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Perceived Cognitive Diversity and Creativity: A Multilevel Study of Motivational Mechanisms and Boundary Conditions

ABSTRACT

Adopting a motivational perspective on creativity, we theorized when and how perceived cognitive diversity in teams was associated with creativity by focusing on the mediating role of intrinsic motivation and the moderating role of learning orientation. We further expanded our contribution by examining these relationships at both the individual and team levels. We used a sample of 382 Chinese employee–supervisor pairs nested within 106 teams to test our hypotheses. The results revealed that, at both the individual and team levels, learning goal orientation significantly moderated the positive association between perceived cognitive diversity and intrinsic motivation such that the latter relationship became stronger as learning goal orientation increased. Furthermore, our findings confirmed that learning goal orientation enhanced the indirect positive relationship between perceived cognitive diversity and creativity through intrinsic motivation.

Keywords: perceived cognitive diversity, creativity, intrinsic motivation, learning goal orientation.

Creativity, defined as the generation of novel and useful ideas (Amabile, 1996), can enhance firm competitiveness under the right conditions (Gong, Zhou, & Chang, 2013). As diverse teams are usually assembled to produce creative ideas (Homan, Hollenbeck, Humphrey, van Knippenberg, Ilgen, & Van Kleef, 2008), and cognitive team diversity (i.e., diversity among team members in terms of thinking, knowledge, skills, world views, and beliefs, van der Vegt & Janssen, 2003) provides diverse cognitive resources for generating creative ideas, interest in the role of cognitive team diversity in creativity has been growing (Shin, Kim, Lee, & Bian, 2012). Extant research suggests that cognitive team diversity can enhance creativity, especially when transformational leadership and team perspective-taking are high (Hoever, van Knippenberg, van Ginkel, & Barkema, 2012; Shin & Zhou, 2007).

Despite the valuable insights generated by prior research, several theoretical voids remain. First, few studies have theorized and examined *how* cognitive team diversity influences creativity (See Shin et al., 2012 and Wang, Kim, & Lee, 2016 for exceptions). Cognitive team diversity implies potential cognitive resources; thus, extant research has unsurprisingly focused on cognitive mechanisms such as the elaboration of task information (Hoever et al., 2012; Kearney & Gebert, 2009). However, although intrinsic motivation has been a dominant perspective in the creativity literature (Amabile, 1996), research linking context and creativity has paid little attention to examining intrinsic motivation as a mechanism. In a recent exception, Wang et al. (2016) found that cognitive team diversity and transformational leadership interactively affected team intrinsic motivation and team creativity. This lack of research is problematic because the explanatory power of the intrinsic motivation perspective remains questionable without such direct examinations. The diversity literature (e.g., Jackson, Joshi, & Erhardt, 2003) also suggests that motivational mechanism is potentially important as well. Unlike demographic diversity (e.g., sex and race) that specifically highlights identity differences and often engenders negative motivation based on social categorization (Tajfel & Turner, 1986), cognitive team diversity features diverse ideas and perspectives that are potentially relevant to intrinsic motivation (i.e., a positive motivational mechanism).

In addition, the extant research on cognitive team diversity and creativity has examined creativity at a single level with a major focus on team creativity (with the exception of Richter, Hirst, van Knippenberg, & Baer, 2012 and Shin et al., 2012 whose studies are focused on individual creativity). Two interesting research

questions arise: (1) Does cognitive team diversity similarly influence team creativity and individual creativity? (2) Does this process involve the same intrinsic motivation mechanism? Moreover, questions concerning the multilevel generalization theory (i.e., whether the same antecedent similarly influences creativity at different levels and whether the same mechanism holds at different levels) have received limited attention in creativity research (Zhou & Shalley, 2011). Therefore, our first goal is to ascertain whether intrinsic motivation mediates the relationship between cognitive team diversity and both individual and team creativity. We focus on perceived cognitive diversity because perceptions have the most direct bearing on motivational and behavioral reactions in teams (Harrison, Price, Gavin, & Florey, 2002) and also play an important role in team creativity dynamics (Shin et al., 2012).

Second, creativity research has generally adopted cognitive and motivational approaches in a parallel fashion, and the integration of different approaches represents a promising research direction (Zhou & Shalley, 2011). Specific to cognitive team diversity, some scholars have examined cognition-related moderators, such as team perspective-taking (i.e., a cognitive process involving the understanding or consideration of other viewpoints; Hoever et al., 2012) and creative self-efficacy (i.e., the self-belief about one's capability to be creative; Shin et al., 2012). However, only a few studies have investigated motivational moderators. This omission is problematic because creativity is the outcome of the interplay between cognitive and motivational variables (Mumford & Gustafson, 1988). In this study, we adopt a motivational perspective by examining learning goal orientation (i.e., the extent to which a team or an individual emphasizes learning and competence development; Bunderson & Sutcliffe, 2003; Gong, Kim, Lee, & Zhu, 2013) as a moderating variable that enhances the effects of cognitive team diversity on creativity. When team members strongly share a goal of learning, they are more likely to enjoy working with people who have different ways of thinking, thus increasing team intrinsic motivation.

Our study extends the current research on diversity and creativity in several important ways. First, we advance extant research on cognitive team diversity and creativity by not only adding intrinsic motivation as a mediating mechanism to link cognitive team diversity and creativity but also by revealing a positive motivational mechanism that goes beyond the negative ones predicted by social categorization processes in the diversity literature. Second, we advance multilevel theory and research on creativity by examining whether the intrinsic motivation mechanism operates similarly in linking cognitive team diversity with both team and individual creativity. In addition, we integrate cognitive and motivational approaches into creativity by examining the interplay between cognitive team diversity and learning goal orientation. The integration of the two approaches can advance our understanding of creativity beyond what each approach can do alone. Finally, as Zhou and Shalley (2011) suggested, a direction for future research is to test cross-national generalizability of the findings in the creativity-at-work literature. Research shows that Chinese employees tend to avoid expressing different views at work (Wei & Li, 2013), even more than do other Asians such as South Koreans (Onishi & Bliss, 2006); accordingly, it is possible that the effects of perceived cognitive diversity on creativity as well as intrinsic motivation in China may be somewhat different from Wang et al.'s (2016) findings in South Korea. Thus, this research may contribute to the cognitive diversity and creativity literatures by examining the effects of perceived cognitive diversity on creativity via intrinsic motivation in the Chinese context.

