A multilevel study of transformational leadership, dual organizational change and innovative behavior in groups

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Abstract

Purpose – Based on dual organizational theory, the purpose of this paper is to examine the relationship between transformational leadership and innovative behavior in groups. The authors proposed that group innovative behavior was influenced by transformational leadership as a group-level construct which was moderated by dual organizational change that represent organization-level resources. Furthermore, the authors identified two organizational change-related situational variables-radical change and incremental change and examined their effects on group innovative behavior.

Design/methodology/approach – The authors collected data from full-time employees working in groups in 43 companies, located in five cities in China including Beijing, Yantai, Chengdu, Xi'an, and Chengde. These enterprises were from a wide range of industries, including manufacturing, financing, information technology, and geological exploration. The authors chose a middle- or senior-level manager from each company to act as chief survey respondent, who were asked to contact managers and employees from a list they had provided and invite them to participate in a web-based survey (via an e-mailed link) or a paper-and-pencil survey. A total of 192 managers and 756 direct subordinates from 112 groups completed the survey.

Findings – Results found that transformational leadership was positively related to group innovative behavior, and this relationship was moderated by radical change, but not incremental change; radical change and incremental change were also positively related to group innovative behavior.

Research limitations/implications – This study adopts a cross-sectional study design, which is insufficient for deriving causal inferences. Future research may adopt a longitudinal study design to investigate causal impacts. Besides, some unmeasured variables could be related to transformational leadership and innovative behavior.

Practical implications – The paper includes implications for adopting appropriate leadership style to motivate innovative behavior, promoting dual organizational change to boost innovative behavior, and generating greater innovative behavior for transformational leaders in times of radical change.

Originality/value – This cross-level study contributes to the relationship between transformational leadership and group innovative behavior in the context of dual organizational change.

Keywords Radical change, Incremental change, Group innovative behaviour, Group transformational leadership

Paper type Research paper

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Introduction

Innovation is very important for organization performance and development in rapidly changing and highly uncertain environments (Lopez-Cabrales *et al.*, 2009) and groups are widely used in workplaces (Shin *et al.*, 2012). Group leaders often asked to follow transformational leadership practices by leading and motivating not only individuals but also groups as a whole (Kozlowski and Bell, 2003). Given that transformational leadership has become increasingly important for organization innovation, there is a need for research into the relationship between transformational leadership and innovation in groups.

Organizations have to be more innovative at the individual, group, and organizational levels to improve core competence in the context of change (Mumford *et al.*, 2002). Given the increase in the use of groups in organizations, group innovative behavior has come to play an important role in enhancing organizational effectiveness. Researchers have argued that innovative behavior, defined as the "intentional generation, promotion, and realization of new ideas within a work role, work group, or organization" (Janssen and Van Yperen, 2004), is key to organizational competitiveness. Innovation is viewed as a multistage process, with different activities and different individual behaviors necessary at each stage. It goes through three stages-idea generation, idea promotion, and idea realization (Scott and Bruce, 1994). Notably, employee innovative behavior is closely related to individual differences and workgroup climate (Tierney *et al.*, 1999), which in turn promote innovative behavior and other innovative outcomes (Mumford *et al.*, 2002). Prior research have found both a direct or an indirect relationship between transformational leadership and employee innovative behavior (Kahai *et al.*, 2003; Shin and Zhou, 2007). We propose that transformational leadership may influence group innovative behavior specially by fostering a work context that supports innovative outcomes.

Transformational leadership theory is the predominant conceptual framework through which leadership behavior is the communication of a purpose that transcends employees' short-term goals and self-interests, and stimulates and encourages them to perform beyond expectations (Bass, 1985). Transformational leaders, who motivate organizations to learn through experimentation, exploration, communication and dialogue (Senge *et al.*, 1994), have the ability to build teams, and provide direction, energy, and support for processes of change and organizational learning (Bass and Riggio, 2006). They are able to interpret the organizational change and offer strategies to cope with it successfully (Yukl, 2002). Effective transformational leadership also integrates individual-level processes with group-level processes (Kozlowski and Bell, 2003), because leadership is inherently multilevel (Yammarino and Dansereau, 2008). Thus, transformational leadership may function at both the individual and the team levels (Zohar and Tenne-Gazit, 2008). At the group level, transformational leadership has been conceptualized as a climate variable that is shared among all team members (Chen *et al.*, 2007). However, previous research has investigated transformational leadership from leader-to-follower interactions and leader-to-team interactions (Zaccaro *et al.*, 2009); little research has focussed on multilevel leader-to-team and leader-to-organization interactions and relationships.

Organizational change, defined as alterations of existing work routines and strategies that affect a whole organization (Herold and Fedor, 2008), is a process aimed at enhancing an organization's innovative capability and thus improve efficiency by introducing new technology, altering strategies, or recalibrating workflows, or by considering mergers and restructuring or re-shaping organizational

culture (Kotter, 2002). The innovative capability to implement successful organizational change is a major asset in developing a competitive edge (Florida, 2005; Friedman, 2005). With the rapid economic development and environmental uncertainty over the past 30 years, many enterprises in China have had to change and innovate in a timely manner. Some quickly adapted to the new environment and thrived, but others floundered in the face of change (Zhang, 2002). We believe that transformational leadership is a necessary leadership practice that can keep pace with the changing times and improve an enterprise's innovative capacity. By extending dual organizational theory (March, 1991) to the domain of organizational change, we argue that dual organizational change is one important situational variable that will boost the relationship between group transformational leadership and group innovative behavior in the Chinese context.

