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Being Different, But Close: How and When Faultlines Enhance Team Learning

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Although work-group diversity may have potential positive impact on team learning and performance, the way diversity characteristics are distributed, influences whether teams exploit this potential. In this quantitative field study on 52 teams in two health-care organizations, we examined the relationship between informational faultlines (the demographic alignment of the informational characteristics of the members in a group, creating relatively homogeneous subgroups) and team learning. We used a moderated-mediation model to test the interplay between faultline strength (the alignment of characteristics) and distance (between subgroups, based on the characteristics) on task and process learning. We hypothesized and found that strong but close subgroups stimulate task and process learning in teams. This study also provides evidence that transactive memory is a mediator in the relationship between the interaction of faultline strength and distance with task and process learning.

Keywords: faultline strength; faultline distance; transactive memory; process learning; task learning

Introduction

In today's organizations, teams have become important building blocks of organizational effectiveness, given their ability to process more information and to solve more complex issues than individuals (Hinsz *et al*., 1997; Mathieu *et al*., 2014). Additionally, due to demographic changes, globalization, workforce mobility and specialization, work groups have become increasingly diverse. Therefore, there has been a growing interest in understanding how teams learn and perform (for reviews see Van Knippenberg and Schippers, 2007; Jackson and Joshi, 2011). Team learning, in this paper defined as a process in which team members 'acquire, share, and combine knowledge through experience with one another' (Argote *et al*., 2001: 370), appears to be a critical group process predicting group performance (Wilson *et al*., 2007).

Research indicates that when teams are diverse in knowledge and information, this can lead to an integration of different views and perspectives, stimulating team learning and innovation (Bunderson and Sutcliffe, 2002; Van der Vegt and Bunderson, 2005). On the other hand, research has shown that diverse teams may become mired in previously adopted routines, unable to learn and change their coordination in fundamentally different ways (e.g., Stewart, 2006; Van Knippenberg and Schippers, 2007; Wilson *et al*., 2007). These mixed findings of past diversity research (for recent meta-analyses see Bell *et al*., 2011; Van Dijk *et al*., 2012) indicate the importance for managers to understand the complexities and dynamics of diverse teams.

In response to these mixed findings, Lau and Murnighan (1998) advanced the conceptualization of the groups' diversity composition by looking at the alignment of members' diversity characteristics, creating homogeneous subgroups, called 'faultlines' (Lau and Murnighan, 1998). For instance, compare a team consisting of two senior nurses and two junior behavioural therapists with a team consisting of a junior and senior nurse and a junior and senior behavioural therapist. According to the faultline perspective, the alignment of member characteristics in the first team captured in the concept of faultline strength, will potentially disrupt team functioning, while the second group is less likely to suffer from subgroup dynamics. So far, ample research has demonstrated the disruptive effects of faultline strength on team level outcomes, such

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as conflict, satisfaction, cohesion, and performance (see Thatcher and Patel, 2011 for a meta-analysis). Despite this convincing evidence, two faultline reviews (Thatcher and Patel, 2012; Meyer *et al*., 2014) indicate, however, that effects of faultline strength on team processes and outcomes are highly contextual, painting an increasingly less coherent picture of faultline research. Some recent studies even found positive effects of faultline strength on information elaboration, reflective reframing (i.e. sense making), employees' loyalty and team performance (e.g., Ellis *et al*., 2013; Hutzschenreuter and Horstkotte, 2013; Iseke *et al*., 2015) with some of them specifying the conditions under which these positive effects may occur (Bezrukova *et al*., 2012; Meyer and Schermuly, 2012; Chung *et al*., 2015; Xie *et al*., 2015). In their faultline review, Thatcher and Patel (2012) have concluded these potential positive effects of faultlines to be an area of future interest.

This study contributes to this literature in three different ways. First, we contribute to the contextual perspective on faultlines, by examining another aspect of faultlines – the demographic *distance* between subgroups – influencing the relationship between faultline strength and team learning. This aspect of group faultlines has been largely ignored in previous faultline research, despite its potentially unique effects on team functioning (c.f. Zanutto *et al*., 2011). To our knowledge, so far only Bezrukova and colleagues (2009) examined faultline distance as a contextual factor and found this factor to further exacerbate negative effects of faultline strength on team performance.

Second, this study contributes to a recent theoretical advancement in faultline research, which conceptualizes subgroups according to whether their members have common identities, resources or task-relevant knowledge (Carton and Cummings; 2012, 2013). This theory in subgroups suggest that the final category – which include informational faultlines may positively impact group level outcomes, through advantageous information processing effects. In this study we examine the potential positive impact of informational faultlines on team learning, under varying degrees of faultline distance. We focus on team learning, as research has shown this type of diversity to be especially relevant for informational faultlines (e.g., Van der Vegt and Bunderson, 2005), thereby contributing to the few faultline studies that have examined this outcome (see Gibson and Vermeulen, 2003; Lau and Murnighan, 2005, Vora and Markóczy, 2012).

Our third contribution is that we respond to the call for faultline research to explore potential mediational processes (Thatcher and Patel, 2011), which help explain the relationship between faultlines and group outcomes. As Carton and Cummings (2012) suggest, the information processing that results from informational faultlines, relates to how subgroups interact and use their mental models. Transactive memory is a mental model of how knowledge is distributed within a team (Lewis, 2003), Therefore, we examine transactive memory as a mediator in contextual relationship between faultline strength and team learning.

