© Academy of Management Journal
2009, Vol. 52, No. 2, 280–293.

A CROSS-LEVEL PERSPECTIVE ON EMPLOYEE CREATIVITY: GOAL ORIENTATION, TEAM LEARNING BEHAVIOR, AND INDIVIDUAL CREATIVITY

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We developed and tested a cross-level model of individual creativity, integrating goal orientation theory and team learning research. Using hierarchical linear modeling, we found cross-level interactions between individuals' goal orientation and team learning behavior in a cross-national sample of 25 R&D teams comprising 198 employees. We hypothesized and found a nonlinear interaction between individual learning orientation and team learning behavior: in teams higher in team learning behavior, the positive relationship between learning orientation and creativity was attenuated at higher levels of learning orientation. An individual approach orientation was positively related to creativity only when team learning behavior was high.

As employee creativity is an important source of organizational innovation and competitive advantage (Amabile, 1988, 1996; Oldham & Cummings, 1996; Shalley, 1991; Zhou, 2003), organizations are increasingly seeking to foster individual creativity (Oldham, 2003). In many organizations people work in teams, and individual creativity is often enacted in this context (Shalley, Zhou, & Oldham, 2004). Thus, managing creativity not only requires the identification of employees with creative potential but also an understanding of how the team context influences the creativity of individuals with different dispositions. This is a challenge for research and practice that inherently has a cross-level focus, requiring insight into the dynamic interplay between individual and team. Despite prominent reviews (e.g., Shalley et al., 2004) highlighting the importance of individual-contextual interactions and evidence in the broader organizational behavior literature of such interactions (Chen & Kanfer, 2006; Chen, Kirkman, Kanfer, Allen, & Rosen, 2007), the creativity literature has yet to explore how teams influence the expression of individual differences related to creativity (Taggar, 2002).

The purpose of the present study is to develop and test cross-level theory regarding the cross-level influences of individual differences and the team context on individual creativity. Building on Amabile's (1996) componential theory of creativity, we propose that factors that foster individual learning set the stage for individual creativity. We develop this perspective both in terms of dispositional differences in goal orientations (Dweck, 1999; Elliot & Church, 1997) that may motivate individuals to seek out, or avoid, opportunities for learning and creativity, and in terms of the contextual influence provided by team learning behavior—that is, collective problem solving and reflection (Edmondson, 1999). Drawing on theories of person-situation interactions (Chen & Kanfer, 2006; Tett & Burnett, 2003), we propose that team learning behavior moderates the extent to which individual goal orientations are associated with employee creativity.

Our study thus makes a number of contributions to the creativity literature and broader organizational behavior field. It puts factors associated with learning center-stage in the study of creativity. By doing this with a cross-level focus and showing that team context shapes the expression of individual differences, our study provides important first evidence of the value of a cross-level approach to understanding individuals' creativity, testifying to

The authors would like to thank the Editor, Brad Kirkman, and the three anonymous reviewers for their insightful comments and suggestions during the review process. We also thank Brian Cooper, Felix Brodbeck, Andreas Richter, and Sam Aryee for their encouragement and advice.

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the promise of this approach, which has been highlighted as one of the most important avenues for future creativity research (Zhou & Shalley, 2008). In addition to these contributions, our study also extends goal orientation research by identifying contextual influences on the expression of goal orientations, integrating insights from team learning research (e.g., Edmondson, 1999) and person-situation theory (Tett & Burnett, 2003). Our study also adds more generally to the emerging interest in cross-level influences in organizational behavior, providing further evidence for the promise of this approach.

LITERATURE REVIEW AND HYPOTHESES

Following prior research, we define creativity as employees' generation of novel and useful ideas concerning products, procedures, and processes at work (Amabile, 1988; Oldham & Cummings, 1996). Creativity at work typically is not a process unbound by practical restraints or goals but one often engendered by problems and challenges that arise in the pursuit of work goals (cf. Shalley, 1991). Accordingly, we focus on creativity as a process in which employees develop novel and useful solutions to challenges and problems encountered in goal pursuit. In a sense, following this focus on creative problem solving and recognizing that creativity often arises in the course of goal-directed behavior, we propose that individual differences in goal orientations may help explain individual differences in creativity (cf. Janssen & Van Yperen, 2004).

Achievement motivation theory describes goal orientation as a motivational orientation that influences how individuals approach, interpret, and respond to achievement situations (Dweck & Leggett, 1988; Elliot & Church, 1997). Goal orientation reflects both self-development beliefs and how these beliefs lead individuals to interpret and engage with their environment. Two distinct goal orientations have been commonly identified: a learning goal orientation, focused on the development of competence and task mastery; and a performance goal orientation, focused on the demonstration of competence to others. A learning goal orientation fosters an intrinsic interest in the task itself, as challenging work provides a means to develop skills and knowledge. It increases the likelihood that people invest effort and persevere to complete complex tasks in the absence of extrinsic rewards (Dweck, 1999). In contrast, people may also be motivated by extrinsic factors such as competing against others, receiving rewards, acknowledgement, or avoiding criticism (VandeWalle, 1997). These externally attuned motivations can be divided into two categories: A performance-approach orientation encourages an individual to seek to attain favorable judgments, while people who are concerned about avoiding unfavorable judgments of competence exhibit a performance-avoidance orientation. Next, we propose links between these goal orientations and creativity and formulate predictions about how team learning behavior moderates these relationships.

Learning Goal Orientation and Creativity

Amabile's (1996) componential model of creativity identifies three building blocks necessary for individual creativity: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation. A learning goal orientation (from here on, a *learning orientation*) is particularly relevant in this regard, because it may be expected to relate to both skill acquisition and intrinsic motivation. Moreover, it may influence people's willingness to solicit and use feedback to improve their skills and creativity.