THEORETICAL DEVELOPMENT AND HYPOTHESES

Cognitive team diversity and creativity

Scholars (Harrison et al., 2002; van der Vegt & Janssen, 2003) have suggested that a mix of different perspectives within teams may stimulate team members to develop unique ideas. Consistent with this, the information/decision-making perspective notes that differences among team members may bring valuable and complementary task-relevant dissimilarities that may extend the accessible information in diverse teams and thus enhance creativity (Pieterse, van Knippenberg, & van Ginkel, 2011). Conversely, other researchers (e.g., Ancona & Caldwell, 1992) have argued that cognitive team diversity disrupts creativity based on the view that dissimilarity is associated with excessive conflict. For example, the socially shared cognition perspective emphasizes team members' mental representation of the task in understanding team performance (van Knippenberg & Schippers, 2007). It suggests that different views and opinions among team members can disrupt team performance by decreasing the quality of team member interaction and the extent to which task representations are shared (Aggarwal & Woolley, 2013). Moreover, still others (e.g., Shin, Kim, Lee & Bian, 2012) found no significant association between cognitive team diversity and team member creativity.

In light of these mixed findings, interest in moderating variables has surged in recent years, perhaps best captured by van Knippenberg and Schippers (2007, p. 518): "It seems time to declare the bankruptcy of the main effects approach and to argue for models that are more complex and that consider moderating variables in explaining the effects of diversity." Following this call, some studies have demonstrated that the effect of cognitive team diversity on creativity is enhanced when team members collectively engage in more perspective-taking (Hoever et al., 2012) and when the creative self-efficacy of individuals or transformational leadership is high (Shin et al., 2012). Conversely, the effect is mitigated when team members are involved in customary tasks in research and development (R&D) teams, such as prototyping, basic design, and pilot production (Kratzer, Leenders, & van Engelen, 2006).

Several studies have also examined the intervening mechanisms between cognitive team diversity and creativity. For example, the elaboration of task-relevant information, which denotes the exchange, discussion, and integration of ideas, knowledge, and insights pertaining to the assigned tasks, mediates the relationship between cognitive team diversity and quality of innovations (Kearney & Gebert, 2009) and team creativity (Hoever et al., 2012). Although these studies have substantiated the important role of a cognitive mechanism, the question remains whether different perspectives within a team could enhance intrinsic motivation and thus enable more creativity. Therefore, despite the importance of cognitive team diversity and creativity for organizations (Shin et al., 2012), when and how cognitive team diversity influences creativity are not yet well understood.

Perceived cognitive diversity and intrinsic motivation

Individual intrinsic motivation refers to the extent to which individuals "engage in work primarily for its own sake, because the work itself is interesting and engaging" (Amabile, Hill, Hennessey, & Tighe, 1994, p. 950). Team intrinsic motivation can be defined as the collective level of engagement and interest in work among team members (Wang et al., 2016). Team intrinsic motivation differs somewhat from individual intrinsic motivation in that the latter is concerned about independent experiences in their jobs, whereas the former is concerned with the shared experiences of everyone working together. Through regular social interaction, coordination, and collaboration with others, team members can develop a shared belief about team experiences, such as how much team members generally enjoy doing team tasks (Morgeson & Hofmann, 1999).

According to Deci and Ryan (1985), contextual factors can enhance intrinsic motivation if they provide relevant information that boosts enthusiasm for doing the job well. When team members are exposed to various ways of thinking, knowledge, and skills relevant to their tasks (i.e., a team high in perceived cognitive diversity), they may feel stimulated and find solving complex problems as a team to be enjoyable. However, as previously discussed, diverse perspectives may also cause conflict among team members and thus weaken the feeling of team enthusiasm. Further, prior studies have noted that perceived dissimilarity in deep-level variables (i.e., work-style) can actually lower employee tendency to engage in perspective-taking (Williams, Parker, & Turner, 2007), potentially limiting the extent to which they actually learn from others. Indeed, the mixed findings highlighted above support the so-called double-edged sword of diversity effects (Pelled, Eisenhardt, & Xin, 1999).

These mixed results suggest that to actualize the potential benefit of cognitive team diversity for intrinsic motivation, team members working in teams perceived to be cognitively diverse need to be encouraged to build positive team dynamics, such as actively learning from others' different opinions and building on each other's ideas. To extend this line of research, we aim to examine the previously overlooked moderator of learning goal orientation that may enhance or mitigate the relationships between perceived cognitive diversity and intrinsic motivation and creativity.

The moderating roles of learning goal orientation

Drawing on previous studies (e.g., Gong, Kim et al., 2013), we propose that learning goal orientation may serve as a boundary condition that determines whether or not perceived cognitive diversity enhances intrinsic motivation. Learning goal orientation pertains to the extent to which a team or individual emphasizes learning and competence development (Bunderson & Sutcliffe, 2003; Gong, Kim et al., 2013). When team members share a goal of continuous improvement, they are likely to enjoy working with people who employ different ways of thinking and possess unique knowledge and skills, thus increasing intrinsic motivation.

Team learning goal orientation serves as a holistic gauge of the extent, scope, and magnitude of learning behaviors (Bunderson & Sutcliffe, 2003). Teams with a high learning goal orientation encourage their members to engage in the process of uncovering the interests of other members and provide a strong desire to achieve a rich and accurate understanding of team tasks (Pearsall & Venkataramani, 2015). The focus on skill development and the deep understanding of peers and tasks can be associated with the intrinsic motivation for mastering task performance (Janssen & van Yperen, 2004). Indeed, Pearsall and Venkataramani (2015) argued that team learning goal orientation enables teams to overcome conflicting individual goals and enhances team performance.