There have been few empirical findings demonstrating the interactive effect between transformational leadership and the dual organizational change on group innovative behavior. Our study contributes to this lack in leadership and innovation literature in several ways. First, we consider interactions between group transformational leadership and group innovative behavior. Second, we offer a perspective complementary to previous individual- and team-level studies. Third, we explore contextual boundary conditions for dual organizational change's effect on group innovative behavior. Specifically, we theorize and test the way in which radical change and transformational leadership interact to influence group innovative behavior.

Literature review and hypotheses

Dual organizational change

Dual organizational theory derives from the concepts of exploration and exploitation in organizational learning theory (OLT). OLT maintains that the core of organizational change lies in learning, such that an organization enhances, creates, and changes its own capabilities through various forms of learning behavior. Organizational learning, involving knowledge acquisition, knowledge sharing, and knowledge utilization, is the capability through which organizations maintain or improve performance based on experience (DiBella *et al.*, 1996). Organizational learning is the process of creating, transforming, and interacting knowledge within an organization (Nonaka and Takeuchi, 1995). As the set of actions within the organization, organizational learning can intentionally and unintentionally influence positive organizational change (Templeton *et al.*, 2002). The growth of new abilities and new knowledge along with the development of organizational capability promote organizational learning. Inability to learn is the reason most firms disappear before 40 years have passed (Senge, 1990). For firms in dynamic competitive environment, it is essential to become "learning organizations," where leaders should serve as designers, teachers, and stewards to facilitate organizational learning (Senge, 1994).

An organization acquires or creates new knowledge by exploratory learning activities and generates new organizational capacities by exploiting new knowledge. Moreover, an organization improves and expands its existing knowledge by exploiting learning activities and using existing knowledge to enhance the efficiency of existing or relevant organizational abilities (March, 1991). March (1991) argues that exploration is a form of learning behavior characterized by searching, change, experiment, adventure, and innovation. In undertaking exploration, enterprises tend to go beyond the existing knowledge framework or technological track in order to discover and create new knowledge and produce new forms of knowledge or capabilities that are different from

those that already exist (Katila and Ahuja, 2002). Exploitation, on the other hand, is a learning behavior characterized by expanded production, refinement, improved efficiency, and implementation. Exploitation tends to promote refined operations within the fields of existing knowledge in order to enhance efficiency through training (Yalcinkaya *et al.*, 2007). Dual organizational theory shows us that there are differences between choosing exploration or exploitation when an organization undergoes a learning, change, and innovation processes. With the increase of environmental uncertainties and the deepening of the research on management paradoxes, the dual concept has extended to other fields, including innovation (radical and continuous innovation), strategic management (the extension and the construction of abilities), objectives orientation (efficiency and flexibility), and organizational change (radical change and incremental change).

Focussing on organizational change, this can be broadly grouped into either radical change or incremental change (Miller and Friesen, 1982; Weick and Quinn, 1999). Radical changes are abrupt, drastic, large-scale, and comprehensive. The change process is quick and is a form of change used by an organization to deal with unpredictable and uncertain environment. In contrast, incremental change is gradual, step-by-step, local and stable change that an organization adapts to attend to the needs of changing circumstances. Porras and Robertson (1992) further classify organizational change into developmental, evolutional, transformational, and revolutionary changes. Krysinski and Reed (1994) maintain that the time dimension is one of the most important variables in measuring organizational change, as the time dimension is of special significance in the process of implementing change. Christina (2002) integrates other classifications of organizational change to create a new classification for the organizational change model based on case studies: generality (the extent of the impact produced by the change on an organization) and time sequence (long-/short-term). Particularly, short-term change takes place within 12 months; revolutionary change is a fundamental institutional or process change, and evolutionary change is an improvement in the existing system or process for an organization. Long-term change takes place beyond 12 months. Notably, even though Miller and Friesen (1982) proposed a structure for the organizational change model, there remains a research gap in quantitative evidence.

Group transformational leadership and group innovative behavior

It has been argued that transformational leadership centers on the processes of transformation and change (Bass and Riggio, 2006). Transformational leadership tends to be more effective when organizational change is ongoing, especially in dealing with minor adjustments that organizations have to undertake (Boal and Bryson, 1988). Transformational leaders become more innovative, have more novel ideas, and can bring about major changes (Bass, 1985). In particular, they can facilitate organizational learning and change by intellectual stimulation and inspirational motivation (Coad and Berry, 1998), and inspire shared mental models in technological organizations that promote technological learning and new technology utilization (Senge *et al.*, 1994). At the group level, transformational leadership offers a pattern of behaviors oriented at the whole workgroup (Cho and Dansereau, 2010), and group behavior emphasizes the extent to which the group or team supports innovative change and the pursuit of new ideas (Kanter, 1983). Previous research has had inconsistent findings on the relationship between transformational leadership and innovative behavior at individual level. Some studies support the positive relationship

between them (Amabile *et al.*, 2004), and some have found a negative relationship (Basu and Green, 1997) or none at all (Moss and Ritossa, 2007). One possible reason for differences in outcome is that employees need time to acquire knowledge in order to produce innovative approaches and behavior, and thus the impact of transformational leadership on innovative behavior also takes time.

According to social cognitive theory (Bandura, 1986), transformational leadership is an important external factor that influences learning. Transformational leadership describes a class of behaviors composed of six dimensions: articulating a vision, providing an appropriate model, fostering the acceptance of group goals, high performance expectations, individualized support, and intellectual stimulation (Podsakoff *et al.*, 1990). Transformational leaders, by articulating a vision, engage in intellectual stimulation, set the expectation for innovation, and serve as creative role models for group members (Gong *et al.*, 2009). Transformational leaders encourage group members to provide ideas for organizational development through intellectual stimulation (Vera and Crossan, 2004). By proposing innovative expectations, transformational leaders establish their own innovative example for group employees. These charismatic leaders will increase a willingness to learn, and with their influencing role, they will generate new ideas and questions from employees (Bass and Avolio, 1990). Transformational leaders create opportunities for group members to learn and develop through understanding, appreciation, and supporting innovative ideas (Bass *et al.*, 2003), and group members are able to overcome the fear of challenging the status quo, which results in greater innovative behavior. In short, transformational leaders who create a motivating climate will also create an innovative atmosphere, which will lead to group members being more likely to innovate. We expect all these dimensions to work together as whole to impact group innovative behavior:

H1. Group transformational leadership is positively related to group innovative behavior.