First, a learning orientation focuses individuals on the acquisition of new knowledge and the development of "deep-processing strategies" facilitating mastery of challenging tasks (Elliot & McGregor, 2001). The focus on skill development associated with a learning orientation implies an intrinsic interest in understanding and mastering task performance (Janssen & Van Yperen, 2004). This interest in the task itself—intrinsic motivation—leads to a deeper and more intensive engagement with the task, which often results in creativity (Amabile, 1996). Moreover, because a learning orientation is also associated with a preference for challenging and demanding tasks (VandeWalle, 1997), individuals with a stronger learning orientation may be expected to be more intrinsically motivated to seek out creative activities that by definition involve uncertain and untried approaches that possess a high likelihood of error or potential failure.

Second, a learning orientation may feed into creativity by engendering the development of domain-relevant skills and creativity-relevant skills. These skills provide the essential background knowledge and basis for creativity (Amabile, 1996). Creativity concerns the development and generation of something new for which the requisite strategies often have yet to be learned (Janssen & Van Yperen, 2004; Zhou, 2003). In order to acquire such knowledge and skills, individuals must engage in a learning process. It is this learning process and the associated development of expertise that benefit from a strong learning orientation (Dweck, 1999).

Third, when obstacles are encountered, learning-

oriented people tend to deal with these challenges by investing additional effort to develop and master new skills (Dweck, 1999; VandeWalle, Cron, & Slocum, 2001). Creativity is often required to resolve such problems. Learning-oriented employees are likely to cope effectively with both negative and positive feedback by putting substantial effort into creative problem-solving activities to identify and apply the strategies needed to succeed (cf. Dweck, 1999).

To our knowledge, although no published research has tested the relationship between learning orientation and creativity, Janssen and Van Yperen (2004) found that a learning orientation had a positive relationship to innovative behavior. Although innovation includes other behaviors in addition to creativity (e.g., championing, promoting, and implementing ideas), we have no reason to believe that findings for creativity per se should diverge from Janssen and Van Yperen's findings. Thus, we predict:

Hypothesis 1. Employee learning orientation is positively related to employee creativity.

Performance Goal Orientation and Creativity

Individuals with a performance goal orientation are primarily motivated by the external outcomes associated with performance. As previously outlined, a distinction can be made between performance-oriented individuals who are more concerned with achieving the outcomes of high performance (from here on, *approach orientation*) and those that are more concerned with avoiding the consequences of poor performance (from here on, *avoidance orientation*). Because both approach- and avoidance-oriented individuals tend to define the effective accomplishment of a task primarily in terms of external evaluations—receiving rewards or avoiding criticism and negative feedback, respectively—their actions can best be understood by taking contextual cues into account. For this reason, we do not propose main effects hypotheses for either an approach or avoidance orientation, but rather consider their effects according to the team learning context.

Individual Differences in the Team Context: Goal Orientation and Team Learning Behavior

Creativity is often enacted in team settings (Taggar, 2002), and a given team context is likely to influence the extent to which individuals act according to their dispositions (Mischel, 1977; cf. Kristoff, 1996). A key premise underlying social learning theory (Rosenthal & Zimmerman, 1978) and trait activation theory (Tett & Burnett, 2003) is that individuals analyze, react to, and influence their environment according to their dispositions. Accordingly, in trying to understand how individual differences in goal orientation play out in teams, we consider whether a context promotes and facilitates existing dispositions to engage in learning and creativity, or alternatively encourages people to display such behaviors they might not otherwise perform. We propose that team learning behavior—collective engagement in reflective decision making, asking questions, seeking feedback, and discussing errors (Edmondson, 1999)—may fulfill both these roles.

Team learning behavior differs from "team climate" or "shared learning orientation" in that it is not so much the beliefs of the collective (Katz & Kahn, 1978) or the team's motivational orientation toward encouraging learning (Bunderson & Sutcliffe, 2003) but rather the process by which team members discuss and solve problems. Teams that seek information, address differences of opinion, and question problem-solving assumptions engage in learning behavior (Edmondson, 1999). Team learning behavior does not necessarily reflect greater resources for learning in terms of more able peers, better funding, and so forth, but rather pertains to information-seeking and reflective decision-making processes. Collectively, these processes encourage learning by increasing the knowledge and information available to team members, creating a context in which it is easier to learn and reduce the psychological risks associated with learning. This in turn encourages people to engage in learning. Team learning behavior may also encourage social learning processes (Rosenthal & Zimmerman, 1978) whereby team members observe their peers engaging in learning activities and so see that learning is valued and supported. In contrast, low team learning behavior is characterized by low levels of information seeking and shared reflection that may be due to other priorities (e.g., delivery targets, efficiency requirements, or strong norms for action).

Learning Orientation and Team Learning Behavior

According to trait activation theory, a team context may bring out—activate—individual dispositions when the contextual influence in play is relevant to the disposition (Tett & Burnett, 2003; cf. Chen & Kanfer, 2006). Thus, the influence of context is less evident when people have a lower dispositional inclination to display the behavior encouraged by the context than when they are more

inclined to display this behavior. Team learning behavior encourages and facilitates individual learning and is a particularly relevant contextual factor for bringing out learning-oriented individuals' disposition to engage in learning. Although individuals with a low learning orientation are less likely to be motivated by team learning behavior (i.e., there is no trait to be activated), team learning behavior will encourage learning among those with a stronger learning orientation.

But an emphasis on learning does not necessarily translate directly into the creative pursuit of work goals. A strong theme in the organizational learning literature is that more learning does not invariably lead to higher performance—learning may be inefficient at high levels (Bunderson & Sutcliffe, 2003; He & Wong, 2004). This is often characterized by a nonlinear relationship between learning and the outcome of interest (Lounamaa & March, 1987). Indeed, March (1991) showed that individuals who balanced the dual requirements of searching for new knowledge and the application of this knowledge were better at developing solutions to applied problems than individuals overemphasizing learning. Similarly, Lounamaa and March (1987) found decreasing returns on effort as learning rates increased. An increasing emphasis on learning did not harm performance, but the added benefits decreased with higher learning. These studies concerned performance rather than creativity, yet the guiding notion is that the application of new ideas and skills in practice leads to higher performance. As such, these studies provide a clear link to our analysis of creativity.

