supportive climate for creativity, which in turn positively relates to team creativity. Thus, this study advances the multilevel theory of creativity (Woodman et al., 1993), which has so far been silent on the process linking creativity at different levels. The conceptualization of the bottom-up process may have implications for the development of multilevel theory beyond the area of creativity. For example, it is important to understand how individual productivity may relate to team productivity. Extending the theorizing and findings in this study, it may be that a supportive climate for productivity could act

as the link between individual productivity and team productivity.

Last but not least, this study extends the componential model of creativity (Amabile, 1988). While the componential model suggests that the acquisition of information, knowledge, and ideas is critical for individual creativity, surprisingly few studies have examined the role of learning in team creativity. The team learning goal and team information exchange are both closely associated with learning: The team learning goal promotes team information exchange, which, in turn, enhances team creativity. Furthermore, through team information exchange, individual members learn from each other and their individual creativity is enhanced. This study, therefore, also extends the componential model to team- and cross-level relationships with creativity.

Managerial Implications

As creative activities are often carried out by teams, understanding team creativity is of practical importance to managers. This study suggests that team goal orientation is important. Managers may find it useful to foster the team learning goal, and this can be done through situational factors such as leadership, assigned objectives, and recognition. For example, managers could help to develop the team learning goal by serving as role models for, and by rewarding, learning. Moreover, they may foster the trust relationship with a team leader, thus unleashing the power of the team learning goal to facilitate information exchange and creativity. Managers may also encourage the team performance approach goal, which is indirectly related to creativity via an increased information exchange within a team. They may also take measures to avoid the development of a team performance avoidance goal. It should be pointed out that a high team learning goal does not necessarily benefit efficiency-based performance. The implication is that managers may develop a team learning goal based on the type of performance they are aiming for. Secondly, managers may foster team information exchange. An open exchange of information in collaborative efforts is critical to team creativity, and the team learning goal and team performance approach goal are positively related to information exchange.

Finally, managers may look to a team context to enhance individual creativity. Team information exchange can be considered as the learning-focused aspect of team behaviors. Managers may provide institutionalized platforms or channels for exchanging ideas, perspectives, and knowledge. These factors can help to increase individual creativity, which may in turn foster the supportive climate for creativity that is beneficial to team creativity. One example of such a platform is the innovation forum at Tata Motors, through which employees share their ideas. To sum up, creativity is a multilevel phenomenon, and, accordingly, it is desirable to adopt a systematic, multilevel approach to enhancing it.

Limitations and Future Research Directions

The findings and implications of this study should be interpreted with its limitations borne in mind. First, it is cross-sectional and thus does not establish causality in relationships. It is possible that a team learning goal at time 1 influences information exchange at time 2, which further reinforces team learning goal at time 3. Similarly, team creativity, once achieved, may reinforce the supportive climate for creativity, which in turn reinforces individual creativity. Future research should empirically examine potential reverse relationships. Second, this study did not examine the interplay between different types of team goal orientation in influencing creativity, due to the relatively high correlation between a team learning goal and the team performance approach goal. It is possible that a team oriented toward both a learning goal and the performance approach goal would be the most creative. Future research may examine this possibility.

Third, this study is the first to examine information exchange as a process linking team goal orientation and team creativity. Other potential team processes may exist. One example is team learning behavior, which includes, but is not limited to, information exchange. Theoretically, it is more fruitful to examine a focused construct such as information exchange, because such constructs enable more precise predictions. Team learning behavior includes other factors that may play a mediating role that is different from that of information exchange. For example, while a team performance approach goal may positively relate to the exchange of task information among team members, it may also be negatively related to the discussion of errors, because such information reveals that the team is not doing well and thus contradicts the performance approach goal. It may also be negatively related to experimentation, because such behavior is risky and may thus ruin the perfor-

mance of the team, which may explain why, overall, no significant direct relationship was found between the team performance approach goal and team creativity. One interesting direction for future research would be to explicitly examine whether different aspects of team learning behavior (e.g., information exchange versus discussing errors or experimenting) play different mediating roles (i.e., positive versus negative).

Fourth, this study examined team goal orientation as a shared property. A different question would be whether diversity in individual goal orientations is related to creativity, and if so, then how. On the one hand, such diversity may provide potentially different inputs (e.g., different approaches to the team's tasks) for the team. On the other hand, it may give rise to conflicts and prevent the exchange of these inputs due to the differences in individual goals in the team. In her thesis research, Pieterse (2009) reported that, based on a series of experiments using student participants, diversity in individual goal orientation had no effect on team performance. Nevertheless, more research is needed before a final conclusion can be reached.

Fifth, this study examined how average individual creativity, and not variance in individual creativity, is related to team creativity. It is possible that a team may have one or two very creative members who drive the team's creativity. We included variance in individual creativity as a control variable and found that it does not significantly relate to team creativity. To explore alternative ways of testing the bottom-up relationship, we also examined the maximum of team members' creativity and found it to be significantly related to team creativity. The average approach, therefore, is not the only viable option. Theoretically, it is possible that the most creative team member may influence the climate for creativity, which in turn increases team creativity. So the average and the maximum approaches converge on the climate mechanism. Indeed, supportive climate for creativity was found to be a mechanism for both the average and the maximum in the present study. Because the maximum approach does not focus on what's typical in a team, supportive climate for creativity may not be the only or the most powerful explanatory mechanism for the maximum. As evidenced in our results, supportive climate for creativity only partially explained the relationship between maximum individual creativity and team creativity.