Theoretical Background

Developments in faultline literature

The term 'faultline' comes from geological faults, which may split certain sections in the ground. Lau and Murnighan (1998: 328) applied this geological term to teams, where faultlines refer to 'hypothetical dividing lines that may split a group into subgroups based on one or more attributes'. The faultline becomes stronger when more attributes align with each other, thereby creating two or more relatively homogeneous subgroups (Lau and Murnighan, 1998; 2005). The faultline framework proposes that strong faultline teams are more likely to suffer from disruptive processes, which will negatively impact group processes and outcomes than weak faultline teams.

Since the introduction of the faultline framework, an abundance of studies have provided evidence for the disruptive effects of faultline strength, including increased levels of conflict and decreased levels of satisfaction, cohesion, and performance (for reviews and a meta-analysis see Meyer *et al*., 2014; Thatcher and Patel, 2011; 2012). However, the relationship between faultline strength and team learning is a relatively understudied area. So far, to our knowledge, only three studies have examined the relationship between faultline strength and team learning and the results are inconclusive. In an experimental field study on 79 student groups, Lau and Murnighan (2005) found that faultlines based on gender and ethnicity were not related to team learning. In a field study on 156 teams in pharmaceutical and medical product firms, Gibson and Vermeulen (2003) found a curvilinear relationship between faultlines and team learning, indicating that moderate faultline groups had higher levels of team learning than strong or weak faultline groups. More recently, Vora and Markóczy (2012) investigated the moderating impact of faultline strength on the relationship between group learning and performance in a study on 22 student groups. They found that group learning in strong faultline groups was both positively and negatively related to performance, depending on the communication content. As aspects of team learning, task and personal communication appeared to instigate positive effects, whereas performance communication had negative effects on performance in faultline groups.

To summarize, it seems to be difficult to predict the effects of faultline strength on team learning without taking other factors into account. Consistent with past diversity research (Joshi and Roh, 2009), recent faultline reviews (Thatcher and Patel, 2012; Meyer *et al*., 2014) suggest that the effects of faultline strength may be highly contextual. Especially, structural aspects of faultlines are a relatively understudied area (for exceptions see Xie *et al*., 2015; Zanutto *et al*., 2011). We respond to this recent development in faultline research by considering the distance between subgroups as a structural aspect of faultlines and a contextual factor moderating the relationship between faultline strength and team learning.

Distance as a contextual factor

Diversity scholars have argued that studies of diversity should not focus solely on the amount or type of differences between people, but should also address the distance between people resulting from these differences. In the relational demography literature, the concept of demographic distance refers to the degree of isolation of an individual from a group (e.g., Tsui *et al*., 1992). Harrison and Klein (2007) specify the type and direction of distance and refer to separation as horizontal differences in position or opinion among group members and disparity to vertical differences between group members relating to status, hierarchy and pay. A recent study by Siebdrat *et al*. (2013) indicated that the individual's perception of how close or how far another person is in terms of subjective distance is negatively related to team collaboration.

Despite previous research on distance, early work on the effects of faultlines on group functioning has focused largely on the concept of faultline strength, while neglecting the distance between subgroups (cf., Bezrukova *et al*., 2009; Zanutto *et al*., 2011). For instance, in a group consisting of two junior nurses who just graduated from school and two senior behavioural therapists with 25 years of work experience, the distance between subgroups is larger than in a group consisting of two nurses having 15 years of work experience and two senior behavioural therapists with 25 years of work experience. Research exclusively focusing on the concept of faultline strength would consider these groups being similar, while the dynamics of the two groups with a different subgroup distance are likely to be quite different.

So far, only Bezrukova *et al*. (2009) provided an empirical test of the moderating impact of distance, on the relationship between faultline strength and team performance. However, as Bezrukova *et al*. (2010) examined the combined effect of faultline strength and distance in a joint faultline measure, moderating the relationship between perceived interpersonal injustice and psychological distress, they did not consider distance as a separate contextual factor. They found support for their expectation that faultline distance further exacerbated the negative effects of social category faultline strength on team performance. Although their expected positive main effect of informational faultline strength on team performance was not supported, they did find distance to moderate strength in informational based subgroups as well, lowering team performance in groups with distant subgroups. We extend this work by explaining team learning in teams with informational faultlines, for varying levels of faultline distance, and as such contributing to the literature on faultline distance.

Research model and hypotheses

Following past research on team learning that has suggested that teams can learn about different topics (e.g., Jehn and Rupert, 2007; Vora and Markóczy, 2012), we distinguish in this study between task and process learning. Task learning can be defined as the process of improving team performance by sharing and reflecting upon knowledge, ideas and insights regarding the task. Process learning can be defined as the pattern of interaction through which team members create work routines and procedures, adapting them according to what is effective (Jehn and Rupert, 2007).

In line with Carton and Cummings' (2012) theory of subgroups, we extend the information processing view on team diversity (Van Knippenberg *et al*., 2004; Van Knippenberg and Schippers, 2007) to explain the dynamics of informational faultlines. In their theory, Carton and Cummings (2012: 447) contrast the potential fruitful effects of subgroups as 'supportive cohorts' with the potential disruptive effect of subgroups as different 'thought worlds' and argue for a balance between 'having alternative sources of knowledge available and finding a common ground in order to synthesize that knowledge'.