Extending these insights to creativity, we may expect that although learning generally is beneficial to creativity, beyond a certain point it gradually adds less to an individual's ability to generate creative solutions to work problems. A thirst for knowledge may stimulate development of new approaches (i.e., the novelty element of creativity), but experimentation and learning also take time without necessarily delivering results (Edmondson, 1999). Creativity, by definition, involves the development of new *and* useful ideas, and creativity in applied settings is not so much about idea generation unbound by practical concerns but about the generation of ideas that serve goal-directed needs. When employees are overly focused on learning as opposed to the pragmatics of goal pursuit, they may overlook workable solutions and favor elegance and novelty over practicality (Bunderson & Sutcliffe, 2003). A strong emphasis on learning may thus have diminishing returns for individuals' creativity in the pursuit of work goals.

Combining these insights from trait activation theory and the learning literature, we argue that under conditions of high team learning, learning orientation has a nonlinear, cubic relationship with creativity: stronger at moderate than at lower or higher levels of learning orientation. When learning orientation is low, team learning behavior cannot really evoke an inclination to learn, and its influence on individual learning and creativity will be small. At moderate levels of learning orientation, in comparison, team learning behavior may bring out individuals' disposition to learn and creativity, and yield a stronger relationship between learning orientation and creativity than when team learning is lower (compare trait activation theory). At higher levels of learning orientation, however, team learning behavior may encourage individuals to prioritize learning activities to such an extent that it has diminishing creative returns, rendering the relationship between learning orientation and creativity weaker than at more moderate levels of learning orientation.

When team learning behavior is low, team context will do little to bring out individual learning orientation, and an overemphasis on learning is unlikely. Under these conditions, we therefore expect that individuals will act in line with their dispositions, albeit not as strongly as when team learning behavior is high. This expectation implies a positive linear relationship between learning orientation and creativity. As noted previously, for moderate levels of learning orientation, this relationship would be weaker than for high team learning behavior (in line with trait activation theory).

Hypothesis 2a. Team learning behavior moderates the relationship between employee learning orientation and employee creativity. When team learning behavior is high, the positive relationship between learning orientation and creativity is stronger at intermediate levels of learning orientation than at lower or higher levels of learning orientation; when team learning behavior is low, learning orientation has a positive linear relationship with creativity.

Performance Orientation and Team Learning Behavior

Performance-oriented people seek to maximize rewards and minimize potential punishments, using environmental cues to decide which behaviors are appropriate. They can thus be expected to focus on the cues provided by the team context as a source of information to determine the choice of behaviors and actions that are favored. Team learn-

ing behavior as a source of social information—or extrinsic motivation—is thus likely to guide individuals with a performance orientation to select actions that are appropriate. The specific nature of the influence of team learning behavior on individuals with an approach orientation as compared with an avoidance orientation is likely to differ, however.

An approach orientation is characterized by showing sensitivity to external cues in order to maximize extrinsic rewards, and so we may predict that individuals with a stronger approach orientation are more responsive to extrinsic motivators such as team learning behavior. When learning is not encouraged, approach-oriented employees are unlikely to be motivated to engage in learning behaviors, as the context suggests little interest in reflective problem solving or information seeking. Consequently, approach-oriented individuals will perceive they are unlikely to be rewarded for directing their energy toward learning and creative activities. An approach orientation will do little to encourage creativity under conditions of low team learning behavior, but by the same token it is unlikely to discourage creative behavior. We therefore expect that approach orientation is unrelated to creativity when team learning behavior is low.

The behavior of approach-oriented individuals is likely to differ, however, when team learning behavior is high, and team norms communicate that learning and creativity comprise an arena in which to demonstrate one's competence. In this context, approach-oriented people will perceive they should engage in learning activities to demonstrate competence, seeking information and experimenting with complex problem approaches. By engaging in learning and creative behaviors, they demonstrate their ability and may compare favorably to or even outperform their peers. Thus, when team learning behavior suggests the social appreciation of learning and creativity, people with a stronger approach orientation may be more motivated to engage in creative activities.

An avoidance orientation implies a tendency to avoid challenges that carry the risk of errors and failure and to favor endeavors with a high chance of success (VandeWalle, 1997). Learning new knowledge and skills and applying them in the development of creative solutions to work problems is unpredictable and associated with the risk of setbacks, errors, and failures. Accordingly, avoidance-oriented individuals may shy away from learning activities and creative challenges unless contextual influences reduce the psychological risks associated with such actions. Team learning behavior may fulfill an important role in this regard. When team learning behavior is low, team context does little to encourage or facilitate learning; thus, avoidance-oriented individuals may associate learning and creativity with risky activities prone to failure and criticism. In effect, this situation would render learning and creativity ambiguous and uncertain challenges, and we would expect avoidance-oriented individuals to shy away from these challenges.

High team learning behavior, however, signals to avoidance-oriented individuals that they are less likely to be criticized for errors or mistakes and that learning and creativity are appropriate, supported, and encouraged. Team learning behavior also facilitates individual learning, thus reducing the psychological risks associated with learning and creativity. Such risk reduction should lower the threshold of engagement in such behaviors, because it signals both that errors and glitches along the way are less likely to elicit negative feedback and that the team encourages people to try different approaches. Accordingly, we propose that team learning behavior attenuates the negative impact of avoidance orientation. In sum, we hypothesize:

Hypothesis 2b. Team learning behavior moderates the relationship between employee approach orientation and employee creativity. Approach orientation is positively related to creativity only with higher team learning behavior.

Hypothesis 2c. Team learning behavior moderates the relationship between employee avoidance orientation and employee creativity. Avoidance orientation is negatively related to creativity only with lower team learning behavior.

METHODS

Research Setting, Participants, and Procedures

We collected data as part of a cross-national R&D leadership development initiative in a large pharmaceutical company. Within the pharmaceutical sector, R&D creativity determines new drug development and in turn shareholder returns, long-term profitability, and company viability. This form of creativity involves researchers striving to develop creative solutions to applied problems (e.g., developing a new therapeutic treatment delivery mechanism that provides a more stable release of active ingredients). As a result, creative problem solving is core to firm success and survival. To solicit participation, we gave presentations to senior managers and program leaders throughout the organization, outlining the purpose of the initiative and its benefits. This proce-

dure helped us to recruit 25 program teams comprising 255 employees based at four research divisions in three countries (the United States, the United Kingdom, and Sweden). All program leaders responded, and an 81 percent member response rate was observed across teams ($n = 198$).

