A Dynamic Perspective on the Relationship Between Team Reflection-in-Action and Team Innovation: The Dual Pathway of Cognition and Emotion

Authors: Liu Wei, Shen Xiaoling, Liu Wei

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Abstract

In a complex and dynamic market environment, and against the backdrop of China's innovation-driven strategy, the long-term development of enterprises depends on team innovation to establish unique competitive advantages. A review of existing research on the relationship between team reflection and innovation reveals a black box in this relationship: while theory posits that reviewing the past can generate new ideas and changes, empirical research on the process mechanisms underlying this relationship remains extremely scarce. Building upon this foundation and traditional reflection-on-action concepts, this study proposes conceptual and empirical distinctions for team reflection-in-action, examines the differential effects of reflection-in-action and reflection-on-action across different innovation stages, and dynamically analyzes behavioral outcomes in both idea formation and idea implementation. By integrating motivational information processing theory and the social functions of emotion perspective, it proposes a coupling mechanism between cognitive-level information processing and affective-level team emotions, constructs a comprehensive model of team reflection' s influence on innovation, thoroughly explores the underlying process mechanisms and boundary conditions, and comprehensively analyzes the moderating effects of contextual factors on stage-specific relationships, thereby contributing to both theory and practice in the domain of reflection and innovation.

Full Text

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LIU Wei, SHEN Xiaoling
(School of Business, Central University of Finance and Economics, Beijing 100081, China)

Abstract

In today' s complex and rapidly changing market environment, and against the backdrop of China' s innovation-driven development strategy, enterprises' long-term growth depends on establishing unique competitive advantages through team innovation. A review of existing research on the relationship between team reflection and innovation reveals a theoretical black box: while literature suggests that reviewing the past can generate new ideas and changes, empirical studies examining the underlying process mechanisms remain scarce. Building upon traditional concepts of after-action reflection, this study proposes conceptual and empirical distinctions for team reflection-in-action, examines the differential roles of reflection-in-action and reflection-on-action across various innovation stages, and dynamically analyzes the behavioral outcomes of both idea generation and implementation. By integrating motivated information processing theory with the social functional perspective of emotion, we propose a coupling mechanism between information processing at the cognitive level and team emotion at the affective level. This framework constructs a comprehensive model of how team reflection influences innovation, exploring process mechanisms and boundary conditions in depth, while analyzing the moderating effects of contextual factors at each stage. These contributions aim to advance both theory and practice in reflection and innovation research.

Keywords: team reflection-in-action, team innovation, information processing, team emotional tone, innovation stage process

1. Problem Introduction

Innovation has become a critical manifestation of corporate strength in the contemporary world, with enterprise development depending on employees and teams applying cutting-edge scientific knowledge to innovative development. Since the 18th Party Congress, Chinese enterprises have further strengthened their position as innovation actors, accounting for over 70% of national R&D investment, researchers, and invention patents. As President Xi Jinping stated, "We must adhere to the concept that innovation is the primary driver and talent is the primary resource, implement an innovation-driven development strategy, improve the national innovation system, accelerate independent innovation in key core technologies, and create new engines for economic and social devel-

opment." Consequently, under the innovation-driven strategy, how to promote team innovation has become a hot topic for organizational behavior researchers and practitioners both domestically and internationally (Wei & Zhang, 2018; Yuan et al., 2015; Amabile & Pratt, 2016; Anderson et al., 2014).

To better promote enterprise innovation and help teams rapidly monitor and adapt to changing contexts, numerous enterprises and studies have proposed that teams must create sufficient space across cognitive, social, and temporal dimensions to conduct continuous reflection on goal appropriateness, strategy correctness, process efficiency, and environmental adaptability (Kakar, 2018; Widmer et al., 2009), applying these practices to management processes. Lenovo' s "fu pan"(review) and Huawei's "democratic life meetings"represent typical corporate practices. Given the dynamic nature of environments, teams must adapt to constantly changing external conditions through reflective activities and process large amounts of emergent information during task completion to achieve team effectiveness and generate innovative ideas (Breugst et al., 2018; De Dreu, 2007; Konradt et al., 2016; Makoto, 2016). Therefore, to clarify the psychological processes and motivational foundations of how team reflection influences innovation and explore how "reviewing the old enables knowing the new," this study integrates motivated information processing theory with the social functional perspective of emotion to propose a coupling mechanism between cognitive and emotional pathways, examining the process mechanisms and boundary conditions through which team reflection-in-action and reflection-on-action influence innovation behaviors at different stages (idea generation and implementation).