More specifically, in teams with strong informational faultlines, the members can share knowledge and information and take risks within the subgroups before exchanging it between subgroups (Carton and Cummings, 2012). Through supportive cohort forming team members are encouraged to advance in their efforts to express knowledge and divergent viewpoints and to consider, explore, and reflect upon various ideas advanced by other team members at the between subgroup level (e.g., Gibson and Vermeulen, 2003; Larson *et al*., 2004). In line with this, research on shared and unshared information indicates that shared information is mentioned more often and that team members are more likely to consider divergent opinions or countervailing information when such views are held by multiple people (e.g., Azzi, 1993; Wittenbaum and Stasser, 1996), which may in turn enhance team learning.

On the other hand, stronger informational based faultlines can impair the ability for team members to converge their mental models through which they come to a common understanding and interpretation of events (Carton and Cummings, 2012; Mathieu *et al*., 2000). When team members lack common ground, misunderstandings can occur (Carlile, 2002), with team mates misclassifying and misusing others ideas or simply not being able to understand how divergent knowledge is related to their own knowledge. Subgroups are more likely to form different 'thought worlds' (Dougherty, 1992), leading to cognitive disintegration in the team as whole, being incapable to understand each other's interpretative perspectives (Cronin *et al*., 2011). As a result, informational faultline strength is more likely to disrupt team learning.

We argue that faultline distance as a contextual factor, will influence whether subgroups are likely to act as supportive cohorts, resulting in higher levels of team learning, or to disrupt team learning through the creation of different thought worlds. The smaller the distance, the more likely that team members will find common ground between subgroups, which in turn will enable them to express, consider, and explore knowledge and divergent viewpoints in the team as a whole. The receptivity to each other's' knowledge, opinions, and ideas will enable them to learn about task related matters as well as about the processes of working together as a group. In contrast, when subgroups become more distant along informational lines, faultlines are more likely to interfere with the group's ability to find common ground and share and interpret knowledge and information between subgroups. Due to cognitive closure to the knowledge, ideas and opinions of the other subgroup, the team as a whole will be less likely to learn about the task they perform, as well as about the process of team collaboration. We therefore hypothesize:

> **Hypothesis 1** Faultline distance moderates the relationship between informational faultline strength and task and process learning. More specifically, when distance is small, faultline strength is more likely to result in higher levels of task and process learning than is the case when distance is large.

Faultlines and transactive memory

In this study, we examine the role of transactive memory as a mediator explaining the contextual impact of faultline distance on the relationship between faultline strength and task and process learning. A team's transactive memory is a team-level cognitive construct that encodes, retrieves and communicates knowledge about who knows what in a team (Liang *et al*., 1995; Wegner, 1987). This shared cognitive representation of who in the team owns certain knowledge relevant to the task, enables the team to develop informal schemas of accountability, through which they can call upon certain experts in a given situation (Stasser *et al*., 1995). As a result, the transactive memory allows the team to learn about the task and about the process of working together, since the team can more easily coordinate their actions, minimizing the need for discussion, allowing specialisation, and taking optimal advantage of the sources of information that are available within the team (Edmondson *et al*., 2007; Liang *et al*., 1995; Moreland, 1999; Edmondson *et al*., 2007).

One prerequisite for building the transactive memory is the presence of a certain composition of expertise, which represents the 'intellectual capital' or 'knowledge assets' available to the team (Marquardt, 1996) and fosters 'distributed' expertise sharing (Mohammed and Dumville, 2001; Rau, 2005). A group's composition with regard to informational differences thus affects the development of a transactive memory. We expect that faultlines can have beneficial effects for the development of a team's transactive memory, particularly when faultline distance is small. In strong but close subgroups, the team is more likely to find common ground, which will stimulate team members to express, consider, and reflect upon knowledge and divergent viewpoints advanced by other team members (e.g., Azzi, 1993; Wittenbaum and Stasser, 1996). The information that is brought up, is more likely to be seen as credible, as it comes from more than one person (e.g., Kameda *et al*., 1997 Credibility of expertise is an important dimension of transactive memory, where team members rely on (Liang *et al*., 1995; Lewis, 2003). As a result, information is more likely to be stored, encoded and retrieved in a team's transactive memory when this information comes from an informational subgroup that is close.

In contrast, the different thought worlds that may originate in teams with distant subgroups, are more likely to impair the team's ability to build an accurate transactive memory. Due to lack of common ground and cognitive disintegration, members may distort knowledge and information about the expertise of other members in the team (e.g., Cronin *et al*., 2011). In their study on the building of transactive memory systems, Hollingshead and Fraidin (2003) found that, in the absence of explicit information, individuals tend to assign expertise according to stereotypes, which impairs the team's capacity to build an accurate transactive memory. To summarize, teams with strong but close faultlines are more likely to develop accurate transactive memory systems, which will facilitate task and process learning. We therefore propose the two following hypotheses that together with the first hypothesis build a conditional indirect effect. In Figure 1 we provide an overview of the hypothesized relationships.

Hypothesis 2 Faultline distance moderates the relationship between informational faultline strength and transactive memory. More specifically, when distance is small, faultline strength is more likely to produce an accurate transactive memory than is the case when distance is large.