On average, teams had 10 members (range 3 to 25) who had worked together for three years. Teams were responsible for developing new therapeutic treatments, technology initiatives, and models of biological compounds. The drivers for program development varied from pure research and incremental innovations to "fast follower" initiatives seeking to develop new treatments in response to competitor releases. The complex and strategic nature of these programs meant that many teams were multidisciplinary (72%). Program leaders tended to fulfill many roles, directing and facilitating research as well as taking on program "boundary-spanning" functions (e.g., lobbying for resources, presenting to senior managers and potential partners). In general, leaders had relatively limited time to engage in hands-on lab research. Rather, specialist team members performed the experimentation and testing. Consequently, it was crucial that individual team members develop creative solutions to problems and identify new directions for ongoing research.

On-line surveys in English were distributed to program leaders and team members (all respondents, including the Swedish participants, were proficient in English). Team members were asked to complete the on-line questionnaire, entering their name, demographic details, and ratings of the independent variables included in the study. Program leaders were e-mailed a separate questionnaire on which to rate team member creativity. Thirty-five, 56, and 9 percent of respondents were based in the United States, the United Kingdom, and Sweden, respectively. Sixty-four percent of respondents were male. On average, employees had worked in the organization for 2.5 years. All participants had completed undergraduate/bachelor's degrees. In addition, 24 percent held master's degrees and 54 percent, Ph.D.s. Fifty-three percent of employees were biologists, 27 percent were chemists (specializing in pharmacy), and 5 percent were computer scientists. The remaining disciplines comprised a range of different vocations, including engineering, statistics, and mathematics.

Measures

Goal orientation. Using VandeWalle's (1997) seven-point scales ranging from 1, "not at all," to 7, "to a large extent," we assessed goal orientation. An example of the five-item learning orientation scale is "I often look for opportunities to develop new skills and knowledge." An example of the four-item avoidance orientation scale is "I'm concerned about taking on a task at work if my performance would reveal that I had low ability." An example of the four-item approach orientation scale is "I'm concerned with showing that I can perform better than my co-workers."

Team learning behavior. Using the seven-item measure developed by Edmondson (1999), we rated team learning behaviors on a scale ranging from 1, "not at all," to 7, "all the time." A sample item is "In this team, someone always makes sure that we stop to reflect on the team's work processes."

Creativity. We measured employees' creativity and, in particular, creative problem-solving processes using the four-item scale reported by Farmer, Tierney, and Kung-McIntyre (2003). Program leaders rated employees' creativity on a six-point scale ranging from 1, "not at all correct," to 6, "completely correct." A sample item is "Solved problems that had caused others difficulty." All measures displayed satisfactory reliability ($\alpha > .70$).

Control variables. Accounting for the heterogeneity of the sample, we controlled for gender, education, country, individual and team tenure, and team size. These variables have been found to distinguish employee creativity (Tierney & Farmer, 2002) and relate to team processes (Edmondson, 1999). We measured education on a five-point scale (1 = "technical college," 5 = "PhD/MBA"). We created dummy variables for country (i.e., U.S., U.K., or Sweden). As two teams had members in different countries, the country variable was controlled at the individual level. We calculated team tenure as the average time leaders and members had worked on their team. Team size was assessed by the number of names reported by program leaders on the consent form.

Validation of Multilevel, Multinational Data Structure

Analyses include individual- and team-level constructs. We performed two different analyses to validate this data structure. First, we examined whether the data empirically justified aggregation of team learning behavior. According to one-way analysis of variance, team learning behavior differed ($p < .05$) between teams. Intraclass correlation coefficients (ICC1 = .19, ICC2 = .60) for team learning behavior were comparable to aggregate constructs reported in the literature (e.g., Edmondson, 1999). Further, a mean $r_{wg(j)}$ across teams of .81 for learning behavior, calculated using a normal distribution, suggested adequate within-team

agreement (James, Demaree, & Wolf, 1984). These results showed that aggregation of team learning behavior was justified.

Multilevel factor analysis is an important advance in analytic techniques, as it provides a more comprehensive test of a multilevel data structure. We used Dyer, Hanges, and Hall's (2005) five-step procedure to assess the data structure. We performed confirmatory factor analysis (CFA) on the five constructs of learning, approach orientation, avoidance orientation, team learning behavior, and creativity. We constructed a model with five factors, loading separately (five-factor model: $\chi^2 = 368.07$, $p < .01$, RMSEA = .06, CFI = .93). We tested whether more parsimonious four- (collapsing approach and avoidance orientation), three- (collapsing all goal orientations), two- (all independent variables loaded on one factor), and one-factor models were better fits to the data (four-factor model: $\chi^2 = 725.10$, $p < .01$, RMSEA = .11, CFI = .75; three-factor: $\chi^2 = 1{,}081.26$, $p < .01$, RMSEA = .15, CFI = .57; two-factor: $\chi^2 = 1{,}399.86$, $p < .01$, RMSEA = .17, CFI = .41; and one–factor: $\chi^2 = 1{,}844.67$, $p < .01$, RMSEA = .20, CFI = .19). These data modeled at the individual level demonstrate the convergent and discriminant validity of the constructs studied, providing sufficient basis to test the multilevel structure of the data (Dyer et al., 2005). Multilevel CFA models individual- and team-level constructs simultaneously at both levels. We expected that the factor structure of the model would be consistent at both levels, thus we constructed within- and between-team CFA models comprising five factors ($\chi^2 = 437.99$, $df = 449$, $p = .64$, RMSEA = .00). Despite the fact that the sample size is low for multilevel CFA (Muthén, 1994), the RMSEA is satisfactory.