How exactly does reviewing the old enable knowing the new? Although numerous scholars have theoretically addressed the relationship between team reflection and creativity, empirical testing remains lacking, and few studies have explored process mechanisms and boundary conditions (Wang et al., 2019; Farnese & Livi, 2016). Current enterprise environments are characterized by rapid development, high complexity, and high uncertainty. New organizational forms emphasize platformization, flattening, flexibility, and dynamism, with teams as the primary work mode. Through integrating members' specific knowledge, cognitive abilities, social relationships, and diverse experiences, these teams achieve complex product or service development and implement innovative ideas and methods (Ni & Zhou, 2017; Liang et al., 2018). Previous research has primarily focused on the cognitive functions of reflection, with limited exploration of emotional functions. Swift and West (1998) distinguished between task reflection and social reflection: task reflection involves reviewing and enriching work-related information, facilitating information processing and cognitive processes, while social reflection involves considering team interaction and social processes, positively influencing team climate and member feelings (Widmer et al., 2009). Therefore, this study proposes examining the critical role of reflection in team innovation processes from both cognitive and emotional perspectives.

On one hand, reflection serves important cognitive functions, promoting more effective information processing among team members and facilitating knowl-

edge and idea sharing. Previous research has explored team reflection from cognitive and learning mechanism perspectives, suggesting that reflection encourages members to continuously update and resolve relevant information, discuss task-related issues, and promote constructive interaction processes for task completion (Somech, 2006). On the other hand, reflection activities during team action possess affective functions that previous research has overlooked, helping members "remain true to their original aspiration" and focus on common goals while effectively alleviating conflict and competitive attitudes among members (Suifan et al., 2020). Under intense task and performance pressure, reflection can rekindle and maintain enthusiasm and optimism toward team goals, mobilizing overall team emotional experiences (Ni & Zhou, 2017; Knight & Eisenkraft, 2015), thereby enhancing innovation motivation.

2.1 Conceptual Connotation of Team Reflection-in-Action

Schmutz and Eppich (2017) categorize team reflection into three types: reflection-pre-action, reflection-on-action, and reflection-in-action. Reflection-pre-action occurs before performance events and tasks, focusing on anticipated situations. Reflection-on-action primarily involves post-hoc reflection and learning through reviewing past situations. Reflection-in-action refers to immediate reflection during practical activities, including the on-site presentation, evaluation, reconstruction, and testing of experiential phenomena. During task completion, reflection-in-action focuses on reviewing, understanding, and reinforcing team goals and processes, enabling members to adapt to team processes and information processing (Schön, 1983). Traditional conceptual frameworks of team reflection primarily focus on reflection occurring during downtime—reviewing the past and final performance—largely ignoring the various intense performance events that occur during team action, during which reflective team processes are also needed and generated (Schmutz et al., 2018).

Team reflection-in-action emphasizes that teams periodically review and reflect on goals and processes during action, rather than merely summarizing and introspecting after completion. This form of reflection plays a crucial role in promoting current performance task completion and effectiveness (Schmutz & Eppich, 2017). Reflection-in-action better facilitates information processing during team activities, helps teams effectively resolve difficulties and urgent problems, prevents deviation from goals, and enables timely adjustments. Reflection-in-action and action can switch between each other, with shorter durations, and its results provide timely feedback to help teams adjust and adapt to current situations, improving ongoing task performance. In contrast, reflection-on-action more strongly influences future team outcomes (Schippers et al., 2015).