Hypothesis 3 Faultline distance moderates the indirect effect of faultline strength on task and process learning through transactive memory. More specifically, we predict that, in a team with a low faultline distance, faultline strength will have a positive indirect effect on task and process learning, through transactive memory.

Method

Sample and procedure

We conducted a field study in two health-care organizations in the Netherlands, for people with mental and/or physical disabilities. The multidisciplinary teams in our sample provided patients with various types of care, including (institutional) day care and (para)medical care. The teams typically consisted of various combination of behavioural therapists, social and pedagogic workers, nurses, and household attendants, representing a wide diversity of educational backgrounds and levels of work experience gained outside of the team. These characteristics are relevant to the concept of team learning, thus rendering the sample highly appropriate for testing our hypotheses. Our initial survey sample consisted of 67 teams (response rate 84%), with 503 respondents. We also collected archival data to complete the demographic information of the teams. For calculating faultlines, we used the 100% decision rule for work-group diversity (Allen *et al*., 2007), which prescribes that only teams with full demographic information should be included. We also excluded the data from teams with less than 50% response rates from the analyses (the average response rate to the team survey was 82%). Following these decision rules, we ultimately arrived at a final sample of 371 individuals in 52 teams. The average age of the team members was 36; 80% were women and 96% were Dutch. The average group size was 10 members, and the members had worked together for an average of 5 years. Participants represented various levels of education (secondary school 17%, lower vocational education 63.6%, and higher vocational education and university 19.5%).

To increase the response rate for each team, agreements were made with the two organizations that allowed us to visit team meetings, during which we asked the team members to complete the survey. The HR managers of the two organizations asked the team leaders to announce our visits two weeks in advance. During our visit to the team meeting, we explained the purpose and importance of the research and guaranteed anonymity to the team member. Any team members who were not present at the meeting received questionnaires in their mailboxes, along with a request to complete and return them.

Measures

Faultlines. For measuring faultline strength, we used the faultline algorithm developed by Thatcher and colleagues (2003), which has been used in previous faultline studies (e.g., Lau and Murnighan, 2005; Bezrukova *et al*., 2009). The algorithm calculates the percentage of total variation in overall group characteristics explained by the strongest group split. It does this by calculating the proportion of the between-group sum of squares relative to the total sum of squares (faultline strength can vary between 0 and 1, with larger values indicating greater strength). In this study, we calculated overall faultline scores based on educational level and prior work

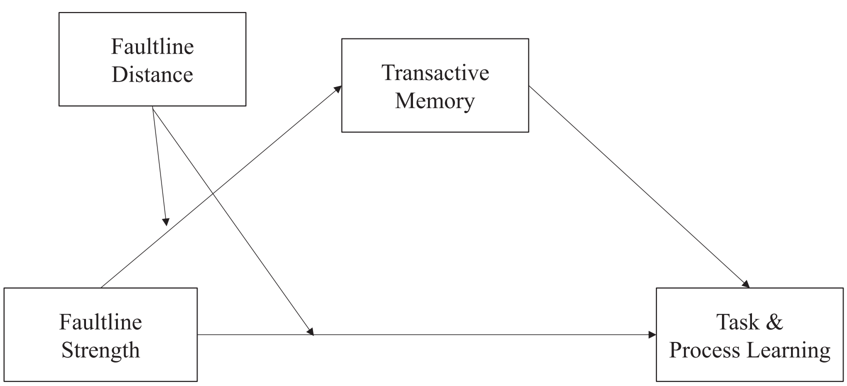

Figure 1 Conceptual model in which the effect of faultline strength on task and process learning is moderated by faultline distance. Transactive memory is the proposed mediator of the conditional effect of faultline strength on task learning and process learning.

experience (in years), given our focus on informational faultlines (Van der Vegt and Bunderson, 2005; Bezrukova *et al*., 2009). The values of faultline strength in our dataset ranged from 0.37 to 0.96, which is an appropriate range for determining faultline effects (e.g., Bezrukova *et al*., 2007; 2009).

To calculate faultline distance, we used the measure developed by Bezrukova and colleagues (2009). This formula reflects how far apart the subgroups are from each other based on demographic characteristics (e.g., the distance score for a group of two junior nurses with vocational training and two senior behavioural therapists with PhDs will be greater than that of a group of two senior doctors and two senior behavioural therapists with PhDs). The score is calculated as the distance between the faultline variable centroids for the subgroups (the Euclidean distance between the two sets of averages):

$$D_g = \sqrt{\sum_{j=1}^{p} \left(\bar{x}_{gj1} - \bar{x}_{gj2}\right)^2},$$

where the centroid (vector of means of each variable) for Subgroup 1 = $\left(\bar{x}_{g11}, \bar{x}_{g21}, \bar{x}_{g31}, \mathrm{K}, \bar{x}_{gp1}\right)$ and the centroid for Subgroup 2 = $\left(\bar{x}_{g12}, \bar{x}_{g22}, \bar{x}_{g32}, \mathrm{K}, \bar{x}_{gp2}\right)$. Faultline distance can take on values between 0 and ∞, with larger values indicating greater distances between demographic subgroups (Bezrukova *et al*., 2009). Values of faultline distance in our sample ranged from 1.56 to 3.65 ($M = 2.42$, $SD = 0.37$).