Because we collected data from different countries, we tested measurement equivalence (the assumption that scales assessed equivalent constructs across settings) (Mullen, 1995). We performed three national (United States, United Kingdom, and Sweden) comparison CFAs using a four-factor measurement model comprising all independent variables, with each country representing a group (using covariance matrices) to determine whether the assumption of measurement invariance was justified (Steenkamp & Baumgartner, 1998). Leaders' ratings of creativity were not included, as four of the program leaders were expatriates (e.g., U.K. citizens working in Sweden), and so cultural assumptions were not applicable to leaders. To test cultural invariance, we included respondents who completed the questionnaire but did not consent to provide their names (providing data on ethnicity but not team membership), as well as employees who completed the survey but were not listed as members of particular teams. This procedure provided 261 respondents. To test for metric equivalence, we allowed error variance to be free and constrained the factor loadings to be equal across countries. A nonsignificant change in chi-square between the constrained and unconstrained models provided evidence of metric equivalence.

RESULTS

Table 1 displays correlations among variables. Individual-level variables are below and aggregated variables above the diagonal. Hypotheses 2a, 2b,

TABLE 1
Means, Standard Deviations, and Correlations[a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1. United States[b]	0.32	0.47		−.74**	.17	.12	−.41*	.47**	−.24	.57**	.07	.65**	.06	−.17
2. United Kingdom[b]	0.59	0.49	−.83**		.29	−.08	.35	−.28	.08	−.55**	−.05	−.55**	.11	.09
3. Gender	1.64	0.48	.05	.12		.18	−.19	.09	−.23	−.11	.02	.01	.22	.23
4. Education	4.06	1.12	.15*	−.06	.20**		−.22	.15	−.11	.28	.08	.02	−.08	.33
5. Tenure	26.84	36.76	−.19**	.20**	.13	−.22**		.02	.73**	−.29	−.19	−.32	−.17	−.17
6. Team size	10.30	6.57	.49**	−.33**	.05	.15*	−.01		−.15	.32	−.06	.24	−.10	−.17
7. Team tenure	34.38	24.55	−.33**	.25**	−.06	−.09	.31**	−.15*		−.12	−.03	−.23	.04	−.19
8. Learning orientation	5.85	0.86	.39**	−.38**	−.01	.22**	−.13	.21**	−.13	(.85)	−.03	.66**	.30	.14
9. Avoidance orientation	2.88	1.31	−.02	.05	.09	−.02	.01	−.06	−.06	−.28**	(.86)	.47**	−.22	−.28
10. Approach orientation	3.96	1.46	.34**	−.30**	.09	−.02	−.08	.10	−.18*	.28**	.22**	(.87)	.15	−.19
11. Team learning	4.73	0.93	.00	.03	−.04	.01	.01	−.05	.02	.18*	−.22**	−.05	(.71)	.12
12. Employee creativity	4.09	1.12	−.01	−.00	.18*	.27**	−.02	−.06	−.13	.25**	−.14	.08	.06	(.84)

[a] Values below the diagonal result from individual-level analyses; those above the diagonal result from group-level analyses. $n = 25$ teams comprising 198 employees. Internal consistency reliabilities are in parentheses.

[b] Dummy variable.

* $p \leq .05$

** $p \leq .01$

and 2c (stating that team learning behavior moderates the relationship between individual goal orientation and creativity) are cross-level interaction hypotheses. We used hierarchical linear modeling (HLM) to test them. We group-mean-centered individual-level (level 1) variables, except for the dummy-coded country and gender variables. To calculate nonlinear terms, we centered the individual-level variables (Aiken & West, 1991) and calculated quadratic and cubic terms based on these. Team-level (level 2) variables were not centered to reduce possible problems with multicollinearity (Raudenbush & Bryk, 2002).

Table 2 summarizes HLM results. First, we tested a null model in which no predictors were entered. Next, we introduced the individual-level linear variables (step 1), the nonlinear terms (step 2), the team variables (step 3), and the linear two-way interactions (step 4) into the multilevel model. In the final step, to test our prediction that the cross-level interaction of learning goal orientation and team learning behavior would have a nonlinear relationship with creativity (Hypothesis 2a), we entered both the quadratic and the cubic terms (note that testing the cubic term requires also entering the quadratic term). All significant cross-level interactions are based on the final model, including all linear and nonlinear cross-level terms (i.e., simultaneous tests of interactions in the same model).

The null model allowed us to test the significance of the between-team variance in creativity by examining the level 2 residual variance of the intercept (τ_{00}) and ICC1. ICC1 represents the proportion of variance in the outcome variable that resided between groups (Liao & Rupp, 2005). The analyses revealed that 42 percent ($\tau_{00} = .58$, $p < .001$, ICC1 = .42) of the variance resided between teams (to be explained by level 2 variables). A necessary precondition for testing cross-level interactions is that the slopes of the relationship between the goal orientations and creativity vary across groups. The results revealed significant variance in the level 1 slopes of goal orientations and creativity: learning orientation ($U1$ variance = .59, $\chi^2[24] = 150.71$, $p < .001$), approach orientation ($U1$ variance = .58, $\chi^2[24] = 145.90$, $p < .001$), and avoidance orientation ($U1$ variance = .58, $\chi^2[24] = 144.61$, $p < .001$).

Individual-level results. The first section of Table 2 shows that among the level 1 control variables, only education ($\gamma = .25$, $p < .05$) and U.S. location ($\gamma = -.72$, $p < .05$) were significant predictors of creativity. Hypothesis 1 predicted that learning orientation would be positively related to employee creativity. Supporting Hypothesis 1, learning orientation ($\gamma = .22$, $p < .05$) had a significant, positive relationship with creativity. When we included control variables in the HLM analyses, neither approach- nor avoidance-orientation was significantly related to creativity.

Cross-level interactions. We estimated slopes-as-outcomes models in HLM to assess the moderating effect of team learning behavior on the relationship among the three goal orientations, nonlinear terms, and employee creativity. The results of this analysis are presented in the final section of Table 2. The model explained 10 percent of the variance in employee creativity. We compared this model to one involving all linear cross-level interactions and excluding all nonlinear terms. The model containing linear terms only explained 3 percent of the variance, less variance ($\Delta R^2 = .07$) than the model described in full.