2.2 Relationship Between Team Reflection and Team Innovation Behavior

Empirical research demonstrates that team reflection promotes team innovation (Wang et al., 2019; Chen et al., 2019; Schippers et al., 2015; Tjosvold et al., 2004). Open review of team goals, strategies, and processes among members contributes to innovative idea generation (Larson & Christensen, 1993; West, 1996). The reflection process improves problem detection and identification (e.g., Bottger & Yetton, 1987; Hirokawa, 1990), environmental assessment and examination (Ancona & Caldwell, 1992), and creative solution formation (Maier & Solem, 1962), all of which are critical for team innovation.

First, team reflection expands intra-team information and cognitive levels, enhancing member communication and thinking. As groups function as information processors, members' proactive and systematic information processing and exchange are crucial (Hinsz et al., 1997). The information-driven nature of teams prompts members to systematically process and analyze problems through exchanging and integrating relevant information, with the level of information-driven processing depending on members' cognitive needs (Kruglanski & Webster, 1996). When teams regularly engage in reflection activities, members jointly review goals, strategies, and processes, which promotes their epistemic motivation for systematic information processing.

Second, team reflection promotes problem detection and identification, enabling detailed attention, critical evaluation, and prevention of groupthink. Reflection is a complex team process comprising diverse behaviors such as questioning, planning, exploratory learning, analysis, comprehensive exploration, knowledge application, meta-learning, using self-awareness to review past events, and reaching consensus with new awareness (West, 2000, p. 4). Reflection requires members to maintain attention to detail, plan progress, raise reasonable questions, and resolve complex problems (Schepers & Wetzels, 2007). Therefore, team reflection prevents conformity and promotes critical evaluation of diverse viewpoints (Schippers et al., 2003), which is key to fostering team creativity.

Finally, team reflection ensures teams can monitor changing environments in real time and respond promptly (Kakar, 2018; West, 2000), providing essential conditions for innovation development. Regular reflection makes teams more sensitive to environmental changes, aware of action outcomes, and capable of innovative adaptation in dynamic contexts (Widmer et al., 2009).

2.3 Influence Mechanism of Team Reflection on Team Innovation Behavior

De Dreu and colleagues proposed motivated information processing theory to define and understand how team members acquire and integrate information during task completion (De Dreu et al., 2008; Nijstad & De Dreu, 2012), suggesting that team contexts influence outcomes through both cognitive and social

mechanisms (Liu & Chen, 2017). In this theory, epistemic motivation and social motivation represent two distinct motivational types that significantly influence individual and team information processing effectiveness. Epistemic motivation refers to individuals' willingness to form comprehensive, rich, and accurate understandings of the world, including current team tasks or problems. Social motivation refers to individuals' tendencies regarding outcome distribution, ranging from pro-self (focusing on personal outcomes) to prosocial (focusing on fairness and collective outcomes) (De Dreu et al., 2008, p. 23). Team activities influence team information processing (Super et al., 2016), with team reflection increasing information volume, re-evaluating information, strengthening epistemic motivation, and establishing prosocial motivation through emphasizing common goals.

At the team level, affective states manifest as shared or consistent emotional reactions among group members (George, 1990). The consistency of members' emotional states to some extent demonstrates that emotion is a phenomenon and state that can emerge at the group level, depending on group characteristics or processes (Ning, 2015; Menges & Kilduff, 2015). Team emotion refers to team members' collective experiences of positive or negative emotions—that is, shared and similar positive or negative emotions among members (Cole et al., 2008; George, 1990). When members communicate sufficiently and face common emotional events, they form shared emotional experiences (George, 1990). Individual emotions in teams positively correlate with team emotions (Ilies et al., 2007). Individuals in work teams often experience highly similar affective states, with similarity high enough to meaningfully aggregate individual affect to the group level (through group averages) to predict group behaviors such as innovative behavior and prosocial behavior (Collins et al., 2013).

Team emotional state formation follows an input-process-state-output pattern (Collins et al., 2013), with primary mechanisms including emotional contagion and affective convergence, manifesting as team emotional tone and affective diversity (Van Kleef et al., 2017). From a social functional perspective (Menges & Kilduff, 2015), emotion is an important mechanism for individual adaptation to groups. A core mechanism through which team emotion influences team outcomes is social integration—the relational bond connecting members to each other and to the group—whereby team emotion achieves group functions by motivating members to focus on group interests and team success. Team members benefit from collective emotional experiences, as emotional signals provide information about environmental or task states (positive emotions signal safety; negative emotions signal problems), thereby influencing behavioral outcomes (George & King, 2007).

