

## Research Article

# The Impact of Cognitive Heterogeneity on the Behavioral Integration of the R&D Team: The Perspective of Conflict Management

Hongtao Xie <sup>1</sup>, Yun Song,<sup>1</sup> Chaoxun Cai,<sup>2</sup> and Junwei Zheng<sup>3</sup>

<sup>1</sup>Faculty of Management and Economics, Kunming University of Science and Technology, Kunming, China

<sup>2</sup>The Railway Engineering Research Institution, China Academy of Railway Sciences Corporation Limited, Beijing, China

<sup>3</sup>Faculty of Civil Engineering and Mechanics, Kunming University of Science and Technology, Kunming, China

Correspondence should be addressed to Hongtao Xie; [xhtkmust@kust.edu.cn](mailto:xhtkmust@kust.edu.cn)

Received 6 February 2022; Revised 25 June 2022; Accepted 15 September 2022; Published 22 September 2022

Academic Editor: Jiafu Su

Copyright © 2022 Hongtao Xie et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The impact of team heterogeneity on team effectiveness has received extensive attention. The paper aims to explore the mechanism of the effect of cognitive heterogeneity on behavioral integration in R&D teams. Based on the IPO theory, this study proposed six hypotheses about how cognitive heterogeneity directly and indirectly (via team conflict and conflict management) affect behavioral integration in R&D teams. Using data collected from 383 R&D teams in 326 high-tech enterprises in China, we investigated whether the dimensions of team conflict mediate the relationship between cognitive heterogeneity and behavioral integration and whether the dimensions of conflict management regulate the impact of cognitive heterogeneity on behavioral integration. The results show the following: (1) cognitive heterogeneity has a significant negative impact on the behavioral integration of R&D teams. Task conflict and relationship conflict fully mediate the relationship between cognitive heterogeneity and behavioral integration. (2) Cooperative conflict management positively moderates the impact of cognitive heterogeneity on task conflict and the impact of task conflict on team behavioral integration. (3) Avoidance conflict management reversely adjusts the positive impact of cognitive heterogeneity on task conflict and relationship conflict and the negative impact of relationship conflict on team behavioral integration. The research results can provide theoretical guidance to improve the process management of cognitive heterogeneity R&D teams.

## 1. Introduction

The arrival of the fourth industrial revolution has increased the complexity and changeability of manufacturing technology systems. As a result, enterprise technological innovation increasingly relies on teamwork. In recent decades, there has been increasing significant interest in the key factors affecting team collaboration and team effectiveness, and significant attention has been paid to how heterogeneity affects team collaboration and team effectiveness. For example, the cognitive heterogeneity of research and development (R&D) teams is a key element affecting team performance. In recent years, there has been increased research on the impact of cognitive heterogeneity

on team innovation performance. However, research specific to R&D in this area has not yet reached clear and consistent conclusions. Because the essence of R&D work is knowledge generation, the demands on R&D team for member heterogeneity are increasing as the complexity of the technology system grows. Furthermore, the operation efficiency of R&D team is heavily dependent on team members' interaction behavior. The R&D team performance will be directly affected by the decision participation and benign interaction of team members. Although team heterogeneity is common in many types of teams, the performance of an R&D team is strongly dependent on the team's heterogeneity and behavior integration, and the boundary of the R&D team is well-defined. We can

effectively and precisely grasp the scope of the members, and it is easy to control the error when collecting data. Therefore, this study is very important and valuable to consider the R&D team.

The mechanisms by which heterogeneity influences team behavioral integration is a vital scientific problem that deserves attention. Given the important impact of behavioral integration on organizations, significant research has been conducted on the antecedent elements of this integration at the team level. Chen and Zhang noted that the emotional intelligence of senior leaders and the team is an antecedent variable for the behavioral integration of senior leadership teams [1]. Cheng et al. [2] posited that the team structure can be improved through resources and rules, promoting team-level behavioral integration. Some scholars have explained the differences in team behavioral integration from the perspective of team heterogeneity. He and Wang [3] noted that differences in the behavioral integration of a university leadership team could be explained from the perspective of team identity. Furthermore, Yao and Sun [4] found a significant negative correlation between team heterogeneity and team behavioral integration. Some studies have shown that conflict among team members directly impacts behavioral integration [5], and that cognitive heterogeneity of the team is one of the main causes of team conflict [6].

In previous studies, the relationship between team heterogeneity and team behavior integration is mostly studied from the organizational and leadership levels, however, the perspective of conflict and conflict management have received little attention. Previous studies have explored the mechanisms involved in the formation of heterogeneous team behavioral integration. However, further research is needed to explore the different mechanisms by which team heterogeneity affects such integration. Existing studies have shown that diverse thoughts across cognitively heterogeneous members help them propose multiple solutions, thereby improving innovation performance of the R&D team. Heterogeneity can provide structural advantages to these types of teams [7, 8]. However, cognitive heterogeneity may simultaneously lead to conflicts and contradictions among members, undermining cooperation, and leading to disadvantages in the innovation process [9]. Gaining a deeper appreciation of the perspective of conflict and conflict management can provide the researchers with valuable insight for team behavioral integration of heterogeneous team. From an IPO (input-process-output) perspective, the impact of R&D team heterogeneity (input) on team innovation performance (output) is mainly affected by team process [10]. When heterogeneous team members experience good interaction and cooperation, the team can simultaneously maximize structural and process advantages. Methods for realizing the behavioral integration of the cognitively heterogeneous innovation team play a key role in improving R&D innovation performance. It allows the cognitively heterogeneous R&D team to gain both structural and process advantages.

This study examines the mediating effect of conflict on the team behavioral integration of the heterogeneous team

and the moderating effect of conflict management on the whole process. The new research perspective can inject new thinking into a commonplace question. There remains a lack of effective theoretical guidance on how to improve the level of heterogeneous innovation through team behavioral integration. To address this topic, this study focuses on conflict management. From an IPO (input-process-output) perspective, the impact of R&D team heterogeneity (input) on team innovation performance (output) is mainly affected by the team process [10]. When heterogeneous team members experience good interaction and cooperation, the team can simultaneously maximize structural and process advantages, discussing the impact of team cognitive heterogeneity on team conflict and team behavioral integration from the perspective of team process. This paper proposes that team conflict plays a mediating role between team heterogeneity and behavioral integration. The paper then analyzes the regulatory role of conflict management between cognitive heterogeneity and team conflict, verifies the research hypothesis through empirical analysis, and discusses the research results. Based on the IPO theory, this study proposed six hypotheses about how cognitive heterogeneity directly and indirectly (via team conflict and conflict management) affected behavioral integration in R&D teams. Using data collected from 383 R&D teams in 326 hightech enterprises in China, we investigated whether the dimensions of team conflict mediate the relationship between cognitive heterogeneity and behavioral integration and whether the dimensions of conflict management regulate the impact of cognitive heterogeneity on behavioral integration. The study reveals the mechanism of cognitive heterogeneity affecting team behavioral integration from the perspective of conflict and proposes related countermeasures to improve the level of heterogeneous R&D team behavioral integration. The study also extends and further develops team process theory, helps improve the behavioral integration fragments of heterogeneous innovation teams, and provides theoretical guidance for improving the management of R&D teams. In terms of practical implications, firstly, team task conflict and team behavioral integration are essential factors affecting team creativity in R&D heterogeneous teams, while relationship conflict is the opposite. It means that when dealing with team-level conflicts, we can encourage team members to express different opinions, and there can be arguments based on no harm and no interpersonal conflicts. On this basis, it is more conducive to the creativity of the R&D team. Secondly, on the way of enterprise development and enterprise management, team innovation needs to be paid attention to and cultivated, because innovation is a key factor for the survival and success of enterprises [11]. Managers need to use the internal advantages of enterprises to create more value. The behavioral integration in the team is also a key process to promote innovation. Hence, it is necessary to study the relationship between the antecedents of team behavioral integration and team behavioral integration. This study also provides some practical guidance for the development of heterogeneous R&D teams.