Hypothesis 2a states that learning orientation has a cubic relationship to creativity contingent on team learning behavior. When team learning behavior is high, learning orientation was expected to be more strongly related to creativity at moderate levels than at higher or lower levels. At moderate levels, learning orientation was also expected to be more strongly related to creativity when team learning behavior was high rather than low. The cubic interaction of learning orientation and team learning behavior was significant ($\gamma = -.06$, $p < .05$). We plotted the association between learning orientation and creativity, comparing two team learning contexts (one s.d. above or below the mean). As the extremes of the cubic function were of particular relevance to our predictions, we plotted learning orientation ranging from two standard deviations above and below the mean. Figure 1 depicts this interaction. An inspection of Figure 1 revealed that when team learning behavior was high, the positive relationship between learning orientation and creativity was stronger at moderate levels of learning orientation (i.e., the mean) than at lower and higher levels. At moderate levels of learning orientation, the relationship was also stronger when team learning behavior was high rather than low. We further analyzed this interaction by evaluating simple slopes (cf. Aiken & West, 1991). We estimated slopes at three levels of learning orientation: the mean, and one standard deviation above and below the mean. Results showed that when team learning behavior was high, the slope was positive but not significant for one standard deviation below the mean ($b = 1.22$, $t = 1.67$, n.s.); positive and significant at the mean ($b = 2.14$, $t = 2.96$, $p < .05$); and positive but not significant when learning orientation was one standard deviation above the mean ($b = 0.30$, $t = 0.41$, n.s.). When team learning was low, the simple slopes of

TABLE 2
Results of Hierarchical Linear Modeling for Effects on Employee Creativity of Cross-Level Interactions of Goal Orientation with Team Learning[a]

Variable	Coefficient	s.e.	*t*	χ^2	Model Deviance	R^{2b}	Total R^{2c}
Null model							
Intercept	4.24*	0.16	26.98*	143.29	507.55		
Level 1 variables							
Intercept	3.27*	0.51	6.44*	142.48	503.03	.13	
United States	−0.72*	0.41	1.74				
United Kingdom	−0.46	0.40	1.16				
Gender	0.16	0.15	1.08				
Education	0.25*	0.06	4.10*				
Tenure	0.00	0.00	1.51				
Learning orientation	0.22*	0.07	2.92*				
Avoidance orientation	−0.08	0.06	1.32				
Approach orientation	0.11	0.06	1.77				
Level 1 nonlinear variables							
Learning orientation squared	−0.51	0.28	1.84	137.41	508.26	.13	
Learning orientation cubed	−0.01	0.01	0.80				
Level 2 variables							
Team size	−0.02	0.02	1.28	126.31	519.77	.12	.11
Team tenure	−0.01	0.00	2.09*				
Team learning	0.18	0.41	0.43				
Linear cross-level interactions							
Learning orientation × team learning	−0.22	0.37	−0.60	132.22	513.72	.09	.11
Avoidance orientation × team learning	0.25	0.23	1.09				
Approach orientation × team learning	0.39	0.18	2.16*				
All cross-level interactions							
Learning orientation × team learning	1.00	0.97	1.02	129.21	513.56	.07	.10
Avoidance orientation × team learning	0.22	0.18	1.24				
Approach orientation × team learning	0.40*	0.20	2.01*				
Learning squared × team learning	−0.88	0.89	0.99				
Learning cubed × team learning	−0.06*	0.03	2.15*				

[a] Employees' $n = 198$, teams' $n = 25$.
[b] Indicates the proportion of variance explained at each level, i.e., level 1 within-team variance, level 2 between-team variance and cross-level interactions.
[c] Indicates $R^2_{\text{within-group}} \times (1 - \text{ICC1}) + R^2_{\text{between-groups}} \times \text{ICC1}$.
* $p < .05$
Two-tailed tests.

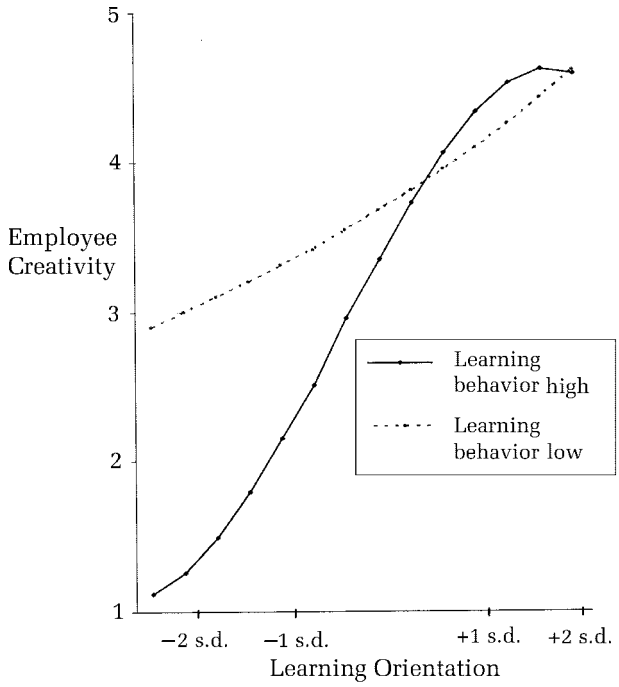
the regression line were significant and positive when learning orientation was one standard deviation below the mean ($b = 0.70$, $t = 2.32$, $p < .05$), at the mean ($b = 0.84$, $t = 2.11$, $p < .05$), and above the mean ($b = 0.99$, $t = 1.98$, $p < .05$). In total, the results support Hypothesis 2a.

Hypothesis 2b predicts that team learning behavior moderates the relationship between approach orientation and creativity. The interaction of approach orientation and team learning behavior was significant ($\gamma = .40$, $p < .05$). Figure 2 depicts the interaction. The relationship between approach orientation and creativity was positive only when team learning was high (i.e., one s.d. above the mean), supporting Hypothesis 2b. Hypothesis 2c predicts that team learning behavior moderates the relationship between avoidance orientation and creativity. This interaction was not significant ($\gamma = .22$, n.s.) failing to support Hypothesis 2c.