We propose that team learning goal orientation moderates the relationship between cognitive team diversity and team intrinsic motivation. Specifically, we hypothesize that the effect of team learning goal orientation on the relationship between cognitive team diversity and team intrinsic motivation is an amplifying one. Theoretically, teams with a shared learning orientation that emphasizes learning and competence development tend to pursue new ideas that largely digress from current thinking and practice (Gong, et al., 2013; Turner et al., 2002). As a result, they more likely view a high degree of cognitive team diversity as helpful rather than disruptive. Instead of interpreting different perspectives and opinions as ways to disrupt team performance, team members sharing a strong team learning goal orientation are likely to regard the perceived differences within a team as resources for mutual learning and competence development in the team. Therefore, team learning goal orientation should stimulate team members to enjoy doing their jobs when they perceive high-cognitive team diversity. In addition, a learning goal orientation is positively related to a preference for challenging and demanding tasks (VandeWalle, 1997). Therefore, facing different ideas or perspectives from team members, teams with a higher learning goal orientation should be more enthused and intrinsically motivated to seek out different ideas and develop constructive and integrative solutions (VandeWalle, Cron, & Slocum, 2001).

We also expect that individual learning orientation moderates the effect of perceived cognitive diversity on individual intrinsic motivation. On the one hand, when an individual experiences high-cognitive team diversity, he/she is exposed to diverse ideas, perspectives, and ways of thinking and faces challenges to absorb and apply such diverse cognitive resources. On the other hand, an individual with a high learning orientation likely emphasizes skill acquisition and competence development and is likely to be energized by diverse ideas (Dweck & Leggett, 1988), and thus becomes highly engaged in their tasks. Individuals with a high learning orientation attribute setbacks to the lack of sufficient effort or efficient strategies, and this attribution makes them even more engaged (through persistent searching for better strategies) in the challenging work process (Gong & Fan, 2006). In sum, we hypothesize the following:

Hypothesis 1: Learning goal orientation moderates the relationship between perceived cognitive diversity and intrinsic motivation, such that the relationship becomes stronger as learning goal orientation increases at both individual and team levels.

The indirect effects of perceived cognitive diversity on creativity through intrinsic motivation

Intrinsic motivation has been argued to be one of the most prominent factors that transmit the effects of various contextual factors on creativity (Amabile, 1996). Individuals have unique talents and interests, and their creativity is enhanced by the free exploration of imagination and personal aptitudes (Rousseau, 1974). As a result, individual intrinsic motivation can be an important predictor of their creative performance. Consistent with this premise, Csikszentmihalyi (1988, p. 337) noted that "it doesn't matter how original one is, if one gets bored in their work, it will be difficult that one will become sufficiently interested in it to make a creative contribution." In addition, we propose that the relationship between intrinsic motivation and creativity at the individual level can hold true for the team level. At the team level, team intrinsic motivation helps team members become more enthusiastic for the activities within a team and thus boost team creativity (Wang et al., 2016). In addition, intrinsically motivated team members who tend to enjoy the pleasure of task completion (Amabile, 1996) are more likely to experiment and reflect on unexpected outcomes, which can also enhance team creativity (Amabile et al., 1994).

The preceding discussions cumulatively suggest first-stage moderation effects (Edwards & Lambert, 2007; Figure 1). Specifically, we expected that perceived cognitive diversity and learning goal orientation would interactively affect intrinsic motivation and in turn would be positively associated with creativity at both individual and team levels. Hence, we propose:

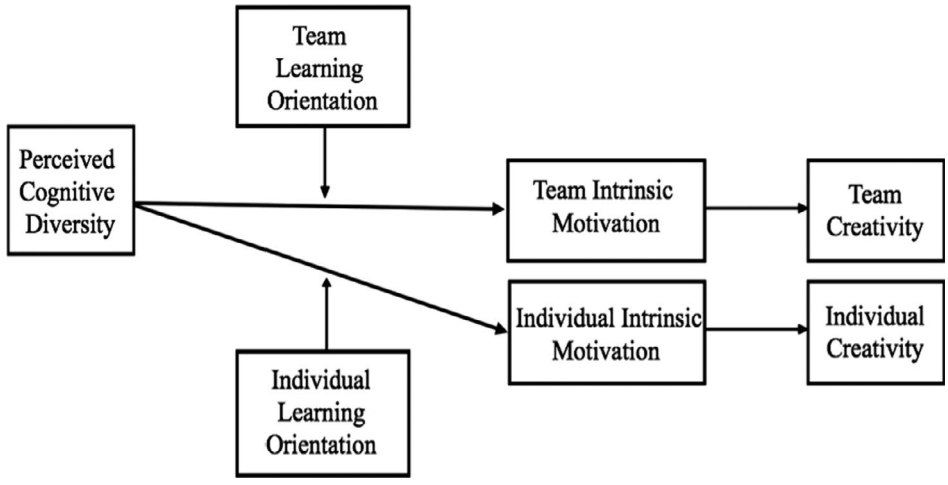

FIGURE 1. Hypothesized model of the process linking perceived cognitive diversity to creativity.

Hypothesis 2: Learning goal orientation moderates the indirect relationship that perceived cognitive diversity has with creativity via intrinsic motivation, such that the indirect relationship is stronger as learning goal orientation increases at both individual and team levels.

METHOD

PARTICIPANTS AND PROCEDURES

We collected data from employees and their supervisors from 106 work teams in 35 organizations. The organizations included 11 service providing companies (e.g., express delivery, property, and traveling), 6 telecommunication companies, 6 manufacturing companies, 4 high-technology companies, 2 financial security companies, 2 sales companies, 3 banks, and 1 construction company. Within each organization, the team tasks were similar (e.g., product sales and delivery service for a sales company, express delivery for a service company, technical and administrative support for a telecommunication company, etc.). The third author obtained the participation of these organizations through a list of companies that cooperate with his university. This author contacted 193 teams (supervisors) in the 35 organizations, with 106 supervisors agreeing to participate in the study (response rate for supervisors = 55%). All work teams formed the smallest functional unit in the organization, and the team members with no direct subordinates reported to the same supervisor and worked together on a steady basis.