## 2. Theoretical Framework and Hypotheses

*2.1. Cognitive Heterogeneity of R&D Team and Team Behavioral Integration.* Heterogeneity occurs at the statistical population level and at the individual cognitive level [12]. Cognitive heterogeneity refers to individual differences in cognitive variables, including values, attitudes, and beliefs. At the organizational level, team cognitive heterogeneity reflects differences in views and in behavioral preferences among team members on the same topic. Cognitive models determine how individuals view, raise, and solve problems [13]. The cognitive heterogeneity of an R&D team generally reflects the degree of differences in team members' beliefs and preferences about innovation. Cognitive diversity teams outperform homogeneous groups in terms of innovation prerequisites, as well as the ability to absorb and integrate new knowledge and develop new ideas [14, 15]. According to the high-level echelon theory, team heterogeneity may affect team outcomes [16]. Previous studies have indicated that team heterogeneity was positively related to team outcomes. Specifically, Huang et al. studied that heterogeneity (e.g., discipline heterogeneity, cognitive heterogeneity, and organizational heterogeneity) induced by interdisciplinary team cooperation has a significantly positive impact on team innovation performance [17]. A cognitively heterogeneous R&D team means that the personnel bring different views and understandings with respect to the associated work. The resulting collision of different views can provide diversified solutions for problem solving, improving team creativity [15]. However, some researchers came to different results, such as the findings that teams with high heterogeneity may have more disputes and cooperation costs [18]. While the team's cognitive heterogeneity can bring diverse information, it can also blur information and increase frustration, negatively impacting communication and interactions between team members. It can damage team cohesion and a shared understanding of requirements [19].

The concept of team behavioral integration has often appeared in organizational studies through the analyses of enterprise senior management teams. Liu et al. [20] and Qu [21] extended the concept of senior management team behavioral integration to R&D teams. In this context, behavioral integration is an aggregation concept with three dimensions: team cooperation, information exchange, and joint decision-making [22]. A core value of behavioral integration is "sharing" [4]. Yao and Sun [23] proposed that the internal mechanisms of behavioral integration include the dual processes of "harmony with difference" and "harmony through difference." When team members have different opinions or opinions on an issue, members' identification with the team is key to understanding team behavioral integration [3]. The disparities in professional knowledge and skills, thinking mode, global outlook, and judgment of good and wrong are all examples of cognitive heterogeneity in this research. Differences in professional knowledge and skills are particularly important in the decision-making of problem-solving service team. Furthermore, cognitive heterogeneity can aid team members in completing complicated tasks and has a significant impact

on team process and outcomes. Previous research has indicated that differences in professional knowledge and skills might positively or negatively affect team performance [24], implying that the impact of heterogeneous teams on team process results is largely dependent on the team's environment [25].

Williams and O'Reilly [26] found that significant differences in the values and communication patterns of organization members can damage team identity. It can adversely affect communication and cooperation within the team. Therefore, an increase in the cognitive heterogeneity of the R&D team may be associated with a reduction in the members' sense of team identity. It further inhibits the communication and interaction between members, reducing the level of behavioral integration. According to Hambrick et al. [27], while heterogeneity may provide a broader range of cognitive resources for the management team, it may also cause team members to be divided, making the information exchange within the team to be problematic. Therefore, integrating ideas and opinions within the team and reducing negative conflicts are critical. The cognitive heterogeneity of R&D team is likely to have a negative impact on team process under the poor team's environment. This background leads to the following hypothesis:

Hypothesis 1: R&D team cognitive heterogeneity negatively impacts team behavioral integration.

*2.2. The Mediating Effect of R&D Team Conflict.* Team cognitive heterogeneity reflects differences in team members' understanding of the world and modes of thought, including differences in subjective and nontask problems, such as personality, norms, or values. Previous studies have found that cognitive diversity improves team effectiveness, and it is thought to provide more extensive available knowledge for team development [28, 29]. Cognitive diversity can also help deepen the understanding of problems and enhance the ability to solve problems when addressing challenges [29]. During R&D teamwork, team members interact frequently to make decisions, solve problems, and find new innovation points. This frequent interaction can lead to conflicts and contradictions if there are significant differences in values and ways of thinking among team members [30].

Conflict begins when one considers that one's interests are, or are about to be, compromised, where another's actions are considered contrary to one's actions [31]. Because conflict is unavoidable in the organization and has a significant impact on team outcomes (e.g., team process or team creativity), this paper focuses on team conflict to investigate how team conflict affects team process. From the perspectives of organizational behavior and interdisciplinary research [32], conflict can be divided into two aspects, such as the within-person difference and the difference between individuals in the team [33]. This study adopted the concept of between-personal conflict, and it divided team conflict into task conflict and relationship conflict, according to Jehn and Mannix [34]. The task conflict in heterogeneous teams can also be identified as a cognitive conflict, which refers to

conflicts among team members about work contents or plans that result in a succession of frictions. Relational conflict is defined as the friction or antagonism among team members in interpersonal relationship, and sometimes, this type of conflict can also be taken as an emotional conflict [35]. These two conflicts might lead to different behaviors and different outcomes in the team [35, 36]. Cognitive heterogeneity leads to differences in the understanding and views of R&D team members with respect to tasks. Cognitively heterogeneous team members may propose different solutions and paths for the same task [34], leading to task conflicts. As the cognitive heterogeneity of the R&D team increases, the views proposed within the team are more diverse, leading to more pronounced task conflicts. In addition, from a social identity perspective, in a cognitively heterogeneous R&D team, the presence of similar and different opinions held can lead to the classification of team members into different types or small subgroups. Once classified or formed, the needs for self-esteem or self-interest may cause different team members to naturally identify with other members of the same type or subgroup, while depreciating or excluding other groups. It can aggravate conflicts and deteriorate interpersonal relationships among members of different groups, generating relational conflicts [37]. Improving behavioral integration despite this cognitive heterogeneity can help better manage the seriousness of relationship conflict. Thus, we propose the following:

Hypothesis 2a: R&D team cognitive heterogeneity has a positive impact on task conflict.

Hypothesis 2b: R&D team cognitive heterogeneity has a positive impact on relationship conflict.

R&D team behavioral integration is the result of team process [23]. Conflict is an important aspect of that process. Team behavioral integration is a dialectical process, where “difference” and “same” interact [3]. The team members’ attitudes towards differences of opinion determine the direction of team process development. If team members objectively face differences of opinion and communicate and exchange information on a case-by-case basis, mutual communication may be smoother and team members’ participation in decision-making may be improved. It may improve team cooperation and behavioral integration. In contrast, if team members are estranged by differences of opinion, or form fragmented small groups, it may reduce information communication flow, reduce members’ participation in decision-making, damage team cooperation, and generate behavioral unconformity.

Task conflict can result in a heated debate, caused by team members’ differences about the content of work tasks and ideas about completing tasks. It involves rational behavior about objective topics [38]. During task conflict, team member goals may be consistent, with the conflict mainly focusing on the path and method to achieve the goals. As task conflict arises from diverse viewpoints of team members, team members will actively exchange knowledge to better complete the task. Consequently, task conflict has the potential to broaden the knowledge scope of team members

[36, 39]. Therefore, task conflict can help improve the level of information communication and decision-making participation among team members, supporting improved team behavioral integration.

In contrast, relationship conflict refers to interpersonal contradictions among team members, including mutual exclusion and personal attacks. They can be accompanied by anger, frustration, annoyance, and other negative emotions. They reflect the emotional behavior of specific subjects [38]. When there is a relationship conflict, information may be less effectively transmitted between team members because of emotional behavior and expression, making it difficult to ensure the rational implementation of decision made and making the team prone to division. When team members experience the identity as a team member, they are more loyal and cooperative to prevent relationship conflict and then reduce team performance [40]. Team relationship conflicts are common in new risk teams [41, 42], and relationship conflict has also been shown to be deleterious to team effectiveness in team management research [40]. Vanaelst et al. [43] stated that interpersonal emotional conflict is the common reason for team members to leave the organization. Interpersonal emotional conflict has an impact on team stability. Lee et al. [44] suggested that team members may feel strongly different from other team members in terms of social distance when experiencing a relationship dispute, and their perception of collective identity as a group or team may weaken. This way of emphasizing social identity demonstrates that relational conflict weakens team members’ engagement in the cooperation process, and negative emotions and conflict perceptions often impair individual cognition and attention, reducing team members’ ability to accomplish tasks. When team members’ attention is consumed, they are more likely to simplify or reduce the resources for information exchange and processing, limiting team members’ scope of information processing of [45–47] and reducing team behavioral integration. Based on these, the hypotheses proposed are as follows:

Hypothesis 3a: R&D team task conflict positively impacts team behavioral integration.