Dual organizational change and group innovative behavior

Contextual elements of change can influence employee behaviors (Armenakis and Bedeian, 1999), but some scholars have conflicting opinions regarding the effectiveness of radical and incremental organizational change. Infusino (1998) suggest that an organization should adopt radical change (i.e. use existing resources) to yield positive outcomes within the shortest time possible, and prepare for the next round of change by making use of the experiences in the present round. They further argue that this model is not only efficient but also cost-effective, and capable of marked performance improvement within a very short span of time. Denning (2005) also maintains that radical change can remarkably enhance organizational competitive power. Abrahamson (2000), however, supports incremental change and argues that an organization should carefully design steps and stages of change, continuously patching up existing loopholes and accumulating incremental changes. He argues that such changes are relatively stable and are less likely to fail. Although radical change and incremental change are important concepts for organization performance, research into organizational change and innovation has not been as robust.

Radical change in strategy, culture, structure, personnel, and work roles often triggers intense emotions (Bartunek, 1984) that can affect how different groups interpret a proposed change and how group members behave. Radical change breaks the existing structure, rules and regulations, which can mean that group members must

learn new knowledge and skills to adapt themselves to new work tasks. The challenges and threats involved in radical change increase needs and methods, which may promote innovative behavior. Group members' innovative behaviors often relate to radical change. In other words, innovative behaviors are a result of dealing with radical change. However, while radical change may be necessary for transforming an organization rapidly to meet new environmental demands, incremental change may be necessary for continuous adaptation over the long term (Leana and Barry, 2000).

Incremental change consists of frequent, purposeful adjustments that are small but ongoing and cumulative in effect (Weick and Quinn, 1999). Feldman and Pentland (2003) argue that employees selectively retain effective elements of their performance routines and integrate them with new, more efficient ones to cope with the daily challenge of real-time adaptation. From an evolutionary perspective, as long as the organization moves forward with incremental changes, learning processes will lead employees to engage in innovative behaviors (Nelson, 1991). Group innovative behavior depends on an organization's ability to cope with both dual organizational change and its own learning processes when one organizational change must be abandoned when it is no longer be suitable for the environment. Thus, dual organizational change will trigger group innovative behavior that will enhance the organizational innovative capabilities:

H2. Dual organizational change is positively related to group innovative behavior.

H2a. Radical change is positively related to group innovative behavior.

H2b. Incremental change is positively related to group innovative behavior.

Dual organizational change as a moderator

Transformational leadership is beneficial to improving the individual, group, and organization efficacy during organizational change (Bass and Riggio, 2006), and some studies have shown that transformational leadership plays an important role in the process of organizational change (Bass and Avolio, 1994), as transformational leaders are change agents, deciding, implementing, and monitoring change. They must be able to overcome deeply rooted interests and obtain commitment from different stakeholders in order to meet the needs of both the external environment and the changing organization. They must also believe that when dealing with the inherent complexity and uncertainty in the process of change, they have the ability to affect change (Cummings and Worley, 1997). Transformational leaders are particularly effective in crisis-ridden organizations because they are able to grasp the opportunity to develop resources, propose a development vision, foster team spirit, commit him- or herself openly to learning to create a learning organization (Wick and Leon, 1995), call on employees to actively participate in change with joint efforts, and overcome resistance to change, all of which may promote group or organization innovation.

Contextual factors can determine the magnitude of influence leader behaviors will have on employee work outcomes (Yukl, 2010) with radical change being an important contextual factor. Radical change involves revolution, process reengineering, breakthrough thinking, resetting, overall change, and the pursuit of an unexpected or dramatic outcome. The core idea of radical change is the widespread implementation of radical transformation and management innovation. When the organization is in a stage of radical change and facing complex change processes, transformational leadership can be responsive to changes in the environment to take timely action to achieve the goal of change, as these leaders bring clarity to a vision of change, expect

good outcomes from changes and innovation, and inspire staff to take part in and try out new ideas to be innovative when working. Overall, transformational leaders may ensure innovative behavior and promote smooth transitions. Research conducted by Mao and Long (2008) in China investigated the effects of organizational change from three aspects: content, magnitude, and speed. They found that the magnitude of organizational change does have some moderating effects between transformational leadership and management innovation, and the content and speed of change moderate the relationship between transformational leadership and technology innovation. However, when change is continuous and incremental in a workgroup, its operational system remains relatively stable, employee work routines are not interrupted frequently, and adaptation demands are less imposing (Carter *et al.*, 2013). Most organizational changes are incremental, and employees tend to be accustomed to them and are less likely to perceive change events as discrete (Rafferty and Griffin, 2006), because employees have to meet the day-to-day challenges of incremental change while pursuing their ongoing task objectives (Seo *et al.*, 2012). In fact, when a change initiative is implemented, employees tend to modify their old work routines to retain more efficient and socially beneficial approaches in the workgroup (Carter *et al.*, 2013). The moderating effect of continuous incremental changes on the relationship between transformational leadership and group innovative behavior is not likely to be palpable, and thus we further hypothesize that incremental change does not moderate the positive relationship between group transformational leadership and group innovative behavior (Figure 1):

H3. Radical change moderate the positive relationship between transformational leadership and group innovative behavior predicted by *H1*, such that the relationship will be more positive when the degree of radical change is high.