2.4 Review of Existing Research

(1) **Lack of empirical testing and indigenous exploration of conceptual connotation and measurement for specific reflection types.** Research on team-level reflection activities has primarily focused on team

reflexivity traits and after-action reflection behaviors. Although many scholars have theoretically addressed the relationship between team reflection and creativity, insufficient research attention has been paid due to the lack of operational definitions for reflection behavior types (Farnese & Livi, 2016). While the correlation between team positive emotion and reflexivity has been verified (Shin et al., 2016), experimental and longitudinal studies are needed to explore the effects and processes of reflection behavior interventions to provide foundations for further research. In practice, Lenovo' s "fu pan" theory and Huawei' s "democratic life meetings" represent Chinese enterprises' practical applications of reflection. Future research should theoretically integrate more effective team learning methods, promote their application, and clarify and expand the conceptual connotation, classification measurement, and differential effects of team reflection through indigenous research.

(2) **Overemphasis on cognitive factors while ignoring emotional factors in reflection' s effect on innovation.** Existing research on reflection' s influence on innovation has concentrated on cognitive factors, whether in problem processing or information integration mechanisms, neglecting the utility of emotional factors in team processes and failing to recognize reflection' s emotional and social functions (Widmer et al., 2009). As a primary social system where members work, teams provide social contexts and climates for information integration and knowledge exchange, serving as important sites for emotion generation that significantly impact team outcomes (Hartel et al., 2006). Examining how coupling mechanisms of cognition and emotion promote team innovation helps open the black box of "how reviewing the old enables knowing the new."

(3) **Failure to capture the dynamic and staged nature of team innovation processes.** Team innovation is a multistage, dynamic complex process where different stages produce differential team interactions and outcomes due to varying task priorities and time pressures (Widmann et al., 2019). Most existing research has not distinguished the different effects of antecedent variables during idea generation versus idea implementation stages (Liang et al., 2018). Anderson et al. (2014) noted that although idea generation and implementation are "inseparable" stages in the innovation process, future research needs to integrate these two distinct sub-stages.

(4) **Unclear contextual and boundary conditions for team reflection' s influence on team innovation at different levels.** Although research on factors influencing team innovation has yielded rich results, integrated models examining contextual factors across different levels remain rare. Reviewing creativity and innovation literature reveals that existing studies have primarily focused on team composition, team processes, and leadership, making it difficult to analyze processes and outcomes influencing team innovation from a multilevel perspective (Anderson et al., 2014; Jiang & Chen, 2016). Examining the mechanisms through which team re-

flection influences innovation across organizational and team contexts represents an important issue urgently needing resolution in organizational behavior research.

3. Research Proposal

This study focuses on the effect of team reflection on team innovation. Based on motivated information processing theory and the social functional perspective of emotion, we propose two mechanisms through which reflection influences innovation and their coupling effects, while integrating and exploring the boundary effects of organizational- and team-level characteristics to enrich research on team innovation promotion (see Figure 1).

Rauter et al. (2018) conceptualize team learning as a construct comprising both cognitive and affective components, where team member interaction and experience sharing can cause changes not only in team-level knowledge and understanding but also fluctuations in emotional and psychological states (Schaubroeck et al., 2016; Sole & Edmondson, 2002). Therefore, teams' shared learning and reflection experiences can produce differential cognitive and affective reactions (Cole et al., 2008). This study focuses on exploring the black box of process mechanisms between reflection and innovation outcomes from both cognitive and emotional perspectives. On one hand, if the influence process follows a dual parallel model of cognition and emotion, then team reflection' s effect on team innovation depends on the respective boundary effects of information processing and team emotion: team reflection can enhance members' epistemic motivation through periodic review to further promote information sharing and processing, while emphasizing common goals to increase prosocial motivation and create positive team emotional tone. On the other hand, cognitive and affective mechanisms may interact, with team reflection activities as key emotional events in teams likely triggering member attention and interaction emotionally, thereby strengthening cognitive processing and outcomes.