Transactive memory, task learning, and process learning. We used existing measurement scales to measure the dependent and mediating variable in an employee survey. Each scale consisted of items scored along a Likert scale ranging from 1 to 7. All of the items have been included in Appendix A.

We operationalized transactive memory as the extent to which members are aware of who knows what within their team (Liang *et al*., 1995; Wegner, 1987). Lewis (2003) measures this meta-knowledge dimension of transactive memory as part of a specialisation subscale, using the following item: 'I know which team members have expertise in specific areas'. We slightly adjusted and extended this part of the subscale to formulate the following three items: 'As a team, we are very familiar with each other's expertise'; 'As a team, we know each other's expertise well.'; and 'If I want to know something about a particular topic, I know exactly who to go to'.

We used an adaptation of the task learning scale developed by Rupert and Jehn (2008). The scale consists of eight items, measuring the extent to which team members feel that they share and reflect upon information, knowledge and ideas about the task at hand, as well as the extent to which such learning improves team performance. Sample items include 'As a team, we learn about the task at hand.', and 'By reflecting upon knowledge about the task, we improve our performance'.

We used an adaptation of the process learning scale developed by Rupert and Jehn (2008). The items measure the extent to which team members think that their team has learned about work processes and routines and the extent to which they adjust these processes when they are no longer effective. The scale consists of five items. Sample items include, 'In our team, we learn about different ways to do our work', and 'We adjust our work procedures when they are no longer effective'.

Confirmatory factor analysis (CFA) was executed for assessing the distinctiveness of the concepts of transactive memory, task learning and process learning at the individual level (see for example, Hinkin, 1995, 1998). This was done through AMOS 23 (Arbuckle, 2015). First, we performed CFA on all study variables together, in order to establish whether the three variables were indeed separate constructs. The fit measures we considered were χ^2/df, which should be 4 or lower. Comparative fit index (CFI) should be > 0.90, although a cut-off value of 0.95 seems to be more advisable. The root mean square error of approximation (RMSEA) should be < 0.06 and the standardized root mean square (SRMR) should be < 0.08 (Hu and Bentler, 1998; 1999). Running the CFA supported enough fit ($\chi^2 = 120.849$; $df = 60$; $p < 0.001$; $\chi^2/df = 2{,}014$; CFI = 0.979; SRMR = 0.0,04; RMSEA = 0.0,05).

Second, for assessing validity criterions, we used Hu and Bentler (1998; 1999) criteria for convergent validity indicating that the average variance extracted (AVE) should be higher than 0.5. With regard to convergent validity, the AVE values were between 0.529 and 0.759, which were sufficient (Hu and Bentler, 1999). Discriminant validity of the three variables was further evaluated and proofed to be good, with the square-root of the AVE higher than the inter-construct correlations (Hu and Bentler, 1999).

Third, we checked on common method variance using the single-factor test (Podsakoff *et al*., 2003). The analyses demonstrated that the three factor model was superior to the single-factor model ($\chi^2 = 1000.608$; $df = 63$; $p < 0.001$; $\chi^2/df = 15.883$; CFI = 0.669; SRMR = 0.160; RMSEA = 0,201), which gave support that common method variance was no problem.

Furthermore, we checked on invariance on the organizations which is necessary as the sample was extracted from two organizations using a configural invariance test and a multi-group moderation test (cf. Cheung and Rensvold, 2002). The configural invariance test, which compares the two groups by evaluating the change in χ^2 ($\Delta\chi^2$) relative to the change in degrees of freedom (Δdf), yielded a positive, non-significant result ($\Delta\chi^2 = 9.139$; $\Delta df = 14$; $p = 0.822$). We tested for metric invariance by conducting a multi-group moderation test using critical ratios for differences. None of the items in any of the constructs differed significantly between the two groups. The observations from the two organizations can thus be treated as having come from one group.

Finally, we checked on the reliability. The transactive memory scale had a composite reliability of 0.90, the task learning scale had a composite reliability of 0.93 and the process learning scale had a composite reliability of 0.85 which demonstrated that all scales had enough reliability (Dijkstra and Henseler, 2015).

After the check on validity and reliability, we checked whether aggregation was appropriate for the three scales. The transactive memory scale had an ICC[1] value of 0.06, an ICC[2] value of 0.29, a r_{wg} value of 0.82 and a significant *F*-test ($F(1{,}370) = 1.42$, $p = 0.04$). Moreover, the task learning scale were also acceptable with ICC[1] = 0.06, and ICC[2] = 0.31, a $r_{wg} = 0.94$ (LeBreton and Senter, 2008) and a significant F-test ($F(1{,}370) = 1.45$, $p = 0.03$). Furtermore, the process learning scale had an ICC[1] value of 0.13, an ICC[2] value of 0.52 and r_{wg} value of 0.89. A significant F-test ($F(1{,}370) = 2.10$, $p < 0.001$). Hence, for all three scales we find support for that all scales met the requirements of reliability and that aggregation was appropriate (Klein and Kozlowski, 2000; Biemann *et al*., 2012).