DISCUSSION

We adopted a cross-level approach to examine how the team context influences the creative expression of individual differences in goal orientations. In support of our conceptual analysis, we found that the relationship between an individual's goal orientation and creativity was contingent on team learning behavior. For individuals dispositionally inclined to learn (i.e., learning-oriented

FIGURE 1
Interaction between Learning Orientation and Team Learning Behavior Predicting Employee Creativity



and, to a lesser extent, approach-oriented individuals), team learning behavior helped "bring out the best in them," bolstering their creative tendencies. However, an important caveat of our analysis is that beyond a certain point (i.e., at high levels of learning orientation), an emphasis on learning has diminishing returns in terms of individual creativity. Our study contributes to the creativity literature by demonstrating that the team context is a powerful moderating influence on individual difference–creativity relationships (cf. Taggar, 2002). Our results also testify to the viability of a cross-level learning perspective (cf. Dragoni, 2005) for understanding creativity. Moreover, the nonlinear interaction between learning orientation and team learning behavior extends the team learning literature, illustrating that the alignment of individuals and team context to promote learning does not necessarily linearly enhance creativity.

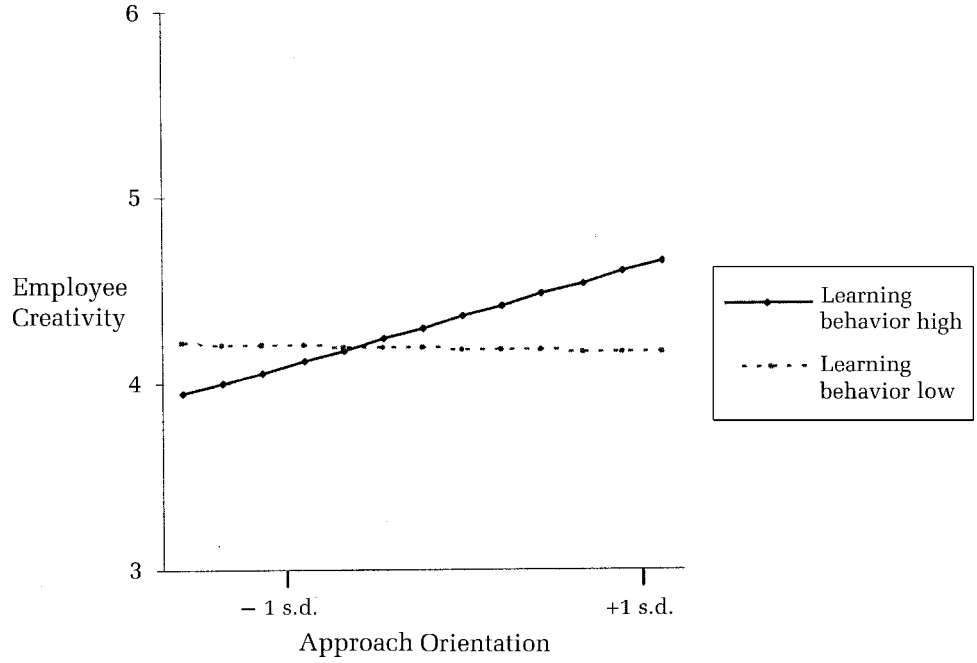
Theoretical Implications

Although Amabile's (1988, 1996) componential theory of creativity included the learning of domain-relevant and creativity-relevant skills and knowledge as key building blocks for creativity, the role of learning in promoting creativity has so far hardly been investigated empirically. Addressing this issue and building on the firm basis provided by Amabile's conceptual work, we proposed and found that factors that promote the learning of knowledge and skills are associated with creativity. These results add further evidence for Amabile's theory (e.g., Taggar, 2002), highlighting it as a useful framework to guide theoretical development. At the same time, our analysis extends Amabile's theory by providing a cross-level framework for understanding how the team context may interact with individual dispositions to affect individual creativity in teams.

At the individual level of analysis, our finding that learning orientation is conducive to creativity complements earlier work by Janssen and Van Yperen (2004) showing that learning orientation is predictive of innovative behavior. Together, these results show that a preference for challenging activities and learning may enhance creative problem solving as well as translating problem solutions into innovations. The main contribution of our study lies in its cross-level analysis, however. This analysis extends understanding of the interplay of individual and team antecedents of creativity and links individual goal orientation and team learning perspectives through insights from research in person-situation interactions. The cross-level interactions corroborate the proposition that team learning behavior invites and facilitates individual learning and thus creativity. Team learning behavior thus helps bring out individuals' creative dispositions, as trait activation theory implies (Tett & Burnett, 2003). These results suggest that we may further advance our understanding of such person-team interactions by extending the current analysis to include other individual differences that have been shown to relate to creativity, such as creative self-efficacy (Tierney & Farmer, 2002) and regulatory focus (Friedman & Forster, 2001). To the extent that these individual differences affect creativity through similar processes (i.e., intrinsic motivation, learning), we expect the team context for learning to have a similar moderating influence. Relatedly, the current analysis may be extended to include other indicators of whether the team context is favorable to learning, such as team climate for learning or team learning orientation. Although conceptually distinct from team learning behavior, they may have a similar moderating influence on the goal orientation–creativity relationship to the extent that they also encourage learning. Exploring these issues, research may build more comprehensive models of the role of learning in team creativity .

Importantly, our results also suggest that there are limits to the benefits of learning. Combining individual dispositions to learn and team learning behavior contributed to higher creativity, but the

FIGURE 2
Interaction between Approach Orientation and Team Learning Behavior Predicting Employee Creativity



"added creative value" of team learning diminished at higher levels of learning orientation. These results are consistent with the notion that the team learning context may bolster individuals' dispositions to engage in learning, yet they also point to the limits of emphasizing learning. Costs and benefits of learning are often studied from a macro perspective (e.g., He & Wong, 2004; but see Bunderson & Sutcliffe, 2003), examining different phenomena (e.g., organizational strategy, innovation investment) and outcomes (e.g., performance, efficiency) than the constructs studied here. The fact that we observed a comparable nonlinear relationship for a precursor to learning is important in that it helps organize approaches to different indicators and ways of studying learning. Also, the cubic interaction between learning orientation and team learning behavior provides further evidence for studying nonlinear effects in learning research.