Figure 1. Overall Research Model

Based on the overall framework and logic, this study' s main content unfolds in the following areas:

Research Content 1: Meta-analysis of the relationship between team reflection and team innovation

Although research finds that team reflective activities positively influence many team outcomes including team performance (e.g., Schippers et al., 2007; Schippers et al., 2012), team innovation (Schippers et al., 2015; Tjosvold et al., 2004), and team effectiveness (Widmer et al., 2009), some studies have obtained divergent results. Wiedow and Konradt (2011) found no significant correlation between team reflection and team outcomes, and even negative effects (e.g., De Dreu, 2002, 2007; Moreland & McMinn, 2010).

Given the lack of consistent conclusions regarding the relationship between team

reflection and creativity and their influence processes, this study intends to employ meta-analysis to collect relevant empirical studies examining the relationship between team reflection and innovation. Since many studies have not strictly distinguished between team reflection and team reflexivity (Chen et al., 2019; Otte et al., 2017), and research on specific reflection behaviors remains limited, this study will include both team reflection and team reflexivity to examine the relationship between reflective activities and team innovation outcomes, further exploring potential mediators and moderators at team and organizational levels to clarify the cognitive and affective process mechanisms through which team reflection influences innovation.

3.2 Research Content 2: Differential Effects of Reflection-in-Action and Reflection-on-Action

Rauter et al. (2018) propose, based on social cognitive theory (Bandura, 1991), that self-regulatory factors influence the operation of cognitive processing systems. Under conditions of collective effort, team reflection represents and determines this group-level self-regulatory capacity. Specifically, team reflection enhances members' cognitive evaluation of goal achievement through promoting group-level cognitive motivation and responses, while reflection activities promote interaction and cooperation, mobilizing positive emotional experiences regarding the reflection process and current conditions through attention to group outcomes and harmonious relationships. By looking back in order to look forward, reflection-in-action provides psychological space for integrating new knowledge and adapting to changing contexts, with the ultimate goal of optimizing immediate tasks and teamwork in ongoing activities (Schmutz et al., 2018). Therefore, team reflection-in-action enables team members to pause cognitively and affectively from immediate tasks, representing a process that can further promote information processing and interaction. This study proposes a parallel path model of reflection-in-action's influence on team innovation (Figure 2).

Figure 2. Parallel Path Model of Team Reflection-in-Action

Cognitive Path: On one hand, reflection makes teams more creative because it stimulates members' cognitive processing of information, enabling interaction and exchange of ideas about how to work more effectively and complete tasks (Paulus & Yang, 2000). Team reflection-in-action involves critical thinking about various perspectives on task progress, enhancing cognitive information processing to abandon unreasonable, incorrect, or impractical solutions and select better alternatives (De Dreu, 2002; Schippers et al., 2015). When team members recognize gaps between current states and goals, they mobilize continuous thinking and reduce gaps through innovative behavior (Locke & Latham, 2002). Experiential learning (Kolb, 1984) indicates that continuous reflection on experience triggers more advanced and universal action plans—cognitive representations of appropriate task solutions. Therefore, reflection-in-action influences team members' cognitive processing of information by enhancing epistemic

motivation, increasing information sharing and re-evaluation, thereby improving team innovation.

Affective Path: On the other hand, Meier et al. (2016) consider positive reflection an important recovery process that helps individuals build psychological and emotional resources (Ten Brummelhuis & Bakker, 2012). Team reflection-in-action helps members focus on common goals and outcomes, calms them down, rebuilds confidence and motivation, stimulates work enthusiasm, and effectively regulates team emotional states and tone. When members reflect more during task execution rather than after completion, they maintain higher expectations and beliefs about collective success, more easily achieving group effort through firm beliefs and emphasizing common goals, thereby enhancing team innovation (Schippers et al., 2015).