H4. Incremental change does not moderate the positive relationship between transformational leadership and group innovative behavior predicted by *H1*.

Method

Sample and procedure

We collected data from full-time employees working in groups in 43 companies in early 2011. These companies were located in five cities in China including Beijing, Yantai, Chengdu, Xi'an, and Chengde. These enterprises were from a wide range of industries, including manufacturing, financing, information technology, and geological exploration. Ten were state-owned firms. Nine firms were joint ventures. In total, 24 were private firms. The average age of the companies was 24.87 years (SD = 17.71), and

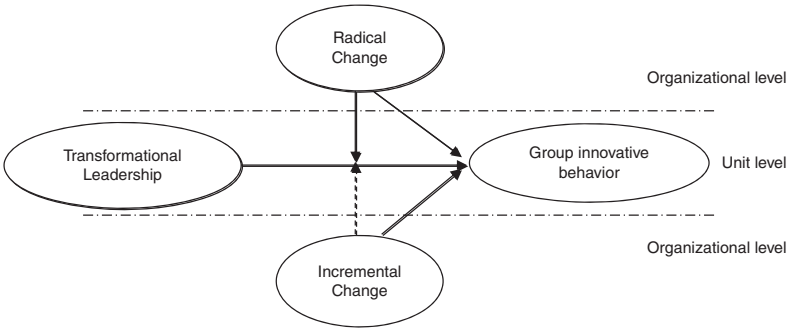

Figure 1.
A multilevel model of transformational leadership and group innovative behavior

72.4 percent had more than 1,000 employees. We chose a middle- or senior-level manager from each company to act as chief survey respondent; they were briefed on how to perform the survey, what matters need attention during the survey and other related issues. We asked the chief survey respondent to contact managers and employees from a list they had provided and invite them to participate in a web-based survey (via an e-mailed link) or a paper-and-pencil survey. Prior to the survey, the respondents were assured that the findings would be completely confidential and used only for scientific research. Paper surveys came with an envelope, and the completed questionnaire sheets were sealed in the envelope by the respondents themselves before being handed into the chief respondents in each company.

Middle-level managers were responsible for a unit or group of direct subordinates. These managers rated individual innovative behavior and organizational change of subordinates and provided demographic information. Direct subordinates reported on their managers' TFL behavior and provided demographic information. Surveys distributed to managers and direct subordinates were assigned a unique code in order to match group leader (i.e. middle-manager) and direct subordinates' responses.

A total of 192 managers and 756 direct subordinates from 112 groups completed the survey, yielding response rates of 96 and 94.5 percent, respectively. In total, 11 incomplete manager's responses and 19 incomplete subordinates' responses were removed from the sample, which yielded a final sample of 181 managers and 737 direct subordinates, consisting on average of 8.2 employees from each group, ranging from 5 to 16 employees. In terms of subordinate sample characteristics, 58.1 percent of the sampled subordinates were male; 73.6 percent were between 25 and 39 years of age; and 76.2 percent reported an bachelor degree or above. In the manager sample, 64.7 percent were male; 77.1 percent were 35 years old or above; and 72.8 percent reported a bachelor degree or above.

Measures

Group transformational leadership. The 24 item Transformational Leadership Behavior Inventory developed by Podsakoff *et al.* (1990) was used to assess transformational leadership (i.e. providing a role model, articulating a vision, communicating high performance expectations, fostering the acceptance of common goals, providing intellectual stimulation, and providing individualized support). Group members used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to assess six dimensions of TFL. An example item included, "Paints an interesting picture of the future for our group." Our analysis shows that there is a high correlation – ranging 0.78-0.89 – between the dimensions of the transformational leadership questionnaire, suggesting support for their combination (Shin and Zhou, 2007). We averaged individual employees' evaluation of the group leader's TFL at the group level to create an index of group-level transformational leadership ($\alpha = 0.946$). Based on common statistical benchmarks (Bliese, 2000), this aggregation was empirically justified (ICC[1] = 0.13; $p < 0.001$; ICC[2] = 0.62; median rwg = 0.86).

Dual organizational change. We used the eight-item scale ranging from 1 (strongly disagree) to 7 (strongly agree; $\alpha = 0.87$) developed by Feng and Zhang (2014) to measure radical change (four items, $\alpha = 0.89$) and incremental change (four items, $\alpha = 0.83$) in the Chinese context. We asked group leaders to evaluate the dual organizational change, as they were considered as the best person for assessing the radical or incremental organizational change (Carter *et al.*, 2013). Evidence of reliability and validity of this

study has been reported in previous research (Feng and Zhang, 2014). Participants responded to questions such as "When there is any organizational change in our company, the magnitude is usually large, covering almost all departments." We also tested whether radical and incremental change perceived by middle managers converges by conducting a convergence test on intra-group homogeneity and inter-group heterogeneity. We first carried out an inter-group heterogeneity test through analysis of variance (ANOVA). Finding suggests that there was a significant difference ($F = 2.230$, $p < 0.001$) between the inter- and intra-group mean squares of radical and incremental change. In other words, dual organizational change significantly varied among surveyed enterprises. The inter-group correlation coefficients ICC (1) and ICC (2) of organizational change were 0.132 and 0.571, respectively, which is higher than the 0.12 threshold recommended by James (1982) and 0.47 recommended by Schneider *et al.* (1998). In addition, the mean and median of rwg of organizational change were 0.956 and 0.952, respectively, both exceeded 0.70 as recommended by James *et al.* (1993) and Klein and Kozlowski (2000), which suggests intra-group interrater consistency.