All team members were asked to participate in the survey. The response rate for the team members was 82%, ranging from 75% to 100% in the team response rate. The participants were informed that the survey was voluntary and were assured of the anonymity of their responses. All of the participants were assigned pre-coded questionnaires to match the subordinate– supervisor surveys. The surveys were completed during working hours. Team members evaluated their own levels of intrinsic motivation as well as their teams' intrinsic motivation, cognitive team diversity, individual and team learning goal orientation, and team elaboration of task-related information. Team leaders assessed creativity at the individual–subordinate and team levels. All respondents were provided with a financial incentive to encourage participation.

Among the 468 member–leader pair surveys distributed, 382 complete ones were returned from 106 teams. Of the team members, 40% were female, the average age was 30.4 years (SD = 5.9), average team tenure was 4.0 years (SD = 2.7), and average organizational tenure was 5.4 years (SD = 5.3). For the supervisors, 23% were female, the average age was 37.4 years (SD = 6.1), and average organizational tenure was 8.6 years (SD = 5.2).

MEASURES

The surveys were developed in English and then translated to Chinese, following Brislin's (1986) back-translation procedure. Specifically, two bilingual individuals independently translated the survey from

English to Chinese (consolidating their differences collectively), and all translators were blind to the study's hypotheses. Unless otherwise specified, all variables in this study were assessed on a seven-point Likert scale (where 1 = "Strongly disagree" and 7 = "Strongly agree").

Perceived cognitive diversity

We assessed perceived cognitive diversity using van der Vegt and Janssen's (2003) four-item measure. Specifically, we asked team members to assess on a seven-point Likert-type scale (1 = "To a very small extent"; 7 = "To a very large extent") the extent to which their team members differ (a) in their way of thinking, (b) in how they view the world, (c) in their knowledge and skills, and (d) in their beliefs about what is right and wrong.

Intrinsic motivation

To assess individual intrinsic motivation, we used the five-item scale of Tierney, Farmer, and Graen (1999). We asked team members to indicate the extent to which they are interested and engaged in their current tasks. An example item includes "I am currently engaged in my tasks because I enjoy engaging in analytical thinking." To assess team intrinsic motivation, we adopted the measure of individual intrinsic motivation of Tierney et al. and changed the focal referent from the individual (i.e., "I") to the team (i.e., "our team").

Learning goal orientation

We assessed individual learning goal orientation using Vandewalle's (1997) five-item measure. Sample items included "I am willing to select a challenging work assignment that I can learn a lot from" and "I often look for opportunities to develop new skills and knowledge." For team learning goal orientation, we used the five-item scale of Bunderson and Sutcliffe (2003), which adopted Vandewalle's (1997) measure for individual learning goal orientation. Sample items included "Our team seeks opportunities to develop new skills and knowledge" and "Our team prefers challenging and difficult assignments that teach new things." We aggregated the individual members' responses to process the team-level learning goal orientation.

Individual creativity

We asked the team leaders to assess the individual creativity of their subordinates using Zhou and George's (2001) 13-item scale on a five-point Likert-type scale (1 = "Strongly disagree," 5 = "Strongly agree"). An example item includes "Searches out new technologies, processes, techniques, and/or product ideas."

Team creativity

To assess team creativity, we used Shin and Zhou's (2007) four-item scale and asked team leaders to assess team creativity. The seven-point scale (1 = "Poorly," 7 = "Very much") was used to measure the responses to the following example questions: (a) "How well does your team produce new ideas?"; and (b) "How useful are those ideas?"

Control variables

We included several control variables. First, we controlled for age, sex, and organizational tenure that might influence individual creativity, consistent with prior research (e.g., Shin et al., 2012). In addition, we controlled for several variables at the team level, namely, team size, average team tenure, sex diversity, and organizational tenure diversity, to partial out their potential influences on team creativity, consistent with other studies (e.g., Harrison et al., 2002; Shin et al., 2012). We used the standard deviation for organizational tenure diversity and Blau's index for sex diversity. We also controlled for task interdependence (i.e., "The work I usually do is a group task rather than an individual task") that might significantly influence the creative processes (van der Vegt & Janssen, 2003). Lastly, we controlled for the team elaboration of task-relevant information, referring to the extent to which team members exchange, discuss, and integrate ideas, knowledge, and perspectives that are relevant to a team's task (van Knippenberg, De Dreu, & Homan, 2004). Several scholars (e.g., Hoever et al., 2012; Kearney & Gebert, 2009) demonstrated that team elaboration of task-relevant information represents the cognitive mechanism that links cognitive team diversity and individual and team creativity. We measured this factor using Kearney and Gebert's (2009) four-item measure. Sample items include "The members of this team complement each other by openly sharing their

knowledge." and "The members of this team carefully consider all perspectives in an effort to generate optimal solutions."

ANALYTICAL STRATEGIES

To test the research hypotheses, we used Mplus 7.3 (Muthén & Muthén, 2012) with observed variables. Given that the data are nested within team and organizations, we ran an intercept-only model at the organization level for team-level outcomes, and an intercept-only model at the team and organization level for individual-level outcomes to control for any possible confounding effects of team- and organization-level factors on the tested relationships. To test the indirect relationships that perceived cognitive diversity has with team creativity and individual creativity through intrinsic motivation, we applied the Monte Carlo method to compute confidence intervals (CIs) (Preacher, Zyphur, & Zhang, 2010). In addition, we tested the moderated indirect effects (i.e., whether learning goal orientation moderates the indirect relationships that perceived cognitive diversity has with individual and team creativity through intrinsic motivation) using the Mplus codes provided by Preacher et al. (2010).