The interaction between approach orientation and team learning behavior provides a potential explanation for the mixed results of prior research regarding performance-related benefits of approach orientation (Elliot & Harackiewicz, 1996; Janssen & Van Yperen, 2004). In our study, an approach orientation was positively related to creativity only when the individual's context encouraged learning. As expected, in teams where there is little extrinsic encouragement to engage in learning, approach orientation had no relationship to creativity. This interaction highlights the importance of context in the relationship between approach orientation and performance-related outcomes. Indeed, positive relationships between approach orientation and performance were often derived from classroom studies (Elliot & Harackiewicz, 1996; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002)—a context designed to encourage learning and academic performance. A more general hypothesis may thus be that an approach orientation is reliably related to complex performance-related outcomes (e.g., academic achievement, creativity, innovation) only when the context encourages and facilitates the acquisition of domain-relevant skills.

The avoidance orientation hypothesis was not supported, which may reflect power and effect size considerations, particularly if this relationship is substantially weaker than the two significant cross-level interactions. Learning activities and opportunities are something one needs to actively seek more than something one needs to avoid. Learning might require the proactive behavior one may expect from learning-oriented and (under certain conditions) approach-oriented individuals. Avoidant behavior associated with an avoidance orientation might in that sense be less predictive of (the lack of) learning and related creativity. On the basis of our data, however, this is mere speculation, and future research will have to shed more light on this issue.

The findings of cross-level interactions also contribute to the burgeoning interest in person-team interactions in organizational behavior more gener-

ally. In keeping with trait activation theory and related analyses (Chen et al., 2007; Tett & Burnett, 2003), our results provide further evidence that team contexts that encourage and facilitate the expression of individual dispositions may strengthen the relationships between individual differences and outcomes. Viewed from that perspective, our results also provide evidence for the generalizability of these analyses to other domains of organizational behavior (i.e., creativity), suggesting that they may offer a powerful framework with which to understand individual behavior in teams.

Managerial Implications

Calls by practitioners and the popular press seem to espouse learning as a panacea for promoting creativity and competitive advantage (e.g., Senge, 1990). Up to a point, our analysis corroborates this conclusion. The relationships observed in our study are complex, but in a nutshell, they do place a premium on learning in developing individual creativity. Our analysis also provides two important qualifications to this conclusion, however.

First, although an emphasis on learning may enhance individual creativity, our study highlights that we must consider not just the individual but rather the *individual in his/her context*. It is the combination of individual disposition and team learning that yields the stronger association with creativity. An emphasis on learning to stimulate individual creativity should therefore entail an emphasis on individuals' inclination to engage in learning in combination with a focus on team learning. On the individual level, this combined focus could include the consideration of goal orientation in personnel selection and investing in employee development programs that build employees' learning orientation (e.g., Gist & Stevens, 1998). At the team level, it would imply fostering team learning behavior. Such fostering may, for instance, be achieved through team leadership that promotes reflection and learning and creates a psychologically safe environment for discussion and exploration (e.g., Edmondson, 1999).

Second, our analysis also provides an important caveat regarding the benefits of learning. An emphasis on person-in-situation learning may stimulate individual creativity at work, yet the return for management efforts (and associated costs of employee selection and development) may be smaller beyond a certain level of learning. In that respect, from the perspective of efficiently investing in practices that promote creativity, efforts to build employees' inclination and potential to learn are probably only attractive up to a certain level of learning.

Limitations and Directions for Future Research

We did not directly measure mechanisms linking goal orientation to creativity. Research is also needed to study the processes underlying the observed moderating effects of team learning behavior. This research could examine whether the acquisition of creativity-relevant skills, such as problem-solving skill development, the acquisition of domain-specific knowledge, and perseverance in the face of negative feedback, act as mediators of the goal orientation–creativity relationship. Future research incorporating such measures would be valuable.

Because of its cross-sectional design, the current research does not allow for conclusions about causality. Previous experimental (e.g., Seijts, Latham, Tasa, & Latham, 2004) and longitudinal (e.g., VandeWalle et al., 2001) research has supported the directionality of the goal orientation–performance relationship; future organizational research should use longitudinal or preferably field-experimental research designs to establish that differences in goal orientations cause differences in individual creativity.

The sample and, in particular, the number of teams ($n = 25$) is relatively small. A larger sample would enhance the power to test cross-level interactions and provide greater confidence in the use of multilevel CFA. Even so, the use of mean team-unit perceptions is a strength of cross-level analyses, because mean ratings tend to cancel out both random variance in individual responses and systematic differences that may contaminate individual perceptions, such as individuals' backgrounds, previous experiences, and personality (James, James, & Ashe, 1990; Seibert, Silver, & Randolph, 2004). Thus, aggregate perceptions are likely to yield more accurate representations of team context, and they allowed us to examine interactions specified at different levels of analysis, something rarely done in the creativity literature.

Another qualification of the current findings is the use of an R&D sample. Arguably, R&D teams provide a context highly focused on creativity, and a legitimate question is whether contextual influences are therefore relatively strong compared to other organizational settings. On the other hand, one might argue that through attraction-selection-attrition processes (Schneider, 1987), R&D employees are likely to have a preference for learning activities. Supporting this view, the variance in employees' goal orientation is low (i.e., reflecting the self-selection of learning-oriented employees). Thus, there is considerable merit in research replicating our study in heterogeneous work settings. Nonetheless, we also note that these results were

based on data collected from three countries, increasing our confidence in the generalizability of the results. Finally, despite statistical results indicating metric equivalence for Swedish respondents, the use of an English survey may be a limitation of the research.

Conclusion

Managers often face the dual challenge of identifying employees with creative potential and managing team context to render it more conducive to individual employees' creativity. Our study directly addresses this challenge, identifying the combination of learning (and approach) orientation and team learning behavior as a possible route to greater creativity. However, our results also caution that there are limits to the extent to which the alignment of individual motivations and team context to promote learning enhances creativity.

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