Hypothesis 3b: R&D team relationship conflict negatively impacts team behavioral integration.

Cognitive heterogeneity does not have a direct linear impact on team behavioral integration. Rather, it can indirectly affect team behavioral integration through task and relationship conflict. Specifically, cognitive heterogeneity can lead to R&D team members having different views and understandings of R&D work [8]. Team members propose different solutions and paths for the same task, and there may be intense debate about the solution paths and methods, resulting in task conflict. However, despite this, because of the consistent goals of team members, task conflict may increase information sharing, joint decision-making, and team cooperation, improving the level of team behavioral integration. In addition, cognitive heterogeneity also means that R&D team members have significant differences in

beliefs, views, values, and other cognitive aspects [26]. These cognitive differences may lead to a sense of team member alienation. R&D team internalization may lead to multiple small groups with different views and values. If different groups are mutually exclusive, it can lead to relationship conflicts and emotional behavior and expression. It can negatively impact information sharing, joint decision-making, and cooperative behavior within the team, thus reducing the team behavioral integration level. It leads to the following hypotheses:

Hypothesis 4a: team task conflict plays a mediating role between team cognitive heterogeneity and team behavioral integration.

Hypothesis 4b: team relationship conflict plays a mediating role between team cognitive heterogeneity and team behavioral integration.

*2.3. The Moderating Effect of R&D Team Conflict Management.* Conflict management refers to a team's holistic understanding of the factors that trigger conflict, conflict cycle, conflict behavior, and conflict management system. The goals of conflict management are not to eliminate conflict but to try to control abnormal factors in the conflict and seek appropriate management methods to maximize the constructive function of conflict [48]. There are many styles of conflict management. Tjosvold et al. [49] divided conflict management into three types: cooperative, competitive, and avoidant. Cooperative conflict management refers to meeting the interests of all parties by promoting cooperation and achieving mutual benefit and win-win results guided by common goals [49]. Competitive conflict management occurs when each party maximizes their own interests, without considering the interests of other parties. Avoidant conflict management means that team members are aware of the presence of conflict, and they avoid and suppress differences to reduce team member friction and ease the tension.

According to the literature on team conflict management, good interaction can help team members to recognize and discuss conflicts publicly rather than avoid or deal with them via competition, which can lead to more effective conflict management [50, 51]. Some scholars believe that positive management strategies, such as problem-solving, cooperation, and collaboration, appear to slow down the destructiveness of some conflicts and enlarge the benefits of some conflicts on team effectiveness, and the effects of passive management tactics, such as adaptation, avoidance, or other aggressive behaviors, including competition and confrontation, appear to be ineffective [52]. The cooperative approach for conflict management can be used to promote common goals and resolve shared interests in team conflicts. However, the stakeholders' goals are negatively connected, which is a core premise in team conflict management. Thus, those who adopt the competitive approach will achieve their own goals at the expense of others' goals under the conflict situation [53]. Besides, avoidance is an attempt and conveys the intention that issues should not be dealt with and

discussed openly [54]. Therefore, how to deal with and manage conflicts may exert the destructive or construction impact [55], representing that the conflict management style has a significant impact on R&D team stability [56]. Appropriate conflict management not only help resolve the short-term conflicts in R&D teams but also has a favorable impact on the team's long-term development [57]. Thus, it is necessary to identify alternative ways to manage and control conflicts rather than eliminate conflicts [48]. The way a team handles conflicts is more important than the conflict itself [18]. According to Tjosvold et al., [49] conflict management is fundamental for team development. In other words, the right conflict management strategy can help teams resolve negative conflicts and achieve positive outcomes [58].

In cognitively heterogeneous R&D teams, cooperative conflict management can promote the cooperation of all parties through a common goal orientation, and it can effectively promote a constructive debate. It can improve the level of task conflict and reduce relationship conflict. When competitive conflict management is adopted, the conflicts between the parties may intensify, promoting constructive debate. However, when the competition is excessive, the conflicts between the members may intensify further, transforming task conflict into relationship conflict. Finally, avoidant conflict management may inhibit the expression of team members' opinions, simultaneously reducing both the benefits and downsides of task conflict and relationship conflict. Based on this, the following hypothesis is proposed, which is based on the premise that H2a is valid.

Hypothesis 5a: the more team members tend to adopt cooperative conflict management, the more significant the positive effect of team cognitive heterogeneity is on task conflict.

Hypothesis 5b: the more team members tend to adopt competitive conflict management, the less significant the positive effect of team cognitive heterogeneity is on task conflict.

Hypothesis 5c: the more team members tend to adopt avoidance conflict management, the less significant the positive effect of team cognitive heterogeneity is on task conflict.

Based on this, the following hypothesis is proposed, which is based on the premise that H2b is valid.

Hypothesis 6a: the more team members tend to adopt cooperative conflict management, the less significant the positive effect of team cognitive heterogeneity is on relationship conflict.

Hypothesis 6b: the more team members tend to adopt competitive conflict management, the more significant the positive effect of team cognitive heterogeneity is on relationship conflict.

Hypothesis 6c: the more team members tend to adopt avoidant conflict management, the less significant the positive effect of team cognitive heterogeneity is on relationship conflict.

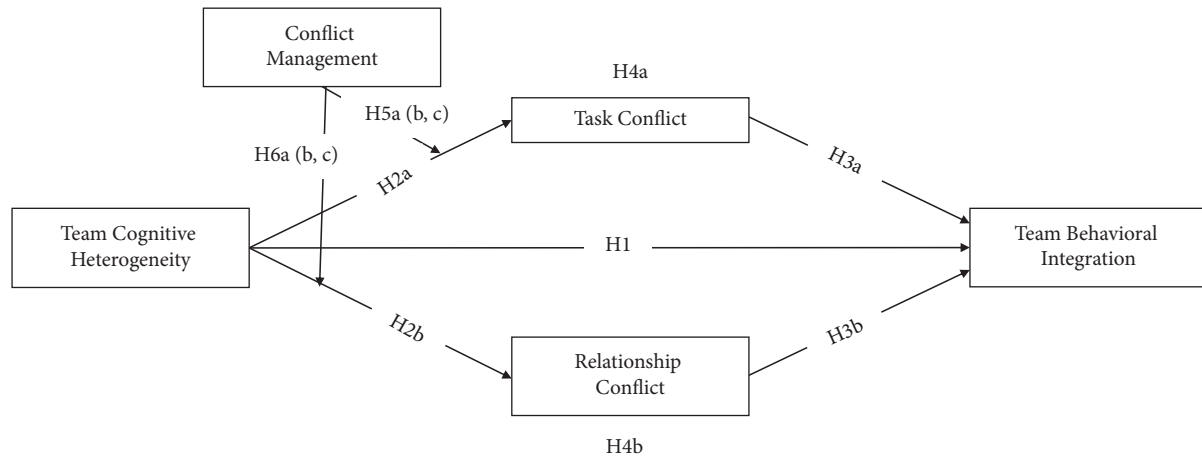


FIGURE 1: Conceptual model.

Taken together, Figure 1 depicts the study’s conceptual model.

### 3. Research Methods

**3.1. Sample and Data Collection.** This study used a “sampling of convenience” method to select hightech enterprises with specialized R&D departments that were willing to participate in the survey. MBA and MEM trainees were used to help obtain R&D team cooperation. To participate, teams need to have at least 5 people and be established for at least 6 months. R&D team leaders or technical leads familiar with the team’s operation were invited to complete the questionnaire. Using this approach, questionnaires were distributed to 433 R&D teams in 326 companies between September and December 2020. A total of 401 questionnaires were recovered at a recovery rate of 92.61%. After removing incorrect attitudes, gaps, omissions, and clear data irregularities and inconsistencies, a total of 383 valid surveys were obtained for a final response efficiency of 95.51%. This study was team focused, and hence, the individual characteristics of team members were not investigated.