The above discussion leads to a more general question: How could researchers better test bottom-up relationships? Current understanding of this issue is still limited. Despite some evidence showing that the average often produces the strongest relationship with team performance (see Bell [2007] for a meta-analysis on a number of team-member trait variables), it would be prudent to base the test on the nature of a team's task (Bell, 2007), or on how the higher-level construct emerges from the lower-level one (Kozlowski & Klein, 2000). For disjunctive tasks, in which the best member would determine team performance (i.e., the type of "maximum emergence" referred to in Kozlowski and Klein's [2000] typology), the maximum approach would be superior. For additive or reciprocal tasks, in which all members are required to make a certain level of creative contribution and their inputs combine or integrate to influence team creativity (i.e., similar to the "pooled constrained emergence" in Kozlowski and Klein's [2000] typology), the average approach would be more appropriate. For R&D tasks, the most creative team member may determine team creativity as a result of his or her superior creative ability. Members may also combine or integrate each other's creative ideas to produce team creativity. In this case, both the maximum and the average approaches would seem viable. A recent study has suggested that certain team roles are more important and the characteristics of the members in the core roles have stronger relationships with team performance (Humphrey, Morgeson, & Mannor, 2009). Hence, a third potential approach is to assign weights to individual members' creativity according to the importance of their roles, and to use the weighted average to test bottom-up relationships. We were not able to examine this approach in the present study, because we had no information on team roles and their importance in the sample teams. Future studies might explore this possibility. Overall, we call for more research to further understand issues related to the testing of bottom-up relationships.

Sixth, while this study examined, for the first time, a mechanism linking individual creativity and team creativity according to the social information processing theory, it cannot be ruled out that other potential mechanisms might exist. As the field moves forward, other mechanisms using different theoretical approaches should be explored. For example, individual creative ideas may cognitively stimulate and build up team creativity. Future research might develop a measure to capture

this phenomenon and then examine it as a potential mechanism.

In this study, we used the supportive-climate-for-innovation scale from Anderson and West (1998). Future research may develop a scale specifically for supportive climate for creativity to replicate our findings. In this study, we used Zhou and George's (2001) creativity scale. Although this scale includes the usefulness element (e.g., "comes up with new and *practical* ideas to *improve performance*"), one may argue that it focuses more on novelty and does not measure novelty and usefulness as separate elements (Sullivan & Ford, 2010). Novelty and usefulness should be tightly coupled in the R&D setting, in which the overarching goal is to develop new products and services that generate sales and profits. Although measuring the two elements separately has its advantages (e.g., it facilitates the examination of the antecedents and consequences of novelty and usefulness), there are potential methodological issues associated with combining them when creativity—rather than novelty or usefulness, separately—is a focus of interest in an HLM analysis. Fully addressing this measurement issue is beyond the scope of this study, but the scholarly community is urged to engage in a series of studies to resolve this issue.

Finally, our study was conducted in South Korea, which in terms of power distance and in-group collectivism practices is ranked higher than some other cultures (e.g., the United States). The teams in this study had formal leaders on an ongoing basis, which is less applicable to lower-power-distance cultures. On the other hand, there are significant variations within cultures. For example, police and military organizations in lower-power-distance cultures may also have formal leaders on an ongoing basis. In a high-power-distance culture, the leaders have disproportionate power over the employees. In this study, the relationship between a team learning goal and team information exchange may have been constrained, because team members generally take fewer initiatives in a high-power-distance culture. The moderating role of the trust relationship with the team leader, on the other hand, may have been strengthened, because the relationships with team leaders influence team members' behaviors more heavily in such a culture. The high in-group collectivism in South Korea may strengthen the relationships that a team performance approach goal and team learning goal have with information exchange, because the team members identify more strongly with the goal of the in-group and are more motivated to cooperate to achieve success for the in-group. Future research may replicate this study in other cultures.

Conclusions

In this study, we provide initial evidence that a team learning goal and team performance approach goal are positively related to team creativity and individual creativity via team information exchange. Moreover, the trust relationship with a team leader plays a moderating role, whereby it strengthens the relationship that the team learning goal has with team information exchange (and subsequently creativity) but weakens the relationship that the team performance approach goal has with team information exchange (and subsequently creativity). Finally, individual creativity has a bottom-up relationship with team creativity via the supportive climate for creativity. We hope that this study will stimulate further development of multilevel theory and further empirical research in the area of creativity. From the practice point of view, managers are advised to adopt a multilevel approach to fostering creativity.

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Yaping Gong (mnygong@ust.hk) is an associate professor of business and management at The Hong Kong University of Science and Technology. He received his Ph.D. from the Ohio State University. His research interests include goal orientation, employee creativity, strategic human resource management, international human resource management, and expatriate management.

Tae-Yeol Kim (tykim@ceibs.edu) is an associate professor of management at China Europe International Business School. He received his Ph.D. from University of North Carolina–Chapel Hill. His current research interests include organizational justice, cross-cultural management, creativity, leadership, and proactivity.

Deog-Ro Lee (drlee@seowon.ac.kr) is a professor of business at Seowon University, South Korea. He received his Ph.D. from Yonsei University, South Korea. His current research interests include creativity, leadership, humor, and labor-management partnership.

Jing Zhu (jingzhu@ust.hk) is an assistant professor of business and management at The Hong Kong University of Science and Technology. She received her Ph.D. from the Carlson School of Management, University of Minnesota. Her research interests include team process and effectiveness, and the dynamic experience of individuals' career transitions, such as expatriate adjustment and job search behaviors.