RESULTS

PSYCHOMETRIC PROPERTIES OF THE MEASURES

We conducted a confirmatory factor analysis using AMOS 20.0 to evaluate the discriminant validity of the key variables (i.e., perceived cognitive diversity, individual and team learning goal orientation, individual and team intrinsic motivation, team elaboration of task-relevant information, and individual and team creativity). We used three-item parcels for the measures with more than three items to adequately assess the model with the large parameter-to-sample size ratio (e.g., Beauducel & Wittmann, 2005). We evaluated the model fit using the chi-square statistics, comparative fit index (CFI), Tucker–Lewis index (TLI), and root-mean-square error of approximation (RMSEA). The eight-factor model fit the data well (χ^2[224, 382] = 392.75; $p < .01$, CFI = .98, RMSEA = .04, and TLI = .97). Moreover, it fits better than the seven-factor model (i.e., combining team learning goal orientation and individual learning goal orientation, χ^2[231, 382] = 1007.77, $p < .01$, CFI = .89, RMSEA = .09, and TLI = .87), and the six-factor model (i.e., combining team and individual learning goal orientation and combining team and individual intrinsic motivation, χ^2[237, 382] = 1401.45, $p < .01$, CFI = .84, RMSEA = .11, and TLI = .81), combining team learning goal orientation and team intrinsic motivation and combining individual learning goal orientation and individual intrinsic motivation, χ^2[237, 382] = 703.60, $p < .01$, CFI = .93, RMSEA = .07, and TLI = .92). Our results supported the distinctiveness of the constructs used in this study.

We assessed the within-team agreement for perceived cognitive diversity, team learning goal orientation, and team intrinsic motivation based on the within-group inter-rater reliability (rwg) (James, Demaree, & Wolf, 1984) and yielded median values of .89, .91, and .92, respectively. We also calculated intra-class correlations (ICC agreement) to examine whether team membership could significantly explain the variance in individual responses (ICC [1]) and to assess the reliability of team-level means (ICC [2], Bliese, 2000). The ICC1 (ICC2) estimate was .42 (.81) for perceived cognitive diversity, .48 (.84) for team learning goal orientation, and .55 (.88) for team intrinsic motivation. These statistics generally meet the levels found in previous studies on aggregation issues (e.g., Kirkman, Chen, Farh, Chen, & Lowe, 2009). Thus, we aggregated the individual responses to the team level.

DESCRIPTIVE STATISTICS

The means, standard deviations, reliabilities, and correlations are reported in Table 1. The teams worked highly interdependently (M = 5.28). The reliabilities for all measures were acceptable (i.e., $\alpha > .70$). Significant differences were found across organizations in individual learning goal orientation ($F(66, 484) = 2.45$, $p < .01$), individual intrinsic motivation ($F(66, 484) = 2.63$, $p < .01$), and team learning goal orientation ($F(66, 41) = 1.64$, $p < .05$). In contrast, team intrinsic motivation did not display significant differences ($F(34, 41) = 1.04$, *n.s.*). Thus, we controlled for any confounding effects of organization-level factors by allowing a random intercept at the organizational level.

Hypothesis 1 stated that learning goal orientation would moderate the relationship between perceived cognitive diversity and intrinsic motivation, so that the relationship would become positive and stronger as learning goal orientation increased at both individual and team levels. Model 3 in Table 2 shows that the interaction term of perceived cognitive diversity and team learning goal orientation was significant ($\beta = .79$, $p < .01$). Specifically, the simple slope tests showed that the relationship between perceived cognitive

TABLE 1. Means, Standard Deviations, Correlations, and Coefficients for Variables in All Data

1-1: Among Individual-Level Variables

	M	SD	1	2	3	4	5	6
1. Age	30.40	5.90	—					
2. Sex	.40	.49	−.05	—				
3. Organizational tenure	5.36	5.31	.77	−.05	—			
4. Individual learning orientation	5.37	1.08	.05	−.01	.07	(.92)		
5. Individual intrinsic motivation	5.10	1.00	.07	−.01	.14	.69	(.87)	
6. Individual creativity	3.48	.69	−.06	−.03	−.07	.23	.27	(.93)

1-2: Among Team-Level Variables

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Team size	5.42	.82	—									
2. Average team tenure	3.99	2.66	−.04	—								
3. Task interdependence	5.02	.94	.14	.06	—							
4. Organizational tenure diversity	3.28	2.53	−.03	.48	.04	—						
5. Sex diversity	.35	.18	−.02	.07	−.14	.07	—					
6. Team elaboration of task-relevant information	5.02	.83	.07	−.15	.36	−.02	−.04	(.90)				
7. Perceived cognitive diversity	4.17	.66	−.08	.03	.04	.11	.05	.27	(.81)			
8. Team learning orientation	4.92	.69	.04	−.02	.53	−.12	−.11	.52	−.06	(.86)		
9. Team intrinsic motivation	4.87	.91	−.04	−.03	.36	.07	−.06	.78	.26	.53	(.90)	
10. Team creativity	5.05	1.05	−.04	−.12	.09	−.01	−.09	.43	.34	.16	.49	(.89)

Note. 1-1: (N = 382). Reliabilities are in parentheses. For all correlation above |.10|, $p \leq .05$; and above |.12|, $p \leq .01$. 1-2: (N = 106). Reliabilities are in parentheses. For all correlation above |.20|, $p \leq .05$; and above |.25|, $p \leq .01$.

diversity and team intrinsic motivation was positive and significant when team learning goal orientation was high (simple slope = .89, $p < .01$), but was not significant when it was low (simple slope = −.21, *n.s.*). The simple slope results are presented in Figure 2. In addition, Model 3 in Table 3 shows that the interaction term of perceived cognitive diversity and individual learning goal orientation was also significant ($\beta = .34$, $p < .05$). Here, simple slope tests showed that the relationship between perceived cognitive diversity and individual intrinsic motivation was insignificant when individual learning goal orientation was high (simple slope = .14, *n.s.*), but was negative and significant when it was low (simple slope = −.60, $p < .05$). The simple slope results are presented in Figure 3 Thus, Hypothesis 1 received partial support.