The following data provide basic statistical information about the R&D teams. The number of R&D personnel in each team was as follows: 35.25% had 5 to 10 members, 40.73% had 10 to 15 members, 17.02% had 15 to 20 members, 5.53% had 20 to 25 members, and 1.47% had 25 to 30 members. Team formation time was as follows: 17.33% had been together for 6 months to 1 year, 32.12% had been together for 1 to 2 years, 25.51% had been together for 2 to 3 years, 16.40% had been together for 3 to 5 years, and 8.64% had been together more than 5 years. The nature of the enterprises was as follows: 47.56% were state-owned enterprises, 29.18% were private enterprises, and 23.26% were foreign-funded or Sino foreign joint ventures.

#### 3.2. Measures

**Dependent variable.** Behavioral integration was assessed in three dimensions: teamwork, information exchange, and

joint decision-making. These were measured using 12 survey items adapted from Hambrick [22], and Li and Hambrick [59], using a 5-point Likert scoring method.

**Independent variable.** Cognitive heterogeneity was assessed using a four-item measurement scale based on Van der Vegt and Janssen [60]. Using a 7-point Likert scale, items measured the extent to which R&D team members differ in their ways of thinking, knowledge and skills, ways of seeing the world, and perceptions of right and wrong, as perceived by the team lead or technical expert.

**Mediator.** Two dimensions of team conflict were assessed, namely task conflict and relationship conflict. These were assessed using 3 measurement items, adapted from a scale designed by Jehn and Mannix [34], using a Likert 5-point scoring method.

**Moderator.** Conflict management was measured using a scale with three dimensions: cooperative conflict management, competitive conflict management, and avoidance conflict management. They were assessed using 12 items developed by Tjosvold et al. [49], measured using a Likert 5-point scoring method.

**Control variables.** Based on previous studies, the control variables were as follows: *a)* size of R&D team: to control the impact of R&D team size effect on team behavioral integration, the number of members in the R&D teams was controlled between 5 and 30 because previous studies linked team size with team process and results. *b)* Team establishment time, also known as team tenure: only teams that had been together for more than 6 months were included in the study to avoid the impact of too short an establishment time on team behavioral integration [61, 62].

### 4. Research Results and Analysis

**4.1. Variable Reliability and Validity Test.** Cronbach’s  $\alpha$  values were used to assess the internal consistency of the items included in the multi-item scale. A Cronbach’s

$\alpha > 0.70$  for all scales indicated that the data had credibility. KMO and Bartlett's sphericity tests were conducted for each variable. The KMO for cognitive heterogeneity = 0.701, KMO for task conflict = 0.706, KMO for relationship conflict = 0.704, KMO for cooperative conflict management = 0.764, KMO for competitive conflict management = 0.702, KMO for conflict avoidance management = 0.701, and KMO for team behavioral integration = 0.892. High KMO scores indicated that sampling was adequate and significant. Bartlett's spherical test of chi-square significance was also satisfied ( $p < 0.001$ ), indicating that the sample was suitable for factor analysis.

A confirmatory factor analysis was conducted to test the discrimination of each variable. Table 1 shows the results. The one-factor model had the lowest degree of fit ( $\chi^2/df = 4.756$ , CFI = 0.49, IFI = 0.496, RMSEA = 0.138), and the seven-factor model had the highest degree of fit ( $\chi^2/df = 1.658$ , CFI = 0.918, IFI = 0.92, RMSEA = 0.058). It indicated that there was a good level of discriminant validity among the variables.

**4.2. Descriptive Statistics and Correlation Analysis of Variables.** Table 2 presents the means, standard deviations, and correlations between study variables. Several associations between study variables are noteworthy. Firstly, there were significant positive correlations between R&D team cognitive heterogeneity, relationship conflict, task conflict, and competition conflict management. Secondly, cognitive heterogeneity was negatively correlated with cooperative conflict management and team behavioral integration. Thirdly, task conflict was significantly and positively associated with relationship conflict, and there was a significant negative correlation between team behavioral integration and relationship conflict. Team behavioral integration was significantly and positively associated with relationship conflict, cooperation conflict management, and avoidance conflict management. There was no significant correlation between team behavioral integration and competition conflict management. Finally, there were significant correlations between the seven principal variables, indicating the need to test the mediation effect. The following sections examine the significance of these associations.

**4.3. Direct Effect of Cognitive Heterogeneity on Behavioral Integration.** A two-factor structure model was used to verify the main study effect, including an investigation of the overall effect of team cognitive heterogeneity on team behavioral integration. The standardized path coefficient showed that the cognitive heterogeneity of the R&D team had a significant negative impact on team behavioral integration ( $b = -0.103$ ,  $p < 0.05$ ), as shown in Figure 2. It verified hypothesis H1.

**4.4. Mediation Analysis.** To verify the mediating role of team conflict on R&D team cognitive heterogeneity and team behavioral integration, the mediating effect verification method embedded within the structural equation model was needed to demonstrate that the variables were significantly

correlated. Table 2 shows a significant correlation between R&D team cognitive heterogeneity, team conflict, and team behavioral integration. The correlation indicates that there is a relationship between variables, however, it does not explain the causal relationship between variables and the size of the impact. Therefore, based on a correlation analysis of each factor, this study further analyzed the influence of the R&D team's cognitive heterogeneity on team behavioral integration using a structural equation model and tested the mediating effect of team conflict. AMOS23.0 was used to test multiple nested models. The results are shown in Table 3.

Table 3 shows that M1 is a direct effect model: the path is from team cognitive heterogeneity to relationship conflict, and from team cognitive heterogeneity to team behavioral integration. M2 is a partial mediation model. The path is from team cognitive heterogeneity to relationship conflict, and from relationship conflict to team behavioral integration. There is also an increase in the path from team cognitive heterogeneity to team behavioral integration. M3 is a complete mediation model. The path is from team cognitive heterogeneity to relationship conflict, and from relationship conflict to team behavioral integration. The matching index obtained from the analysis shows that the complete mediation model provides a good match. In contrast, the matching index of the direct impact model M1 and the partial mediation model M2 is relatively poor. The principle of model reduction indicates that the complete mediation model M3 is the best matching model. Similarly, M6 is the best matching model when compared with M4 and M5. The path coefficients of M3 and M6 are shown in Figure 3.

Figure 3 shows that team cognitive heterogeneity had a significant positive effect on task conflict and relationship conflict ( $\beta = 0.417$ ,  $p < 0.01$ ;  $\beta = 0.432$ , and  $p < 0.01$ ). Task conflict had a significant positive effect on team behavioral integration ( $\beta = 0.393$ ,  $p < 0.01$ ), and relational conflict had a significant negative effect on team behavioral integration ( $\beta = -0.406$ ,  $p < 0.01$ ). The results verified hypotheses H2a, H2b, H3a, H3b, H4a, and H4b. In summary, task conflict and relationship conflict played a fully mediating role between R&D team cognitive heterogeneity and team behavioral integration.

**4.5. Moderating Effect Test of Conflict Management.** A hierarchical regression analysis was applied to test the moderating effect of conflict management between R&D team cognitive heterogeneity and team conflict. As indicated in Table 4, M7 is the benchmark model that only considers the impact of team cognitive heterogeneity on task conflict. M10 is the benchmark model that only considers the impact of team cognitive heterogeneity on relationship conflict. Based on M7 and M10, M8 and M11 add cooperative conflict management, competitive conflict management, and avoidance conflict management. Compared with the benchmark model, the  $\Delta R^2$  of M8 and M11 significantly increased, indicating that an increase in the three variables of cooperative conflict management, competitive conflict management, and avoidance conflict management improved the explanatory power of cognitive heterogeneity on team conflict.



TABLE 1: Confirmatory factor analysis.

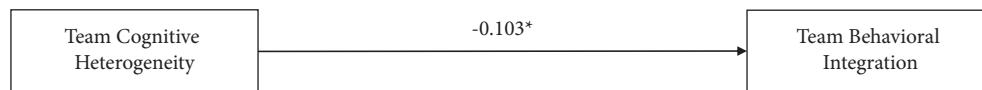
Model	$\chi^2/df$	Gfi	IFI	CFI	RMSEA
Seven-factor model: TCD, RC, TC, COCM, CMCM, ACM, BI	1.658	0.902	0.920	0.918	0.058
Six-factor model: TCD, RC + TC, COCM, CMCM, ACM, BI	1.970	0.867	0.879	0.876	0.070
Five-factor model: TCD, RC, TC, COCM + CMCM + ACM, BI	2.688	0.772	0.784	0.78	0.093
Four-factor model: TCD, RC + TC, COCM + CMCM + ACM, BI	3.759	0.632	0.640	0.634	0.118
Three-factor model: TCD + RC + TC, COCM + CMCM + ACM, BI	4.110	0.570	0.588	0.582	0.126
Two-factor model: TCD + RC + TC + COCM + CMCM + ACM, BI	4.141	0.562	0.581	0.575	0.126
One-factor model: TCD + RC + TC + COCM + CMCM + ACM + BI	4.756	0.478	0.496	0.490	0.138

Note. TCD represents team cognitive heterogeneity, RC represents relationship conflict, TC represents task conflict, COCM represents cooperative new conflict management, CMCM represents competitive conflict management, ACM represents avoidance conflict management, and BI represents behavioral integration.