Group innovative behavior. The six-item innovative behavior scale developed by Scott and Bruce (1994) was used to assess the group innovative behavior questionnaire, which focussed on new idea generation. Managers evaluated their direct subordinates. Ratings were completed on a five-point scale from 1 (strongly disagree) to 5 (strongly agree; $\alpha = 0.958$). A sample item was "Develops adequate plans and schedules for the implementation of new ideas." Items were averaged and, based on appropriate aggregation statistics (ICC[1] = 0.13; $p < 0.001$; ICC[2] = 0.87; median rwg = 0.83), this measure was aggregated to the organizational level of analysis.

Control variables. Previous research has consistently related industry type and company size to innovative behavior (Shin and Zhou, 2007; Wang *et al.*, 2013). To make sure our findings hold irrespective of these group attribute variables, we incorporated these variables as control variables. We controlled for average group gender (male = 1, female = 0) and average group age (under 25 years old = 1; 25-35 years old = 2; 25-35 years old = 3; 40-49 years old = 5; above 50 = 5), and we examined them as control variables to see whether these demographic variables affected our results. Consistent with prior research (Gong *et al.*, 2009), average group age was related to innovative behavior, while average group gender was not. Therefore, we did not incorporate average group gender in our final model. We also coded industry type into three dummy variables based on ownership type: private firms; state-owned firms; and joint ventures, and examined their effects on group innovative behavior using ANOVA. The results showed that the ownership type had a significant effect on group innovative behavior ($F = 2.59$, $p < 0.05$), whereas organization size did not ($F = 2.48$, $p > 0.05$). We thus included average group age and the ownership type as control variables.

Data analyses. We estimated CFAs by using Amos 17.0 to confirm the dimensionality and the discriminant validity of our latent independent variables. Following previous research (Wang *et al.*, 2013), transformational leadership and innovative behavior were treated as group-level variables whereas radical change and incremental change were treated as organization-level variables. To test *H1*, we regressed group innovative behavior for the control variables and for group transformational leadership. To address *H2-H4*, we regressed group innovative behavior for the control variables and for the dual organizational change and added the interaction coefficient of radical change and incremental change. Due to the multilevel nature of our data, we used hierarchical linear modeling to test hypotheses (Raudenbush and Bryk, 2002).

Results

Descriptive statistics

Table I presents the group and organization-level descriptive statistics, reliabilities, and correlations of the variables among the study. At the group level, both group transformational leadership and average group age were positively related to group innovative behavior ($r = 0.224$, $p < 0.001$; $r = 0.163$, $p < 0.05$, respectively). At the organizational level, radical change was negatively related to incremental change ($r = -0.215$, $p < 0.001$) and ownership type ($r = -0.194$, $p < 00.01$, respectively). Ownership type was positively related to radical change ($r = 0.147$, $p < 0.05$).

Construct validity

Because responses to the dual organizational change and innovative behavior items were collected from the same source at the same time, the relationship between the two measures could be inflated because of common method variance, we used two methods to test for potential common method variance. The results are shown in Table II. The fitting results of the Harman single-factor model did not meet acceptable standards ($\chi^2 = 5{,}417.106$, df = 495, NNFI = 0.615, CFI = 0.125, RMSEA = 0.125; McDonald and Ho, 2002). We conducted confirmatory factor analyses to assess the distinctiveness of these measures. Construct distinctiveness was tested for four major variables: transformational leadership, radical change, incremental change, and employee innovative behavior. The hypothesized four-factor baseline model provided a good fit with all fit indices within acceptable levels ($\chi^2 = 1{,}442.305$, df = 521, CFI = 0.926,

Variables	Mean	SD	1	2
Group level (n = 112)				
1. Group transformational leadership	4.032	0.524	*0.946*	
2. Group innovative behavior	3.436	0.792	0.224***	*0.958*
3. Average group age	2.781	1.013	0.163*	0.147
Organization level (n = 43)				
1. Radical change	2.788	0.791	*0.893*	
2. Incremental change	3.093	0.943	−0.215***	*0.836*
3. Industry type	1.739	0.792	−0.194**	0.147*

Table I.
Descriptive statistics, correlation coefficients and reliabilities of group-level variables and organization-level variables

Notes: Italic figures on the diagonal represent internal consistency coefficient "a." The internal consistency reliabilities of the two group-level variables (i.e. group transformational leadership and group innovative behavior) were calculated at the individual level of analysis because these variables were measured at the individual level. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Model	χ^2	df	χ^2/df	NNFI	CFI	RMSEA	AIC
Four-factor model	1,442.305	521	2.768	0.933	0.926	0.045	1,858.305
Three-factor model (TFL, RC + CC, EIB)	1,656.261	524	3.161	0.867	0.882	0.067	1,951.261
Three-factor model (TFL + RC, CC, EIB)	1,892.851	524	3.612	0.847	0.862	0.078	1,993.528
Two-factor model (TFL + RC + CC, EIB)	1,938.332	524	3.699	0.836	0.849	0.083	2,148.338
Single-factor model	5,417.106	495	10.944	0.615	0.612	0.125	5,615.106

Table II.
Common method bias test and confirmatory factor analyses

Notes: TFL stands for transformational leadership, RC for radical change; CC for incremental change; EIB for employee innovative behavior; + represents that two factors combine into one variable. ***$p < 0.001$

NNFI = 0.933, RMSEA = 0.045). To check the validity of the hypothesized four-factor measurement model, we compared it to the other alternative models. Model 2 was a three-factor model with the radical change and incremental change as one factor. Model 3 was a three-factor model with transformational leadership and radical change as one factor. Model 4 was a two-factor model with transformational leadership and dual organizational change as one factor and employee innovative behavior as another. Model 5 was a one factor model with all the items loading on a single-factor. The hypothesized four-factor measurement model had a significantly better fit than the other more parsimonious models based on the χ^2 difference test.