Control variables. We included task routinization as a covariate in our analyses because team learning may be less of an issue for teams with routine tasks (Mohrman *et al*., 1995). The variable was measured using three items adopted from Withey, Daft and Cooper (1983): ‘Our work is routine’; ‘People in this team do about the same job in the same way most of the time’; and ‘Team members perform repetitive activities in doing their jobs’ (Composite reliability = 0.76; ICC[1] = 0.04; ICC[2] = 0.24; $r_{wg} = 0.68$). As such, there is support that this scale met the requirements of reliability and that aggregation was appropriate.

Analysis

The mean scores, standard deviations, scale reliabilities (Cronbach’s alpha) and Pearson correlations were computed for all variables. PROCESS (Hayes, 2013) was used to test the hypotheses. Hypotheses 1 and 2 are based on a set of relationships that constitute a moderated-mediation model, which is formalized in Hypothesis 3. To examine the model, we followed the procedures outlined by, and used the PROCESS macro developed by Hayes (2013). First, we tested the impact of the independent variable (faultline strength) and the moderator variable (faultline distance), along with their interaction on the dependent variables (task learning and process learning). Second, we examined the impact of the independent variable (faultline strength) and the moderator variable (faultline distance), along with their interaction on the mediating variable (transactive memory). Finally, we assessed the significance of the conditional indirect effects identified in Hypothesis 3.

Results

Hypothesis testing

The means, standard deviations, and correlations among the variables in our study are displayed in Table 1. The results reveal three significant positive correlations: between transactive memory and task learning ($r = 0.57$, $p < 0.001$); between transactive memory and process learning ($r = 0.68$, $p < 0.001$); and between task learning and process learning ($r = 0.83$, $p < 0.001$). We used the PROCESS procedure (Hayes, 2013) which provides the results in several steps (see Table 2). In Figure 2 we depicted the models we used for testing the three hypotheses.

Hypothesis 1

The first step (Model 1) examines the conditional effect of faultline strength on task learning and process learning, moderated by faultline distance (Hypothesis 1). We formally examined this interaction using the Johnson–Neyman technique (Bauer and Curran, 2005; Hayes and Matthes, 2009), which mathematically derives the range of significance for the conditional effect of faultline strength. This range contains the values of the moderator, in which the associations between faultline strength and task learning and between faultline strength and process learning are statistically different from zero. The results reveal a significant positive conditional effect of faultline strength on task learning when faultline distance is small (<1.89). The results are similar results for the conditional effect of faultline strength on process learning when faultline distance is small (<2.25). As faultline distance increases, however, the association

Table 1 Means, standard deviations and correlations between the variables

	M	*SD*	*1*	*2*	*3*	*4*	*5*
1. Task routinization	4.10	0.51					
2. Faultline strength	0.63	0.14	0.08				
3. Faultline distance	2.42	0.37	–0.05	0.21			
4. Transactive memory	5.28	0.50	0.18	0.14	0.01		
5. Process learning	5.66	0.42	0.23	0.19	–0.24	0.68**	
6. Task learning	5.66	0.51	0.22	0.24	–0.17	0.57**	0.83**

Note: $N = 52$ groups;
** $p < 0.01$,
* $p < 0.05$.

Table 2 Ordinary least squares regression model coefficients

		Model 1							Model 2				Model 3					
Outcome		*Task learning*			*Process learning*				*Transactive memory*				*Task learning*			*Process learning*		
Predictor	→	*B*	*p*	*(SE)*	*B*	*p*	*(SE)*		*B*	*p*	*(SE)*		*B*	*p*	*(SE)*	*B*	*p*	*(SE)*
Intercept		2.001	0.245	1.699	0.748	0.668	1.730		−1.143	0.658	2.568		2.483	0.217	2.106	1.471	0.366	1.610
Task routinization		0.145	0.475	0.202	0.191	0.361	0.207		0.148	0.486	0.211		0.083	0.632	0.172	0.097	0.441	0.125
Faultline strength (Str)	c_1 →	5.739	0.032	2.599	7.903	0.002	2.467	a_1→	9.155	0.041	4.350	c'_1 →	1.878	0.604	3.818	2.113	0.477	2.945
Faultline distance (Dist)	c_2 →	1.054	0.087	0.604	1.482	0.022	0.624	a_2→	2.265	0.037	1.052	c'_2 →	0.099	0.906	0.905	0.049	0.941	0.666
Faultline strength × faultline distance	c_3 →	-2.019	0.038	0.946	-2.889	0.003	0.920	a_3→	−3.538	0.043	1.702	c'_3 →	−0.527	0.708	1.487	−0.651	0.561	1.112
Transactive memory												b →	0.422	0.035	.148	0.633	0.001	0.169
Model R^2		.203			.24				.174				.415			.563		
F(3,48)		2.108	0.095		5.144	<0.05			2.520	0.054		F(4,47)	2.544	<0.05		6.392	<0.001	

Note. $N = 52$ teams. Faultline strength and distance calculated based on educational level and prior work experience (in years).

between faultline strength and task learning disappears, although a significant negative effect on process learning emerges (faultline distance > 3.44). These findings support Hypothesis 1 (see Figures 3 and 4).

Hypothesis 2

The second step (Model 2) examines a conditional effect of faultline distance on transactive memory, with faultline distance serving as moderator. The results, tested according to the Johnson–Neyman technique (cf. Hayes and Matthes, 2009), reveal that faultline strength has a significant positive conditional effect on transactive memory when faultline distance is very small (<1.61). As faultline distance increases, however, the effect of faultline strength on transactive memory becomes negative, albeit non-significant. These findings support Hypothesis 2 (see Figure 5).