TABLE 2: Descriptive statistics and correlation coefficient of variables.

Variable	Mean	S.D.	1	2	3	4	5	6	7
1. Cognitive heterogeneity	3.043	0.723	1						
2. Relationship conflict	3.127	0.719	0.512**	1					
3. Task conflict	3.214	0.683	0.483**	0.675**	1				
4. Cooperative conflict management	3.574	0.612	-0.185*	-0.319**	-0.201*	1			
5. Competition conflict management	3.112	0.568	0.374**	0.398**	0.425**	-0.117	1		
6. Avoidance conflict management	3.434	0.534	0.021	-0.084	-0.030	0.197**	0.241**	1	
7. Team behavioral integration	3.581	0.513	-0.162*	-0.374**	0.213**	0.532**	0.013	0.419**	1

Note.  $N = 198$ ; S.D. = standard deviation. \* $p < 0.05$ ; \*\* $p < 0.01$ .



Note. \* $p < 0.05$ .

FIGURE 2: Direct effect of cognitive heterogeneity on behavioral integration.

M9 and M12 added the product terms of cooperative conflict management, competitive conflict management, avoidance conflict management, and cognitive heterogeneity, based on M8 and M11, respectively. M9 and M12 tested the moderating effects of cooperative conflict management, competitive conflict management, and avoidance conflict management. All variables in M9 explained at least 53.3% of the change in task conflict, an increase of 10.4% over M8. The regression coefficient of interaction between cooperative conflict management and cognitive heterogeneity was 0.195, with a  $p$ -value  $< 0.1$ . The regression coefficient of interaction between avoidance conflict management and cognitive heterogeneity was  $-0.107$ , with a  $p$ -value  $< 0.05$ . Therefore, cooperative conflict management positively moderated the impact of cognitive heterogeneity on task conflict, verifying H5a. The moderating effect of competitive conflict management on cognitive heterogeneity and task conflict was not significant, and H5b was not supported. Avoidance conflict management had an inverse regulatory impact on the relationship between cognitive heterogeneity and task conflict, supporting hypothesis H5c.

All variables in M12 explained at least 51.2% of the change in relational conflict, which was 9.2% higher compared to M11 in explaining the change of relational conflict. The regression coefficient of the interaction between cooperative conflict management and cognitive heterogeneity

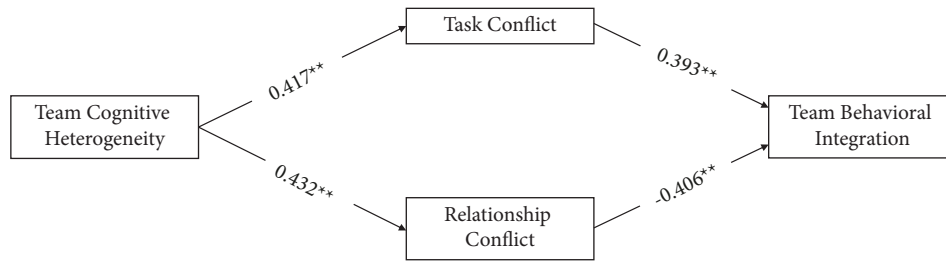
was  $-0.093$ , at a  $p$ -value  $> 0.1$ . The regression coefficient of interaction between competitive conflict management and cognitive heterogeneity was 0.162, which was also at a  $p$ -value  $> 0.1$ . The regression coefficient of the interaction between avoidance conflict management and cognitive heterogeneity was  $-0.186$  at a  $p$ -value  $< 0.01$ . Therefore, the moderating effect of cooperative conflict management on cognitive heterogeneity and relationship conflict was not found to be statistically significant, and hypothesis H6a was not verified. The moderating effect of competitive conflict management on cognitive heterogeneity and relationship conflict was not statistically significant, failing to support hypothesis H6b. Avoidance conflict management negatively moderated the impact of cognitive heterogeneity on relational conflict, verifying hypothesis H6c.

To demonstrate the moderating effect of cooperative conflict management and avoidance conflict management, cooperative conflict management and avoidance conflict management were grouped into subgroups at high and low levels. It was done to describe the impact of cognitive heterogeneity on task conflict and relationship conflict under different conflict management levels, as shown in Figure 4(a) and 4(b). Figure 4 shows that when the cooperative conflict management level was high, the positive impact of cognitive heterogeneity on task conflict was stronger compared to low cooperative conflict. When avoidance conflict management



TABLE 3: Comparison of matching indices between structural equation models with mediating effect.

Models	$\chi^2/df$	Gfi	IFI	CFI	RMSEA
M1 (Direct effect model): TCD→RC; TCD→BI	3.545	0.712	0.810	0.782	0.092
M2 (Partial mediation model): TCD→RC→BI; TCD→BI	2.413	0.810	0.899	0.854	0.078
M3 (Complete mediation model): TCD→RC→BI	1.957	0.917	0.931	0.922	0.061
M4 (Direct effect model): TCD→TC; TCD→BI	4.031	0.691	0.723	0.711	0.109
M5 (Partial mediation model): TCD→TC→BI; TCD→BI	3.031	0.827	0.863	0.843	0.097
M6 (Complete mediation model): TCD→TC→BI	2.154	0.901	0.496	0.49	0.083



Note. \*\*  $p < 0.10$ .

FIGURE 3: Influence path of team cognitive heterogeneity on team behavioral integration.

TABLE 4: The moderating effect of conflict management between cognitive heterogeneity and team conflict.

Variables	TC			RC		
	M7	M8	M9	M10	M11	M12
TCD	0.408**	0.387**	0.372**	0.427**	0.411**	0.397**
COCM		0.247**	0.218**		-0.139	-0.104
CMCM		-0.073	-0.064		0.267	0.241
ACM		-0.104*	-0.091*		-0.112**	-0.109**
COCM*TCD			0.195**			-0.093
CMCM*TCD			-0.083			0.162
ACM* TCD			-0.107*			-0.186**
$R^2$	0.403	0.429	0.533	0.398	0.420	0.512
$\Delta R^2$		0.026	0.104		0.022	0.092
F	5.163**	7.544**	9.316**	4.476**	6.732**	9.841**

Note. \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ .

level was high, the positive impact of cognitive heterogeneity on relational conflict was weaker compared to the level of avoidance conflict management. The results of hypotheses testing were finally summarized in Table 5.

### 5. Discussions

5.1. Findings. Based on previous research, this paper established a conceptual model of the impact of the cognitive heterogeneity of R&D teams on team behavioral integration. The study proposed a series of research hypotheses on the mediating role of team conflict and the moderating role of conflict management. The results of the empirical study show that some of the hypotheses were verified, with the following main findings.

- (1) The cognitive heterogeneity of R&D teams has a significant negative impact on team behavioral integration. The empirical findings suggest that cognitive heterogeneity brings diverse solutions to R&D teams but adversely affects the quality of

communication and cooperation among team members. It helps explain the difficulties R&D teams may have in gaining both structural and process advantages in the innovation process [9].