To further test the validity of the measures, we computed the average variance explained using the loadings from the expected four-factor measurement model. Convergent validity is suggested if the AVE of each latent variable exceeds 0.50 (Fornell and Larcker, 1981), this was the case for each of the scale variables in this study, suggesting convergent and discriminant validity of the latent variables.

The moderating role of dual organizational change on the relationship between transformational leadership and group innovative behavior

To test the above hypotheses, we developed a model consisting of average group age and group transformational leadership as Level-1 predictors, and ownership type and radical/incremental change as Level-2 predictors of the Level-1 intercept of group innovative behavior. Results of hierarchical linear modeling analyses with group innovative behavior as the dependent variable are shown in Table III. As presented in

Variables	Model 1 Null model	Model 2 Control variables effect	Model 3 Level-1 main effect	Model 4 Level-2 main effect	Model 5a Level-2 Moderating effect	Model 5b Level-2 Moderating effect
Intercept(γ_{00})	3.421***	3.425***	3.426***	3.409***	3.482***	3.393***
Control variables						
Average group age		0.121*	0.093*	0.101	0.021	0.074
Ownership type		−0.187*	−0.227*	−0.172*	−0.168*	−0.232*
Level-1 predictor variables						
GTFL(γ_{10})			0.181**	0.154*	0.154*	0.153*
Level-2 predictor variables						
RC(γ_{01})				0.621***	0.595***	
CC(γ_{01})				0.164*		0.216
Interaction effects						
GTFL × RC(γ_{11})					0.108**	
GTFL × CC(γ_{11})						−0.977
Variance						
$\ddot{y}^2$	0.446	0.431	0.402	0.406	0.403	0.392
τ_{00}	0.254***	−0.056*	0.272***	0.345***	0.144***	0.261***
τ_{11}			0.126*	0.304*	0.183*	0.106*
$R^2_{Level\text{-}1}$			0.402	0.407	0.403	0.393

Notes: TFL stands for transformational leadership, RC stands for radical change, CC for incremental change, and EIB for employee innovative behavior. All coefficients are estimated values (γ) of fixed effects under robust standard error. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table III. Moderating role of radical change and incremental change on the relationship between TFL and GIB

Table III, $\tau_{00} = 0.254$ ($p < 0.001$) in Model 1, indicating that it was appropriate to conduct cross-level analyses. In Model 3, $R^2_{Level\text{-}1}$ is 0.402, indicating that 27.2 percent of the intra-group variance of group innovative behavior can be accounted for by group transformational leadership, where the regression coefficient associated with group transformational leadership was significant at the 0.01 level, *H1* is supported.

To test *H2a* and *H2b*, we regressed group transformational leadership, radical change and incremental change separately for group innovative behavior, together with control variables. In Model 4, radical change and incremental change emerged as significant predictors of group innovative behavior ($\gamma_{01} = 0.621$, $p < 0.001$; $\gamma_{01} = 0.164$, $p < 0.05$). When including control variables and transformational leadership, radical change and their interaction in Model 5a, significant main effects of both variables, along with the interaction term were found. Therefore, radical change moderated the relationship between group transformational leadership and group innovative behavior based on the statistical criteria established by Howell *et al.* (1986), and *H3* is supported. However, in Model 5b, incremental change and its interaction effects with group transformational leadership were not significant in predicting group innovative behavior, thus supporting *H4*.

To understand the interaction effect, we plotted the regression line of group transformational leadership on group innovative behavior at 1 SD below and 1 SD above the mean of radical change (Aiken and West, 1991). As depicted in Figure 2, the regression line for group transformational leadership on group innovative behavior is significantly positive under conditions of high radical change and significant under conditions of low radical change. Notably, group innovative behavior increases with the degree of transformational leadership regardless of the degree of radical change. As radical change has a significant and independent effect on group innovative behavior, it supplements the effect of transformational leadership, suggesting that factors other than transformational leadership motivate group employees to engage in innovative behavior during radical change.

Discussion and conclusions

Theoretical contributions

This study positions dual organizational change as a new and important variable that can predict and moderate the relationship between group transformational leadership and group innovative behavior in the Chinese context. The results we obtained lead to three conclusions. First, there is a positive relationship between transformational leadership and innovative behavior at the group level. Second, dual organizational change relates positively to group innovative behavior at the cross-level. Third, radical change moderates this relationship between transformational leadership and

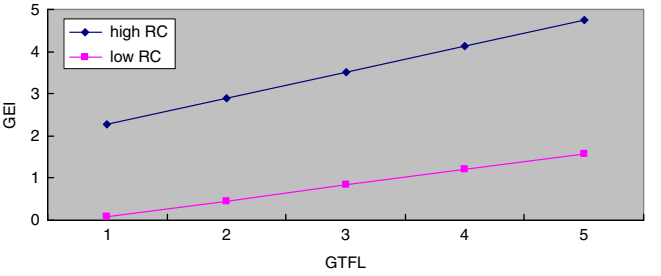

Figure 2.
Moderating effects of RC on the relationship between GTFL and GIB

innovative behavior in groups. This study advances the leadership and innovation literatures in several ways. We now discuss how these empirically guided conclusions extend the findings of prior studies.