Hypotheses 2 predicted that learning goal orientation would moderate the indirect relationship that perceived cognitive diversity has with creativity through intrinsic motivation, such that the indirect relationships become stronger as learning goal orientation increases at both individual and team levels. First, as shown in Table 2 (Model 5), team intrinsic motivation was significantly related to team creativity ($\beta = .48$, $p < .01$) after controlling for team size, team average tenure, task interdependence, organizational diversity, sex diversity, and team elaboration of task-relevant information as well as perceived cognitive diversity, team learning goal orientation, and its interactive term. In addition, the moderated path-analytic procedures showed that the indirect relationship that perceived cognitive diversity has with team creativity through team intrinsic motivation was not significant when team learning goal orientation was low (indirect

TABLE 2. The Effects of Perceived Cognitive Diversity and Team Learning Orientation on Team Outcomes

Variables	Team intrinsic motivation			Team creativity	
	M1	M2	M3	M4	M5
Intercept	2.29**	−.18**	4.50**	2.98**	2.82**
Team size	−.08**	−.06**	−.01**	−.03**	.00**
Average team tenure	−.03**	−.04**	.01**	−.06**	−.03**
Task interdependence	.35**	.07**	.07**	.08**	−.08**
Organizational tenure diversity	.03**	.05**	.03**	.01**	−.01**
Sex diversity	−.12**	−.05**	−.12**	−.53**	−.50**
Team elaboration of task-relevant information					.12**
Perceived cognitive diversity	.33**	.37**	.34**	.53**	.32**
Team learning orientation		.70**	.68**		−.12**
Perceived cognitive diversity × Team learning orientation			.79**		.07**
Team intrinsic motivation					.48**
pseudo R^2	.20**	.40**	.52**	.15**	.32**

Note. (N = 106 teams, 35 companies). *p < .05, **p < .01 (one-tailed).

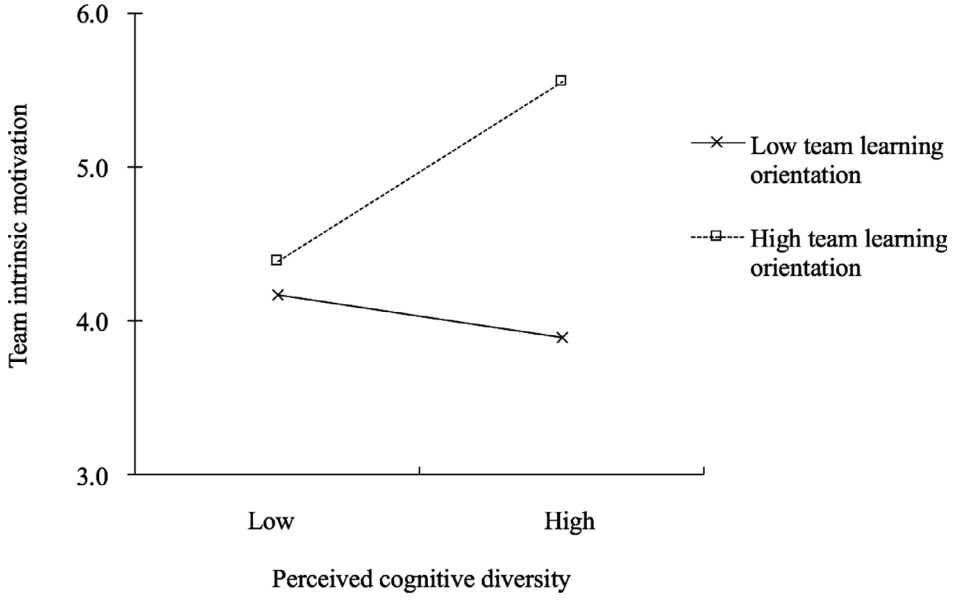

FIGURE 2. Simple slopes of perceived cognitive diversity on team intrinsic motivation at levels of team learning orientation.

effect = −.10, 95% CI = [−.40, .06]) but became significant when it was high (indirect effect = .42, 95% CI = [.11, .86]). The difference in the indirect relationships was significant ($\Delta\gamma$ = .52, 95% CI = [.07, .88]; Figure 3).

On the other hand, as shown in Table 3 (Model 5), the relationship between individual intrinsic motivation and individual creativity failed to reach significance (β = .07, *n.s.*) after controlling for age, sex, organizational tenure, and individual learning goal orientation within-team part as well as other team-level control variables, perceived cognitive diversity, individual learning goal orientation between-team part and its

TABLE 3. The Effects of Perceived Cognitive Diversity and Individual Learning Orientation on Individual Outcomes

Variables	Individual intrinsic motivation			Individual creativity	
	M1	M2	M3	M4	M5
Intercept	3.15**	−.07**	5.47**	1.84**	2.83**
Level-1 variables					
Age	−.01**	−.00**	−.00**	−.00**	−.01**
Sex	.04**	−.00**	−.00**	−.03**	−.03**
Organizational tenure	.01**	.01**	.01**	−.01**	−.01**
Individual learning orientation within-team part		.49**	.50**		−.00**
Individual intrinsic motivation					.07**
Level-2 variables					
Team size	−.04**	.00**	.03**	.07**	.10**
Average team tenure	.02**	.03**	.02**	−.04**	−.02**
Task interdependence	.18**	−.11**	−.13**	.02**	−.24**
Organizational tenure diversity	−.15**	.06**	−.09**	−.07**	−.12**
Sex diversity	−.01**	−.01**	−.00**	.06**	.05**
Perceived cognitive diversity	.18**	−.09**	−.23**	.04**	−.32**
Individual learning orientation between-team part		1.13**	1.16**		1.44**
Perceived cognitive diversity × Individual learning orientation between-team part			.34**		.39**
pseudo R^2	.45*	.58*	.58*	.35*	.37*

Note. (N = 382 individuals, 106 teams, 35 organizations). Results of 34 dummy variables are not included in the table. *p < .05, **p < .01 (one-tailed).