- (2) Task conflict and relationship conflict fully mediate the effect of cognitive heterogeneity in R&D teams on team behavioral integration. Cognitive heterogeneity in R&D teams can stimulate team members to engage in high-quality arguments about solutions to R&D tasks, positively affecting team behavioral integration. However, it can also divide the team into multiple subgroups and create antagonistic conflicts among members, negatively affecting behavioral integration.
- (3) Cooperative conflict management positively moderates the effect of cognitive heterogeneity on task conflict. Avoidant conflict management inversely moderates the effect of cognitive heterogeneity on task conflict and relational conflict. Cooperative conflict management facilitates task conflict by

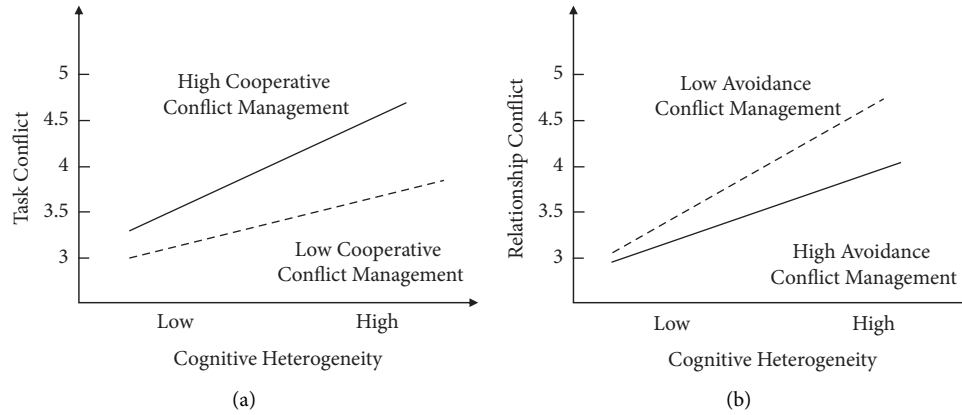


FIGURE 4: Moderating effect of conflict management on cognitive heterogeneity and team conflict. (a) Moderation of cooperative conflict management. (b) Moderation of avoidance conflict management.

TABLE 5: Verification results of moderating effect hypothesis.

Hypothesis	The contents of the hypothesis	Verified results
H5a	The more the team members tend to adopt cooperative conflict management, the more significant the positive effect of cognitive heterogeneity on task conflict.	Support
H5b	The more the team members tend to adopt competitive conflict management, the less significant the positive effect of cognitive heterogeneity on task conflict.	Nonsupport
H5c	The more the team members tend to adopt avoidance conflict management, the less significant the positive effect of cognitive heterogeneity on task conflict.	Support
H6a	The more the team members tend to adopt cooperative conflict management, the less significant the positive effect of cognitive heterogeneity on relational conflict.	Nonsupport
H6b	The more the team members tend to adopt competitive conflict management, the more significant the positive effect of cognitive heterogeneity on relationship conflict.	Nonsupport
H6c	The more the team members tend to adopt avoidance conflict management, the less significant the positive effect of cognitive heterogeneity on relationship conflict.	Support

guiding benign arguments among team members through common goals. In contrast, avoidant conflict leads to an inhibitory and evasive approach to addressing disputes among team members, simultaneously reducing task conflict and relational conflict.

- (4) According to the testing results of the moderation effect hypothesis, H5b, H6a, and H6b are not supported. The data were collected in China, a country with a strong collectivism culture that contrasts with the culture that the conflict management theories assume [63, 64]. According to the examination result of H5a, in the high collectivism cultural setting, the radical competition management approach for task conflict is not significant in R&D teams with cognitive diversity. Based on the findings of H6a and H6b, when relationship conflict emerges as a result of the cognitive diversity in teams, the inability to take a construction and aggressive approach to addressing the problems suggests that the relationship conflict has hindered the team from engaging the process of good interaction and development. Conflict avoidance management reduces relational conflict caused

by the team's cognitive heterogeneity, implying that in some situations, focusing on facilitating information exchange or decision-making will not be sufficient. A proper reduction in team relationship conflict will provide a constant source of motivation for the team's subsequent healthy development.

*5.2. Theoretical Implications.* Firstly, this study contributes to the conflict management literature from the perspectives of cognitive heterogeneity and focusing on R&D team context. This study identifies the effect of cognitive heterogeneity on task and relationship conflict management. The prior research on conflict management has focused on the personal, emotional, behavioral, and contextual factors to affect conflict management [65, 66]. The existing conflict management literature has also focused on the contexts of work teams [67], top management teams (TMTs) [68], project teams [65], etc. The cognitive heterogeneity is critical to conflict management in R&D team. However, it is ignored in the past. This study investigated and found the positive relationship between cognitive heterogeneity and team conflict management in the R&D team context and found

the moderating effects of different conflict management approaches, including cooperative and avoidance strategies.

Secondly, on the basis of the IPO model, this study identifies the impacts of cognitive heterogeneity and conflict management on behavioral integration, contributing to behavioral integration literature. In the past, scholars mainly investigated the mechanisms for behavioral integration from TMTs' perspective [69, 70] and based on the upper echelons theory [71]. However, less research focused on the effects of team heterogeneity and conflict management. Thus, this study found that task conflict played the positive mediation role between cognitive heterogeneity and behavioral integration, as well as that relationship conflict exerted the negative mediation role in this relationship.

*5.3. Management Implications.* Based on the results of the empirical study and the main findings, the following insights are presented for those managing heterogeneous R&D teams.

- (1) Cognitive heterogeneity does not necessarily lead to improved innovation performance in R&D teams. While cognitive heterogeneity brings structural advantages, it may also bring process disadvantages. It highlights the need to strengthen the process management of cognitively heterogeneous R&D teams, which, in turn, should help improve the behavioral integration of these teams.
- (2) Cognitive heterogeneity can trigger both task and relationship conflict among R&D team members. Both types of conflicts coexist [72]. Team task conflict positively affects team behavioral integration, while relationship conflict negatively affects team behavioral integration. To improve behavioral integration in R&D teams, the focus should be on enhancing task conflict among team members and decreasing relationship conflict using appropriate conflict management strategies.
- (3) Cooperative conflict management promotes task conflict in teams and helps improve the level of behavioral integration in R&D teams. Therefore, when managing these heterogeneous teams, encouraging cooperative conflict management can help maximize constructive conflict and improve process efficiencies [49]. Avoidance conflict management can reduce the level of relational conflict in R&D teams and inhibit the negative effects of relational conflict on team behavioral integration. When there are small groups within R&D teams and there is serious intergroup antagonism, avoidance conflict management is not necessarily a less effective management tool. However, while avoidance conflict can reduce the level of relational conflict in teams, it can also inhibit productive task conflict, reducing constructive conflict.

*5.4. Limitation and Future Research.* This study makes significant contributions to the field of team management. However, there remain some limitations that deserve attention in future research. Firstly, this research focuses on

R&D teams in high-tech enterprises in China. Future research should investigate teams in high-tech enterprises in other countries. Secondly, there are many types of team heterogeneity. This paper focuses on the impact of cognitive heterogeneity on the behavioral integration of R&D teams. Future studies should consider both knowledge heterogeneity and other antecedents affecting team effectiveness. Thirdly, a questionnaire survey was used as a data source for data collection. This method has some limitations, limiting the availability of some factors in data collection. Future studies could use case analysis or interviews to improve the research. Fourth, the object of this study includes R&D teams of hightech enterprises, limiting the universality of the research results. Future research should explore more meaningful representative teams and compare the results with this study to assess the universality of the conclusions.

## 6. Conclusions

The perspective of the effect and mechanism of team heterogeneity on behavioral integration in the R&D team context is less prevalent. This study investigated and tested the underlying mechanism of cognitive heterogeneity and behavioral integration through the data of 383 R&D teams collected from hightech enterprises in China. The results indicated that cognitive heterogeneity could increase the behavioral integration via task conflict and decrease the behavioral integration via relationship conflict. Furthermore, cooperative conflict management approach could facilitate the relationship between cognitive heterogeneity and task conflict. Avoidance conflict management approach would weaken the positive effects of cognitive heterogeneity on task and relationship conflicts. These findings provide insights into heterogeneity cognitive improvement, conflict management, and the integration of team members' behaviors for R&D teams.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

## Acknowledgments

This study was funded by National Natural Science Foundation of China (Grant nos. 72162026, 72161021, and 71942006), Technical Research and Development Plan Project of China Academy of Railway Sciences Group Limited Company (Grant no. 2051YF7301), and Research Project of the Construction and Operation Mechanism of the National Sichuan-Tibet Railway Technology Innovation Centre (Grant no. 2020JDR0396).