The positive effects of group transformational leadership on group innovative behavior

We first provide empirical support for a positive relationship between transformational leadership and innovative behavior in groups, using matched supervisor-subordinate data collected from 112 groups in China. Although research has shown that individual group members significantly influence individual innovative behavior (Shin and Zhou, 2007), whether group transformational leadership affects group innovative behavior has rarely been studied. Group leaders serve as active contributors linking the strategic target formulated by top leaders to the daily implementation. They are important in organizational change processes because they are given more autonomy and power to manage their workgroup operations for efficiency as well as initiate and implement change programs through improving products or services (Balogun and Johnson, 2004). Previous studies on the impact of transformational leadership on innovative behavior have had inconsistent results. For example, Jaussi and Dionne (2003) found that transformational leadership had no effect on individual creativity. Our study, however, suggests positive prediction effects within Chinese corporate settings. We can explain our research findings using the internal and external motivation theory. Internal motivation plays an important role in determining innovative behavior because it can encourage group members to both generate novel and useful ideas and stick to their ideas when faced with challenges, which in turn allows them become more and more innovative (Deci and Ryan, 2008). When employees are driven by internal motivation, they tend to focus on work issues (Simon, 1967), and such focus leads group members to evoke ideas through self-management (Zhang and Bartol, 2010). Transformational leaders, regarded as a prominent facet of the organizational change and innovation context, may be charismatic or visionary, provide a role model, intellectual stimulation or inspiration or have high performance expectations (Bass, 1985; Podsakoff *et al.*, 1990; Howell and Avolio, 1993; Dvir *et al.*, 2002). They may act as change agents and innovative models by showing innovative words and deeds, they may inspire subordinates to initiate and implement changes that improve organizational effectiveness, they may encourage novel approaches and unique ideas; and they may motive employees to apply newly learned skills on the job (Bass *et al.*, 2003). Over time, these behaviors may extremely enhance employee's motivation to innovate, supporting innovative engagement and create greater levels of innovation climate perceptions.

The effects of radical change and incremental change on group innovative behavior

Organizations often try to operate systems with relative stability or efficiency-oriented functioning, that are interrupted by periods of adaptation that are rarely long (i.e. radical change) and brief mostly (i.e. incremental change) (Weick and Quinn, 1999). This study provides empirical evidence that radical change and incremental change are two important organization-level types contributing to group innovative behavior. Our study supports the theoretical view of the dual organizational change as a valid predictor of organizational innovation and suggests that choosing a suitable organizational change model serving culture may be useful as an approach for increasing employee innovative behavior. Radical change and incremental change may both occur in organizations (Burke, 2002). Radical change challenges the self-identity,

meaning, and creativity of group members (Argyris, 1990), which helps them to deal with high uncertainty of their future roles and privileges. Radical change is appropriate if the environment introduces new factors, such as new competition, new technology, or new government regulations, which may influence organization innovation in a beneficial manner. When it occurs, radical change places great demands on employees and their workgroups in terms of adaptation demands, increased work load, constraints, conflicts, and the expenditure of energy and additional resources that may interfere with getting their current work done (Carter *et al.*, 2013). Radical change may cause group members to adapt to the changing environment to change the current operational system and incorporate new elements into the system for a time, and employees may create an innovative atmosphere to accommodate themselves as well. However, although organizations may at times need to transform themselves rapidly to meet new institutional demands, such as deregulation and global competition, they typically have to maintain operational continuity to provide services to customers, preserve institutional legitimacy, and secure the resources to fund costly changes (Oliver, 1991). Employees seek predictable relationships, dependable resources, and consistency in behavior and thinking, while simultaneously seeking new stimulation and personal development. Incremental change is movement or variations in degree along an established conceptual continuum or system framework. It is suitable for a step-by-step environment, that is based on precedents and intended to do more of the same but better. It involves less cost and time and provides more stability than radical change (Kindler, 1979).

The role of dual organizational change. The most important implication of our findings is that situational factors play important roles in helping leaders capitalize on the potential benefits of group transformational leadership for innovative behavior. Although leadership scholars have suggested that leaders play a key role in the organizational change process (Gilley *et al.*, 2009), our research provides an integrated explanation about how the interaction of transformational leadership and dual organizational change influence the group members' innovative behavior. Our findings suggest that radical change moderates the direct effects of group transformational leadership on group innovative behavior in that the conditional direct effects significantly differ when radical change is at high vs low levels ($\beta = 0.108$, $p < 0.01$), but no such moderated effect is found for incremental change ($\beta = -0.977$, $p > 0.05$). The present study not only theoretically developed the cross-level interaction effect on group innovative behavior by integrating research on radical change and incremental change, but empirically demonstrated the moderating role of radical change on the relationship between transformational leadership and innovative behavior in groups in different corporates in China.

Transformational leadership and organizational change constitute two areas in organizational behavior research that have not been integrated until now as a means of explaining innovative behavior. Our finding provides multilevel evidence that radical change significantly influences the positive relationship between transformational leadership and group innovative behavior. Particularly, we showed that racial change is a supplementing moderator (Howell *et al.*, 1986). Our literature review shows that the previous research tended to focus on explaining the nature of the change and the reasons for the failure of the changes, as well as modeling to processes of change management. Despite informative prior theories, models, and multistage approaches, transformational leaders still lacked a clear understanding about organizational

change, including antecedent variables, effective process of change, appropriate pattern of the change, the interaction effect between transformational leadership and organizational change, the behavior of employees who participate in change, understandings as to why change is so difficult to achieve, and models to manage the change process (Armenakis and Harris, 2009).

From a contingency perspective, organizational change depends on a large number of internal and external factors. Consequently, change is generally organization specific, and firms tend to adopt different change strategies by combining radical and incremental change at different paces and with different intensities. When transformational leadership matches the unique patterns of organizational change, firms are more likely to gain superior and sustained performance, which can be partly explained by group innovative behavior during organizational change. Our findings suggest that radical change may be more effective for transformational leaders to generate greater group innovative behavior. In times of radical change, transformational leaders enhance group innovative behavior by putting forward the vision, improving work processes and group innovative capability. Furthermore, consistent with our hypothesis, our research results show that the positive influence of transformational leadership on innovative behavior is not affected by incremental change. According to the organizational ecology theory (Baum, 1996), organizational inertia provides stability and ensures efficiency. Incremental change is often characterized by organizational growth and increase in hierarchical structure. Further, incremental change is generally easier to implement than radical change because employees may not even be aware of the gradual change. In fact, about more than 95 percent of organizations keep themselves competitive by changing continuously through incremental adaptations to solve problems or to change a part of the large organizational system (Brown and Eisenhardt, 1997). Therefore, transformational leadership positively influences group innovative behavior regardless of continuous organizational change, but only radical change affects the positive relationship.