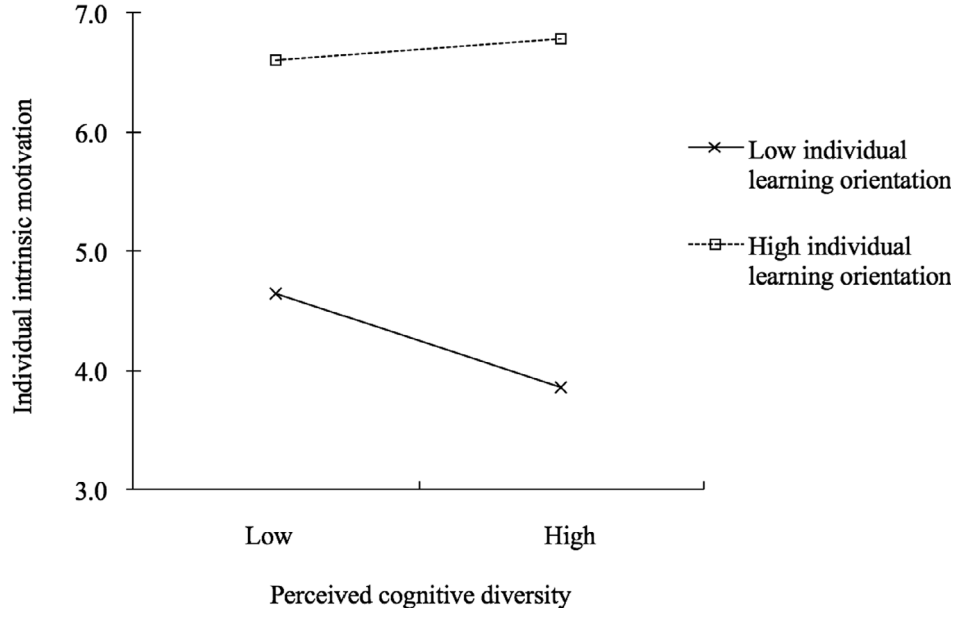

FIGURE 3. Simple slopes of perceived cognitive diversity on team intrinsic motivation at levels of individual learning orientation.

interactive term. The moderated path-analytic procedures showed that the indirect relationship that perceived cognitive diversity has with individual creativity through individual intrinsic motivation was not significant when team learning goal orientation was high (indirect effect = .01, 90% CI = [.01, .026]) but became significant when it was low (indirect effect = −.05, 90% CI = [−.124, −.002]). The difference in the indirect relationships was significant ($\Delta\gamma$ = .06, 90% CI = [.001, .068]). Although 90% CI are less stringent than 95% CI, they are acceptable in multilevel studies with complex data structures (e.g., Gross, Semmer, Meier, Kalin, Jacobshagen, & Tschan, 2011). The model tested (2-1-1 model) contains five research variables (excluding eight control variables) that are tested in a serial moderated mediation path with two levels even controlling for individual learning goal orientation within-team part, which necessitates the conservation of statistical power. Taken together, these results provide support for a team-level moderated mediation effect, and partial support for an individual-level moderated mediation effect.

As a supplementary analysis, we ran a sensitivity test to check the robustness of our findings without controlling for team elaboration of task-relevant information (which is highly correlated to team intrinsic motivation, r = .78). The results showed that all of the significant results remained the same without controlling for team elaboration of task-relevant information. For example, in Model 5 in Table 2, team intrinsic motivation was significantly related to team creativity (β = .55, $p < .01$). All detailed results are available upon request from the authors. In addition, given that there would be variance in individual intrinsic motivation and team intrinsic motivation evaluation among team members, we included both the mean and SD of team-level intrinsic motivation to account for both mean levels and the variability in the team. The results showed that the effect of mean levels of team intrinsic motivation on team creativity remained similar, but the effect of SD levels of team intrinsic motivation on team creativity was not significant (for individual intrinsic motivation, β = .09, *n.s.*; for team intrinsic motivation, β = .20, *n.s.*).

DISCUSSION

Our study provides important theoretical implications for the diversity and creativity literatures and suggests opportunities for more in-depth future studies. First, this study theorizes and tests a motivational mechanism that links perceived cognitive diversity with individual and team creativity. Despite the importance of understanding how cognitive team diversity facilitates creativity, only a few studies (e.g., Hoever et al., 2012; Kearney & Gebert, 2009) have examined the cognitive mechanism. Departing from these studies, our findings suggest that intrinsic motivation can be an important mediating mechanism to link perceived cognitive diversity and team creativity. Our study also demonstrated the incremental predictive power of team intrinsic motivation in linking perceived cognitive diversity and team creativity above and beyond *team elaboration of task-relevant information*. As such, our findings extend the extant research (e.g., Hoever et al., 2012; Kearney & Gebert, 2009) showing that team elaboration of task-relevant information significantly mediates the relationship between diversity and team creativity. These findings suggest that the motivational mechanisms represent a novel and useful addition to the cognitive mechanism regarding how cognitive team diversity influences creativity. In addition, our results suggest that earlier findings on the effects of perceived cognitive diversity on team intrinsic motivation among South Korean employees (Wang et al., 2016) can be generalized to employees in other cultural contexts (i.e., China).

Second, our findings extend the research on perceived cognitive diversity and creativity at a single level (e.g., for team-level creativity, Hoever et al., 2012; Wang et al., 2016; for individual creativity, Shin et al., 2012) by examining the relationships between perceived cognitive diversity and both individual and team creativity. Furthermore, we examined whether the relationships among the same constructs generalize across different levels (i.e., multilevel models in the strict sense, Zhou & Shalley, 2011). Specifically, we contribute to multilevel theory and research on creativity by demonstrating that intrinsic motivation links the relationship between perceived cognitive diversity and both team and individual creativity similarly. In addition, we also demonstrate similar moderating effects on both of these links, thereby enhancing theoretical parsimony.