## References

- [1] Q. Chen and Q. J. Zhang, "Research on the impact of executives' EQ on team behavior integration," *Leadership Science*, vol. 23, pp. 28–32, 2014.
- [2] J. Cheng, H. Q. Bai, and D. Liu, "How CEO promotes behavioral integration of top management team: an explanation based on structuration theory," *Management World*, vol. 2, pp. 159–173, 2017.
- [3] L. J. He and Y. F. Wang, "Research on the behavior integration of university leadership team: team cognitive perspective," *Hebei Acad. J.*, vol. 30, pp. 190–193, 2010.
- [4] Z. .. Yao and H. Sun, "Study on the relationship between top management team composition and behavior integration," *Nankai Bus. Rev.*, vol. 13, pp. 15–22, 2010.
- [5] M. Magni, L. Proserpio, M. Hoegl, and B. Provera, "The role of team behavioral integration and cohesion in shaping individual improvisation," *Research Policy*, vol. 38, no. 6, pp. 1044–1053, 2009.
- [6] A. C. Mooney and J. Sonnenfeld, "Exploring antecedents to top management team conflict: the importance of behavioral integration," *Academy of Management Proceedings*, vol. 2001, no. 1, pp. 11–16, 2001.
- [7] T. Simons, L. H. Pelled, and K. A. Smith, "Making use of difference: diversity, debate, and decision comprehensiveness in top management teams," *Academy of Management Journal*, vol. 42, no. 6, pp. 662–673, 1999.
- [8] S. J. Shin, T. Y. Kim, J. Y. Lee, and L. Bian, "Cognitive team diversity and individual team member creativity: a cross-level interaction," *Academy of Management Journal*, vol. 55, no. 1, pp. 197–212, 2012.
- [9] K. Lovelace, D. L. Shapiro, and L. R. Weingart, "Maximizing cross-functional new product teams' innovativeness and constraint adherence: a conflict communications perspective," *Academy of Management Journal*, vol. 44, no. 4, pp. 779–793, 2001.
- [10] F. Homberg and H. T. M. Bui, "Top management team diversity: a systematic review," *Group & Organization Management*, vol. 38, no. 4, pp. 455–479, 2013.
- [11] W. Bartlett and V. Bukvič, "Barriers to SME growth in Slovenia," *MOCT-MOST: Economic Policy in Transitional Economics*, vol. 11, no. 2, pp. 177–195, 2001.
- [12] R. C. Anderson, D. M. Reeb, A. Upadhyay, and W. Zhao, "The economics of director heterogeneity," *Financial Management*, vol. 40, no. 1, pp. 5–38, 2011.
- [13] D. A. Carter, B. J. Simkins, and W. G. Simpson, "Corporate governance, board diversity, and firm value," *The Financial Review*, vol. 38, no. 1, pp. 33–53, 2003.
- [14] W. M. Cohen and D. A. Levinthal, "Absorptive capacity: a new perspective on learning and innovation," *Administrative Science Quarterly*, vol. 35, no. 1, pp. 128–152, 1990.
- [15] M. Garcia Martinez, F. Zouaghi, and T. Garcia Marco, "Diversity is strategy: the effect of R&D team diversity on innovative performance," *R & D Management*, vol. 47, no. 2, pp. 311–329, 2017.
- [16] A. K. Lui, C. K. Lo, and E. W. Ngai, "Does mandated RFID affect firm risk? The moderating role of top management team heterogeneity," *International Journal of Production Economics*, vol. 210, pp. 84–96, 2019.
- [17] S. Huang, J. Chen, L. Mei, and W. Mo, "The effect of heterogeneity and leadership on innovation performance: evidence from university research teams in China," *Sustainability*, vol. 11, no. 16, p. 4441, 2019.
- [18] S. Paul, P. Seetharaman, I. Samarah, and P. P. Mykytyn, "Impact of heterogeneity and collaborative conflict management style on the performance of synchronous global virtual teams," *Information & Management*, vol. 41, no. 3, pp. 303–321, 2004.
- [19] C. C. Miller, L. M. Burke, and W. H. Glick, "Cognitive diversity among upper-echelon executives: implications for strategic decision processes," *Strategic Management Journal*, vol. 19, pp. 39–58, 1998.
- [20] N. Liu, Z. .. Zhang, and Z. Zhang, "An empirical study on the relationship between R & D team diversity," *Behav. Integr. Innov. Perform.*, vol. 33, pp. 135–141, 2012.
- [21] X. Y. Qu, "Research on the relationship between behavior integration and dual innovation of R&D team: based on the mediating role of learning space and the moderating role of team reflection," *R & D Management*, vol. 29, pp. 115–126, 2017.
- [22] D. C. Hambrick, "Top management groups: a conceptual integration and reconsideration of the 'team' label," *Research in Organizational Behavior*, vol. 16, p. 171, 1994.
- [23] Z. H. Yao and H. F. Sun, "Construction and measurement of behavioral integration of top management team: from the perspective of behavior," *Journal of Business Economics*, vol. 12, pp. 28–36, 2009.
- [24] J. Mathieu, M. T. Maynard, T. Rapp, and L. Gilson, "Team effectiveness 1997–2007: a review of recent advancements and a glimpse into the future," *Journal of Management*, vol. 34, no. 3, pp. 410–476, 2008.
- [25] M. A. Carpenter, "The implications of strategy and social context for the relationship between top management team heterogeneity and firm performance," *Strategic Management Journal*, vol. 23, no. 3, pp. 275–284, 2002.
- [26] K. Y. Williams and C. A. O'Reilly, "Demography and diversity in organizations: a review of 40 Years of research," *Research in Organizational Behavior*, vol. 20, pp. 77–140, 1998.
- [27] D. C. Hambrick, T. S. Cho, and M. J. Chen, "The influence of top management team heterogeneity on firms' competitive moves," *Administrative Science Quarterly*, vol. 41, no. 4, pp. 659–684, 1996.
- [28] R. Mitchell, B. Boyle, R. O'Brien et al., "Balancing cognitive diversity and mutual understanding in multidisciplinary teams," *Health Care Management Review*, vol. 42, no. 1, pp. 42–52, 2017.
- [29] R. Mitchell, B. Boyle, and S. Von Stieglitz, "Professional commitment and team effectiveness: a moderated mediation investigation of cognitive diversity and task conflict," *Journal of Business and Psychology*, vol. 34, no. 4, pp. 471–483, 2019.
- [30] D. L. Ferris, M. Chen, and S. Lim, "Comparing and contrasting workplace ostracism and incivility," *Annu. Rev. Organ. Psychol. Organ. Behav.*, vol. 4, no. 1, pp. 315–338, 2017.
- [31] A. A. Tabassi, A. Abdullah, and D. J. Bryde, "Conflict management, team coordination, and performance within multicultural temporary projects: evidence from the construction industry," *Project Management Journal*, vol. 50, no. 1, pp. 101–114, 2019.
- [32] S. R. Magnotta and C. M. Johnson, "The role of sales team intragroup conflict on critical job outcomes," *Industrial Marketing Management*, vol. 84, pp. 126–137, 2020.
- [33] R. Agnihotri, C. B. Gabler, O. S. Itani, F. Jaramillo, and M. T. Krush, "Salesperson ambidexterity and customer satisfaction: examining the role of customer demandingness, adaptive selling, and role conflict," *Journal of Personal Selling and Sales Management*, vol. 37, no. 1, pp. 27–41, 2017.