Hypothesis 3

The final step (Model 3) examines whether the indirect effect of faultline strength on task and process learning through transactive memory is moderated by faultline distance. Results from the prior analyses have established that the path from faultline strength to transactive memory is moderated by faultline distance. The indirect effect of faultline strength on task learning and process learning through transactive memory is a function, defined as the product of the conditional effect of faultline strength on transactive memory and the effect of transactive memory on task learning and process learning, controlling for faultline strength (Hayes, 2015):

$$\omega = (a_1 + a_3 W)b_1,$$

which can be rewritten as:

$$\omega_{\text{task learning}} = (a_1 + a_3 W)b_1 = a_1 b_1 + a_3 b_1 W = 3.861 - 1.492W,$$
$$\omega_{\text{process learning}} = (a_1 + a_3 W)b_1 = a_1 b_1 + a_3 b_1 W = 5.790 - 2.238W,$$

where W is the value of faultline distance, and b is the effect of transactive memory on task learning and process learning from the regression model summarized in Table 2, Model 3.

The indirect effect of faultline strength on task and process learning through transactive memory seems to decrease with increasing faultline distance, as the index of the moderated mediation (slope) is negative (see Figures 6 and 7). When faultline distance is low (<2.59), the indirect effect is positive, meaning that greater faultline strength leads to higher transactive memory, which in turn results in higher task learning. A similar trend can be observed for the indirect effect of faultline distance on process learning. Although we did not formulate any hypotheses in this regard, the results

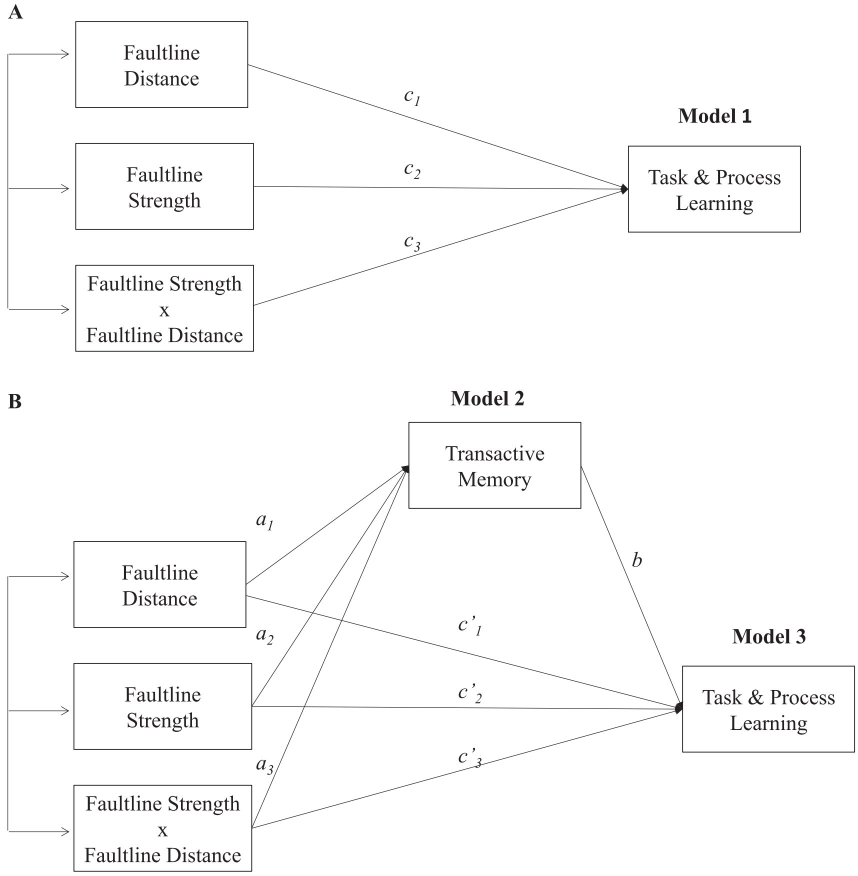

Figure 2 Conceptual model in Figure 1 represented in the form of a path model (A) and visually depicting the three ordinary least squares regressions estimated (B) and reported in Table 2.

reveal that the indirect effect becomes negative as faultline distance increases. They also indicate that, when faultline strength and faultline distance are held constant, transactive memory has a positive significant effect on task learning ($b = .422$, $p < 0.05$) and process learning ($b = .633$, $p < 0.05$).

The indirect effect can also be described as the difference between the total effect of the interaction (c_3) and the direct effect of the interaction after controlling for a proposed mediator (c'_3). As noted by Morgan-Lopez and MacKinnon (2006), this difference is equal to the product of the effect of the interaction on the proposed mediator (a_3) and the effect of the proposed mediator on the outcome controlling for the interaction (b). In fact, $a_3 b = c_3 - c'_3$: –3.538* .422 = –1.492 = –.202 to –.527 for task learning and –3.538* .633 = –2.238 = –2.889 to –.651 for process learning (differences are due to rounding). The 95% bootstrap interval for the index of the moderated mediation, based on 10,000 bootstrap samples using the PROCESS macro (Hayes, 2013) is entirely below zero (–4.074 to –.151 for task learning and –5.286 to –.169 for process learning). As indicated by these results, the indirect effect of faultline strength on task and process learning through transactive memory is negatively moderated by faultline distance. Hypothesis 3 is thus supported.