Highlighting these moderating effects of team learning goal orientation can also enrich the emerging research on team goal orientation. Deviating from studies that indicate that team learning goal orientation is positively associated with team creativity (e.g., Gong, Kim et al., 2013), the current study reveals that team learning goal orientation significantly amplifies the potential benefit of perceived cognitive diversity in team intrinsic motivation and subsequently creativity. Our findings also suggest that team goal orientation research can benefit from the consideration of team types (e.g., cognitively diverse teams) as potential boundary conditions.

Third, the moderating roles of individual and team learning goal orientation also contribute to the current understanding of how motivational processes may interact to shape individual and team creativity. Creativity research has generally examined cognitive and motivational approaches separately (Zhou & Shalley, 2011). In particular, the role of motivational variables as potential boundary conditions has not been substantially examined in the research on perceived cognitive diversity and creativity. We integrated the cognitive (i.e., perceived cognitive diversity) and motivational (i.e., learning goal orientation) approaches and demonstrated that they interact to shape creativity in distinct ways. These motivational variables act as boundary conditions for the cognitive approach and provide a potential explanation for the prior mixed findings (e.g., Pieterse et al., 2011; Shin et al., 2012).

It is noteworthy that contrary to our expectation, the moderating effect of individual learning goal orientation on the indirect relationship between perceived cognitive diversity and creativity through individual intrinsic motivation was not significant. It is plausible that perceived cognitive diversity has equivocal implications for individuals with high learning goal orientation depending on the personal traits of the individuals. For example, even when people emphasize learning and competence development, those with an internal locus of control may not be strongly excited by external factors (e.g., perceived cognitive diversity) to improve their knowledge and skills while those with an external locus of control can be more influenced by others' diverse ideas. Future research should further examine the explanations for this unexpected finding and determine whether the finding is R&D team-specific or generalizable to other types of teams.

PRACTICAL IMPLICATIONS

Alongside its contribution to theory, this study offers several important practical considerations for managers and organizations. First, organizations are increasingly putting together cognitively diverse teams and assigning them innovative tasks, but their success has been mixed. Effectively managing diverse teams is critical to ensure that they are able to reap the benefits of heightened fairness perceptions and sustained competitive advantage (Yang & Konrad, 2011). Our findings suggest that managers who would like to boost creativity in teams with a high level of cognitive team diversity should develop a strong team learning orientation. Without such an orientation, the potential of cognitive team diversity will not be fully unleashed. Managers may enhance team learning goal orientation by showing respect and encouraging the team to share their expertise, intellectually stimulating subordinates, enhancing knowledge sharing, and supporting subordinates to take risks and learn from their mistakes.

In addition, our findings suggest that the formation of cognitively diverse teams may be a beneficial approach to making jobs enjoyable, intrinsically motivating, and to foster creativity, particularly when the jobs are not inherently encouraging based on their inherent requirements. This implication is practically important because not every job can be inherently designed to require high creativity. Nevertheless, every job requires certain levels of creativity to produce better job performance. For example, sales jobs generally do not require high levels of creativity and are not inherently enjoyable, but sellers need to be creative to meet various customer demands. In this case, forming a sales team with perceived cognitive diversity (and encouraging individual and team learning) can help stimulate both intrinsic motivation and creativity. Managers may also wish to foster the growth of perceived cognitive diversity within teams by encouraging employees to seek feedback from diverse sources (e.g., De Stobbeleir, Ashford, & Buyens, 2011). Conversely, when jobs require creativity and are inherently interesting, building cognitively diverse teams may be less necessary. This implication is significant because the perception of perceived cognitive diversity may bring some unintended consequences (e.g., conflict).

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The findings and implications of this study should be interpreted with its limitations in mind. First, we employed a cross-sectional design to test our hypotheses, raising questions on causality. Although we obtained data from multiple sources and levels, it is plausible that high levels of creativity help to foster motivation at both the team and individual level. Furthermore, highly creative teams may cause an employee to perceive that the cognitive diversity is higher than it actually is. Thus, we urge future research to replicate our findings using data gathered at multiple time points.

Second, we did not assess the actual levels of cognitive team diversity among team members, such as diversity in team informational resources (Richter et al., 2012) but instead focused on self-reported perceived cognitive diversity. Although perceived cognitive diversity may have the most direct bearing on motivational and behavioral reactions in teams (Harrison et al., 2002) and is important for team dynamics and

creativity (Shin et al., 2012), the issue of how the actual differences in the cognitive styles of team members would affect individual and team creativity interactively with learning goal orientation, and indirectly via intrinsic motivation remains unclear in the present investigation.

Third, this study did not examine the effects of other types of team goal orientations, such as performance orientation (Gong, Kim et al., 2013). Conceptually, a shared team performance goal orientation generates a preference for high team performance (Weldon, Jehn, & Pradhan, 1991). Teams that have a shared performance goal orientation may enjoy doing their work despite disagreements because of high perceived cognitive diversity. Therefore, future research should investigate how team performance goal orientation affects the relationship among (perceived) cognitive team diversity, intrinsic motivation, and creativity.

In addition, this study examined only team learning goal orientation for creativity as a moderator for the linkage between cognitive team diversity and intrinsic motivation and creativity. Other potential moderators may exist. As previously discussed, cognitive team diversity may not partially generate the expected positive results because it may instigate dysfunctional conflict among team members. If individuals have high levels of emotional competence (i.e., a set of skills that enables them to understand their own and other's emotions and use these emotions to guide one's thinking and actions; Kim, Cable, Kim, & Wang, 2009), then they may be able to more effectively handle the differing opinions and perspectives arising from high-cognitive team diversity within a team and therefore achieve the full potential benefits of cognitive team diversity. Future studies need to examine this prospective moderating effect on the relationship between cognitive team diversity and individual and team creativity.

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