- [34] K. A. Jehn and E. A. Mannix, "The dynamic nature of conflict: a longitudinal study of intragroup conflict and group performance," *Academy of Management Journal*, vol. 44, no. 2, pp. 238–251, 2001.
- [35] C. K. W. De Dreu, "When too little or too much hurts: evidence for a curvilinear relationship between task conflict and innovation in teams," *Journal of Management*, vol. 32, no. 1, pp. 83–107, 2006.
- [36] D. Wang, Z. Su, and H. Guo, "Top management team conflict and exploratory innovation: the mediating impact of market orientation," *Industrial Marketing Management*, vol. 82, pp. 87–95, 2019.
- [37] J. C. Turner, "Social Comparison and social identity: some prospects for intergroup behaviour," *European Journal of Social Psychology*, vol. 5, pp. 1–34, 1975.
- [38] K. A. Jehn and C. Bendersky, "Intragroup conflict in organizations: a contingency perspective on the conflict-outcome relationship," *Research in Organizational Behavior*, vol. 25, pp. 187–242, 2003.
- [39] S. Parayitam and R. S. Dooley, "The interplay between cognitive-and affective conflict and cognition-and affect-based trust in influencing decision outcomes," *Journal of Business Research*, vol. 62, no. 8, pp. 789–796, 2009.
- [40] S. Boone, P. Andries, and B. Clarysse, "Does team entrepreneurial passion matter for relationship conflict and team performance? On the importance of fit between passion focus and venture development stage," *Journal of Business Venturing*, vol. 35, no. 5, Article ID 105984, 2020.
- [41] P. Steffens, S. Terjesen, and P. Davidsson, "Birds of a feather get lost together: new venture team composition and performance," *Small Business Economics*, vol. 39, no. 3, pp. 727–743, 2012.
- [42] A. C. Klotz, K. M. Hmieleski, B. H. Bradley, and L. W. Busenitz, "New venture teams: a review of the literature and roadmap for future research," *Journal of Management*, vol. 40, no. 1, pp. 226–255, 2014.
- [43] I. Vanaelst, B. Clarysse, M. Wright, A. Lockett, N. Moray, and R. S'Jegers, "Entrepreneurial team development in academic spinouts: an examination of team heterogeneity," *Entrepreneurship: Theory and Practice*, vol. 30, no. 2, pp. 249–271, 2006.
- [44] E. K. Lee, A. C. Avgar, W. W. Park, and D. Choi, "The dual effects of task conflict on team creativity: focusing on the role of team-focused transformational leadership," *International Journal of Conflict Management*, vol. 30, no. 1, pp. 132–154, 2019.
- [45] B. M. Staw, L. E. Sandelands, and J. E. Dutton, "Threat rigidity effects in organizational behavior: a multilevel analysis," *Administrative Science Quarterly*, vol. 26, no. 4, pp. 501–524, 1981.
- [46] J. Y. Jiang, X. Zhang, and D. Tjosvold, "Emotion regulation as a boundary condition of the relationship between team conflict and performance: a multi-level examination," *Journal of Organizational Behavior*, vol. 34, no. 5, pp. 714–734, 2013.
- [47] D. Choi, M. L. Kraimer, and S. E. Seibert, "Conflict, justice, and inequality: why perceptions of leader-member exchange differentiation hurt performance in teams," *Journal of Organizational Behavior*, vol. 41, no. 6, pp. 567–586, 2020.
- [48] A. Caputo, O. B. Ayoko, and N. Amoo, "The moderating role of cultural intelligence in the relationship between cultural orientations and conflict management styles," *Journal of Business Research*, vol. 89, pp. 10–20, 2018.
- [49] D. Tjosvold, C. Hui, and Z. Yu, "Conflict management and task reflexivity for team in-role and extra-role performance in China," *International Journal of Conflict Management*, vol. 14, no. 2, pp. 141–163, 2003.
- [50] L. A. Franco, E. A. Rouwette, and H. Korzilius, "Different paths to consensus? The impact of need for closure on model-supported group conflict management," *European Journal of Operational Research*, vol. 249, no. 3, pp. 878–889, 2016.
- [51] M. Curcija, N. Breakey, and S. Driml, "Development of a conflict management model as a tool for improved project outcomes in community based tourism," *Tourism Management*, vol. 70, pp. 341–354, 2019.
- [52] B. H. Bradley, H. J. Anderson, J. E. Baur, and A. C. Klotz, "When conflict helps: integrating evidence for beneficial conflict in groups and teams under three perspectives," *Group Dynamics: Theory, Research, and Practice*, vol. 19, no. 4, pp. 243–272, 2015.
- [53] J. C. Huang, "Unbundling task conflict and relationship conflict: the moderating role of team goal orientation and conflict management," *International Journal of Conflict Management*, vol. 21, no. 3, pp. 334–355, 2010.
- [54] G. Chen and D. Tjosvold, "Conflict management and team effectiveness in China: the mediating role of justice," *Asia Pacific Journal of Management*, vol. 19, no. 4, pp. 557–572, 2002.
- [55] O. B. Ayoko, C. E. Härtel, and V. J. Callan, "Resolving the puzzle of productive and destructive conflict in culturally heterogeneous workgroups: a communication accommodation theory approach," *International Journal of Conflict Management*, vol. 13, no. 2, pp. 165–195, 2002.
- [56] M. S. Khan, R. J. Breitenacker, and E. J. Schwarz, "Adding fuel to the fire: need for achievement diversity and relationship conflict in entrepreneurial teams," *Management Decision*, vol. 53, no. 1, pp. 75–99, 2015.
- [57] K. A. Way, N. L. Jimmieson, and P. Bordia, "Shared perceptions of supervisor conflict management style: a cross-level moderator of relationship conflict and employee outcomes," *International Journal of Conflict Management*, vol. 27, no. 1, pp. 25–49, 2016.
- [58] M. Y. Leung, J. Yu, and Q. Liang, "Analysis of the relationships between value management techniques, conflict management, and workshop satisfaction of construction participants," *Journal of Management in Engineering*, vol. 30, no. 3, Article ID 4014004, 2014.
- [59] J. Li and D. C. Hambrick, "Factional groups: a new vantage on demographic faultlines, conflict, and disintegration in work teams," *Academy of Management Journal*, vol. 48, no. 5, pp. 794–813, 2005.
- [60] G. S. Van der Vegt and O. Janssen, "Joint impact of interdependence and group diversity on innovation," *Journal of Management*, vol. 29, no. 5, pp. 729–751, 2003.
- [61] K. A. Bantel and S. E. Jackson, "Top management and innovations in banking: does the composition of the top team make a difference?" *Strategic Management Journal*, vol. 10, no. S1, pp. 107–124, 1989.
- [62] W. E. Watson, K. Kumar, and L. K. Michaelsen, "Cultural diversity's impact on interaction process and performance: comparing homogeneous and diverse task groups," *Academy of Management Journal*, vol. 36, no. 3, pp. 590–602, 1993.
- [63] Y. Meng, H. Yu, Z. Ma, and Z. Yang, "The impact of young Chinese employees' notions of work on conflict management styles: an explorative study," *International Journal of Conflict Management*, vol. 29, no. 3, pp. 306–326, 2018.
- [64] J. Yin, M. Jia, Z. Ma, and G. Liao, "Team leader's conflict management styles and innovation performance in

- entrepreneurial teams,” *International Journal of Conflict Management*, vol. 31, no. 3, pp. 373–392, 2020.
- [65] X. Huo, L. Zhang, and H. Guo, “Antecedents of relationship conflict in cross-functional project teams,” *Project Management Journal*, vol. 47, no. 5, pp. 52–69, 2016.
- [66] S. Xu and Z. C. Cao, “Antecedents and outcomes of work-nonwork conflict in hospitality: a meta-analysis,” *International Journal of Contemporary Hospitality Management*, vol. 31, no. 10, pp. 3919–3942, 2019.
- [67] H. Syna Desivilya and D. Yagil, “The role of emotions in conflict management: the case of work teams,” *International Journal of Conflict Management*, vol. 16, no. 1, pp. 55–69, 2005.
- [68] C. Camelo-Ordaz, J. García-Cruz, and E. Sousa-Ginel, “Antecedents of relationship conflict in top management teams,” *International Journal of Conflict Management*, vol. 25, no. 2, pp. 124–147, 2014.
- [69] Z. Simsek, J. F. Veiga, M. H. Lubatkin, and R. N. Dino, “Modeling the multilevel determinants of top management team behavioral integration,” *Academy of Management Journal*, vol. 48, no. 1, pp. 69–84, 2005.
- [70] A. Carmeli and M. Y. Halevi, “How top management team behavioral integration and behavioral complexity enable organizational ambidexterity: the moderating role of contextual ambidexterity,” *The Leadership Quarterly*, vol. 20, no. 2, pp. 207–218, 2009.
- [71] D. C. Hambrick and P. A. Mason, “Upper echelons: the organization as a reflection of its top managers,” *Academy of Management Review*, vol. 9, no. 2, pp. 193–206, 1984.
- [72] M. Afzalur Rahim, “Empirical studies on managing conflict,” *International Journal of Conflict Management*, vol. 11, no. 1, pp. 5–8, 2000.