Managerial implications

With dynamic competitive environments and unpredictable organizational changes, an increasing number of organizations have encouraged group members to innovate (Shalley and Gilson, 2004), as group innovative behavior has become the key to sustained innovation and competitiveness (Shalley *et al.*, 2009). Our study has a number of important implications for this trend. First, company managers should adopt transformational leadership appropriately to better motivate group members to engage in innovative behavior. Previous studies have shown that internal motivation is the key psychological mechanism that drives innovative behavior (Grant and Berry, 2011). Further, external rewards are the decisive factor for innovative performance (Deci *et al.*, 1999), and that a good control over external motivation is critical to innovative behavior (Amabile, 1996). Therefore, transformational leaders should have clear expectations for innovative performance (Shalley and Gilson, 2004), and encourages employees to enhance their self-efficacy by accomplishing innovative tasks autonomously and independently. Managers need to ensure both the internal and external motivations of their employees, assuring that they are not conflicting but complementing each other to jointly enhance innovative behavior (Manolopoulos, 2006). During processes of radical change, transformational leaders need to assume responsibility for formulating, implementing, and control of organizational change strategies (Kanter *et al.*, 1992).

The complexity of the organizational change is a challenge that administrators at all levels of an organization have to face (Biech, 2007), including employees and leaders at all levels of organizational hierarchy (Katz and Kahn, 1966), and how to improve innovative behaviors that may arise from organizational change has become one of the most important tasks for transformational leaders (Ahn *et al.*, 2004). Transformational leaders propose the vision for the organizational change and draw up long-term plans whereas middle-level managers implement the strategic plans and lower-level employees participate in specific plans for organizational change and in day-to-day activities (Lussier, 2009).

Organizational change, regardless of its size, has a cascading effect on an organization. To survive in dynamic and uncertain competitive environments, organizations need to continuously strive to innovate, and transformational leaders need to balance radical change and incremental change to ensure group members are motivated to engage in innovative behavior. When facing a major radical change, employees are often at a loss or even have a strong resistance to it. In such cases, transformational leaders need to effectively communicate the goals of radical change, acknowledging the challenges, and motivating employees by establishing a strong belief in future success, as innovation can be digested and absorbed only when members of the organization understand the significance of the change (Marris, 1975). While implementing the change, transformational leaders should use their own charisma, listen to ideas and suggestions, and encourage employees to actively participate. Transformational leaders should set an example for employees, motivate their aspiration for innovation, encourage them to put forward creative ideas, improve their work methods, and enhance their ability to innovate, as all of this are crucial for the survival and sustained high performance of an organization.

Innovation management practice has focussed predominately on leadership that boosts innovative behavior in employees, but our results suggest that innovation management may be improved by focussing on organizational change factors that influence how transformational leadership affect innovative behavior in employees. We found that radical change plays a key role in influencing the relationship between transformational leadership and group innovative behavior. Radical change that shifts underlying assumptions, deep-seated mindsets, culture, strategy, or other significant organizational paradigms (Kuhn, 1970) has been positively linked to increased competitiveness when firms are able to clearly differentiate themselves in the market (Denning, 2005). This study highlights the need for training and development that fosters radical change and incremental change. Organizations could implement practices that are responsible for change strategy, implementation, and monitoring, and transformational leaders could execute strategies and plans by developing shorter term operational plans that give life to top management directives to initiate group innovative behavior (Lussier, 2009).

Limitations and future research suggestions

This research has several limitations that should be noted. First, this study adopts a cross-sectional study design, which is insufficient for deriving causal inferences. Future research may adopt a longitudinal study design to investigate causal impacts. Second, some unmeasured variables could be related to transformational leadership and innovative behavior. Although we were able to test multiple moderation processes simultaneously, we neither modeled nor tested potential mediators of these moderation effects.

In fact, research in related areas points to potential mediators, and future research is needed to explore the "black box" of the relationships that emerged in our study. Third, previous studies have found that leadership style directly affects the changing conditions of organizations (Gilley, 2005) and that leadership style is the root cause of change and a key driver of successful organizational change to improve organizational innovation capabilities (Higgs and Rowland, 2005). Prior empirical studies have confirmed that transformational leadership plays a major role in organizational change success. For instance, Zhang (2002) found that at different stages of organizational change, leaders should be flexible and able to switch between transformational and transactional leadership behaviors. Thus, in order to achieve successful organizational change, transformational leaders not only need to transform employee behavior, but also need to pursue their own learning and understanding of the objective laws of the market. They need to know how to adopt radical reform strategies, but also to implement incremental change strategies in all aspects of the organization, including technology, products, process, quality, and marketing.

Conclusion

This cross-level study examines the relationship between transformational leadership and group innovative behavior in the context of dual organizational change. We hypothesize and find that transformational leadership and dual organizational change – radical and incremental change – are positively related to group innovative behavior. Further, radical change moderates the positively relationship between transformational leadership and group innovative behavior such that the relationship will be more positive when the degree of radical change is high. These results suggest that radical change and incremental change are also two important factors influencing group innovative behavior except transformational leadership, that bridges the research gap by investigating how radical and incremental organizational changes, which are organizational-level constructs, influence innovative behavior at the group level. Organizational leaders can adopt transformational leadership to promote group innovative behavior in times of radical change.

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