Additionally, cognitive and affective mechanisms may interact in team processes (Figure 3). Team information processing and outcomes may depend on the joint operation of both motivational processes, with optimal individual and team effectiveness occurring when members are driven by high levels of both epistemic and social motivation (Nijstad & De Dreu, 2012). Only through high epistemic motivation to systematically process and integrate information can the information and resource sharing established by group-level social motivation be fully utilized (De Dreu, 2007). Specifically, when conceptualizing motivated information processing theory at the team level (Prussia & Kinicki, 1996), team cognitive responses reflect team cognitive evaluation and investment in goal achievement, while the social functional perspective of emotion indicates (Frijda & Mesquita, 1994) that team affective responses are relational bonds connecting members to each other and to the group (Menges & Kilduff, 2015). As key emotional events in teams, reflection activities likely trigger member attention and interaction emotionally, interactively influencing cognitive information processing and ultimately affecting team innovation.

Figure 3. Interactive Path Model of Team Reflection-in-Action

3.3 Research Content 3: Dynamic Perspective of Reflection-in-Action' s Influence on Innovation Behavior

Liang et al. (2018) empirically validate that team innovation is a multistage complex process including idea generation and idea implementation. The first stage emphasizes exploratory and divergent thinking, while the second shifts toward exploitative and convergent thinking (Amabile et al., 1996; Baer, 2012; West, 2002). Team reflection activities may produce differential team processes and outcomes across innovation stages (Widmann et al., 2019), as shown in Figure 4.

During the **idea generation stage**, teams' primary task is to engage in divergent thinking, generate original ideas, and use these to guide subsequent actions

(Gersick, 1988; Skilton & Dooley, 2010). Idea generation occurs mainly in initial task stages, where members can explore more possibilities without resource limitations, strengthening discussion, mining, and integration of members' experiences and ideas for fuller team knowledge utilization and sharing. Reflection and review during this stage enable members to timely examine and evaluate situations, raise questions and challenges, and promote idea exchange and interaction, which is critical for team innovation (Bottger & Yetton, 1987; Hirokawa, 1990; Somech, 2006).

During the **idea implementation stage**, teams need to select and develop specific ideas to achieve final innovation goals, requiring members to have consistent ideas and actions (Baruah & Paulus, 2009). Implementation occurs mainly in later task stages, where limited resources create time pressure, requiring members to concentrate time and energy on promoting and integrating new ideas (Edmondson et al., 2007). Reflection activities during implementation strengthen members' identification with team goals and strategies, promote mutual trust and understanding, form shared ideas and experiences under time pressure, abandon less promising ideas, and encourage members to strive for success (De Dreu, 2002; Schippers et al., 2015). Reflection during implementation helps members experience 阶段性成果, mobilizes positive feelings, and reduces gaps between goals and reality through innovative behavior (Locke & Latham, 2002).

Figure 4. Moderating Effect Model of Team Innovation Stages

4. Theoretical Construction

This study develops a dynamic process framework of reflection and innovation behavior in teams, exploring the coupling mechanisms of cognitive and emotional pathways and their process effects and boundary conditions across different innovation stages. By expanding processual and dynamic perspectives on teams, we focus on intense group events occurring during ongoing tasks and the reflective team processes that also emerge during task execution (Schmutz et al., 2018).

First, this study theoretically and empirically constructs a dynamic team reflection process, adopting dynamic and systematic perspectives to comprehensively consider differential effects of team reflection on innovation behaviors across stages. By detailing members' activities and processes during task progression, we distinguish between reflection-on-action and reflection-in-action (Schmutz et al., 2018), further differentiate innovation actions into idea generation and implementation stages (Widmann et al., 2019), and establish an integrated model of team information processing and interaction. Previous team reflection research has focused on post-task reflection behaviors, with traditional conceptual frameworks emphasizing reflection during downtime—reviewing past and final performance (Schmutz & Eppich, 2017). This study proposes that reflection-in-action and reflection-on-action may have differential effects and influences on

team tasks and outcomes, requiring in-depth analysis of their conceptual connotations, structural content, and measurement evaluation. Meanwhile, influenced by team and innovation dynamic characteristics, reflection-in-action may produce differential outcomes across innovation stages, necessitating identification of specific stage-based contexts in member interaction processes, including both creative functions during idea generation and innovation outcomes during implementation, to further explore differential reflection effects.

Second, this study establishes a cognitive-emotional coupling mechanism model for team reflection, introducing the emotional perspective into reflection research. Based on information processing and emotion theories, we expand beyond existing cognitive approaches to incorporate team emotion, expecting to enhance explanatory power regarding how reflection influences innovation. Working in teams requires coordinated action because team tasks are highly demanding and complex, requiring members to coordinate and cooperate to integrate efforts toward common goals (Widmer et al., 2009), necessitating both cognitive sharing and emotional integration (Shin et al., 2016). Team learning is a structural process containing both cognitive and affective components (Todt et al., 2018), where member interaction and experience sharing cause changes not only in team-level knowledge and understanding but also fluctuations in psychological processes and emotions (Schaubroeck et al., 2016; Sole & Edmondson, 2002). Therefore, teams' shared learning and reflection experiences produce differential cognitive and affective reactions (Cole et al., 2008). Exploring process mechanism black boxes between reflection and innovation outcomes from both cognitive and emotional perspectives holds important significance for expanding team learning theory. On one hand, if influence processes follow a dual parallel model of cognition and emotion, then team reflection' s effect on team innovation depends on respective boundary effects of information processing and team emotion. On the other hand, cognitive and affective mechanisms may interact, with team reflection activities as key emotional events likely triggering member attention and interaction emotionally, thereby influencing cognitive processing and outcomes. Introducing emotional mechanisms holds important practical significance for advancing team learning and innovation research.

Third, this study proposes an integrated theory of reflection' s influence on innovation processes, combining reflection and innovation research across different levels and stages (Anderson et al., 2014) to reveal influence mechanisms and utility boundaries, improving model explanatory and predictive power. By identifying under what conditions team learning activities can maximize their effectiveness in team operations (Chen et al., 2019), we define boundary conditions for team reflection' s influence on innovation. This includes not only examining team-level conditional factors but also introducing multilevel moderating variables (e.g., organizational structure at the organizational level) to explore how to better utilize, manage, and adjust reflection activities to achieve higher creativity enhancement across different contexts (Wei & Zhang, 2018; Wang et al., 2019). This study intends to balance theoretical depth across multiple levels, employing rigorous research designs combined with team- and

organizational-level contextual conditions to propose model construction and validation. Contextual factors influencing the relationship between team reflection and innovation include both team-level task and team characteristics and organizational-level climate and management practices. The same team activities and behaviors may produce different outcomes due to differences in task stages, team nature, or organizational climate. Therefore, based on 梳理 the coupling mechanisms of emotional and cognitive mediation processes, we comprehensively examine moderating effects of contextual factors across relationships to enhance overall model external validity and real-world explanatory power.

Through constructing this theoretical system, this study makes contributions in three aspects: First, theoretical innovation extends team reflection's influence on innovation from after-action to in-action, from innovation outcomes to innovation process stages, and from cognitive to emotional mechanisms. By specifically distinguishing the connotations and characteristics of reflection-in-action versus reflection-on-action, examining differential effects of cognitive-emotional coupling mechanisms across innovation stages, we expand understanding of team reflection processes and outcomes.

Second, perspective innovation treats team-level learning' s influence on behavior as a black box problem, with motivated information processing theory and emotion' s social functional perspective providing new thinking and theoretical foundations for deeply understanding the reflection-innovation relationship. By analyzing differential effects of team- and organizational-level contextual conditions in this process, we systematically establish an integrated model of team innovation promotion, exploring process mechanisms and boundary conditions of team reflection' s influence on innovation outcomes.

Third, methodological innovation combines depth interviews, questionnaire surveys, and experimental research for cross-validation and multi-faceted demonstration. When conducting surveys and data collection, we employ longitudinal methods to measure team reflection activities, cognitive and social motivation, team emotion and changes, team- and organizational-level contextual variables, and team innovation behaviors in stages. Experimental methods establish and validate causal relationships between variables. Additionally, depth interviews uncover root causes hidden beneath phenomena and variable relationships. This project proposes dynamic and contextual characteristics of reflection' s influence on innovation, employing more comprehensive and scientific methods for analysis and validation to improve research result validity and persuasiveness.

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Note: Figure translations are in progress. See original paper for figures.