Discussion

Summary of research findings

In this study, we examined the contextual effect of faultline distance on the relationship between informational faultline strength and task and process learning. In addition, we examined transactive memory as a mediating mechanism in this relationship. We built a moderated-mediation model through three hypotheses, which were largely supported by our findings. First, we proposed and found that faultline distance moderates the relationship of faultline strength with task and process learning, but only when faultline distance is small. More specifically, in teams with a small faultline distance, faultline strength is positively related to task and process learning. This relationship disappears as faultline distance increases. These results partly support our hypothesis,

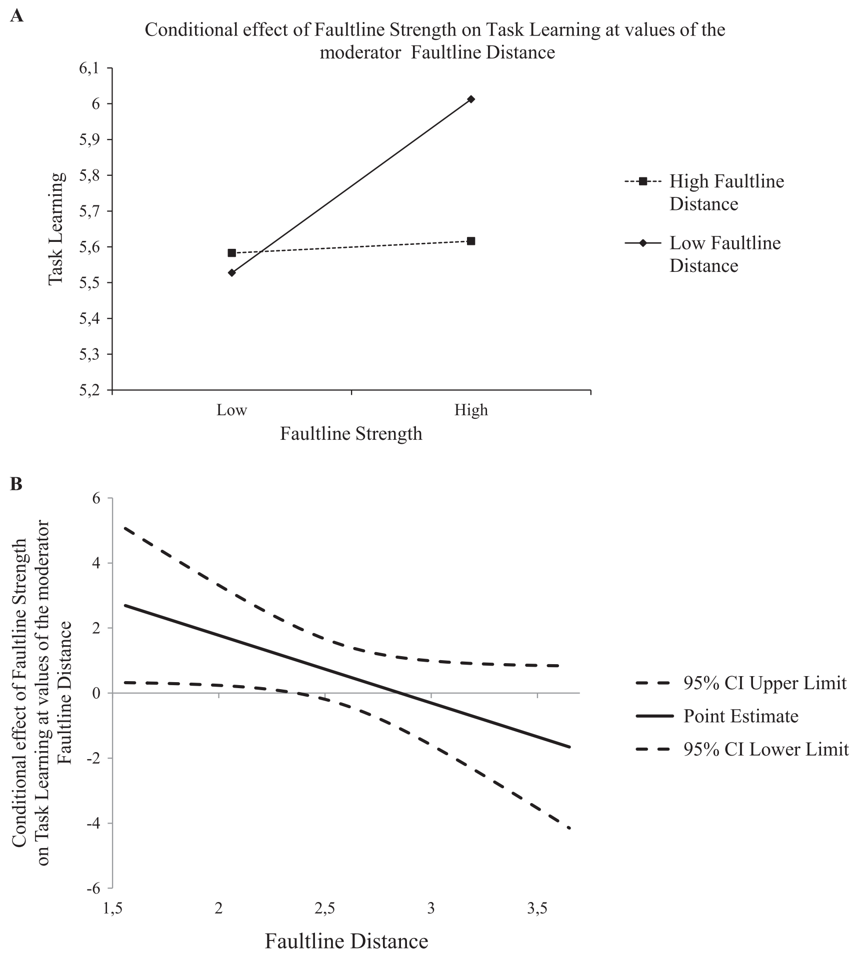

Figure 3 Task learning as a function of faultline strength and faultline distance (A) and John–Neyman regions of significance for the conditional effect of faultline strength at values of faultline distance (B).

confirming that faultline strength can enhance team learning under certain conditions (i.e. when distance is small). These results add to previous research indicating that faultline distance may qualify the effects of strength on team processes and outcomes (Bezrukova *et al.*, 2009). We extend this past work by showing that, under certain levels of faultline distance, faultline strength can also have positive effects and promote team learning.

In our second hypothesis, we proposed and found that faultline distance moderates the effect of faultline strength on transactive memory. In this case as well, when faultline distance is small, faultline strength promotes the team's transactive memory. In addition, the relationship between faultline strength and transactive memory tends to become significant at high levels of faultline distance, thus indicating that faultline strength decreases transactive memory as faultline distance increases. These results support our predictions.

In the final step of our model, we proposed and found that the indirect effect of faultline strength on task and process learning through transactive memory is contingent on faultline distance. In teams with low faultline distance, the indirect effect was positive, indicating that faultline strength promotes the team's transactive memory, which in turn enhances task and process learning. Our results do not reveal any evidence of this process for teams with greater faultline distance, although the downward slope suggests that the process become negative when faultline distance is high. A low faultline distance may thus create common ground through which the team can form a transactive memory, and subsequently promoting team learning processes.

Contributions to the literature

These findings contribute to the contextual perspective on faultlines which examines when and how the effects of faultline strength on team processes and outcomes may vary. Most of these contextual studies report that negative faultline effects are exacerbated or decreased (e.g., Bezrukova *et al.*, 2009; Homan *et al.*, 2007; Rico *et al.*, 2007; for exceptions with conditional positive effects see Bezrukova *et al.*, 2012; Meyer and Schermuly, 2012; Chung *et al.*, 2015; Xie *et al.*, 2015). This study extends

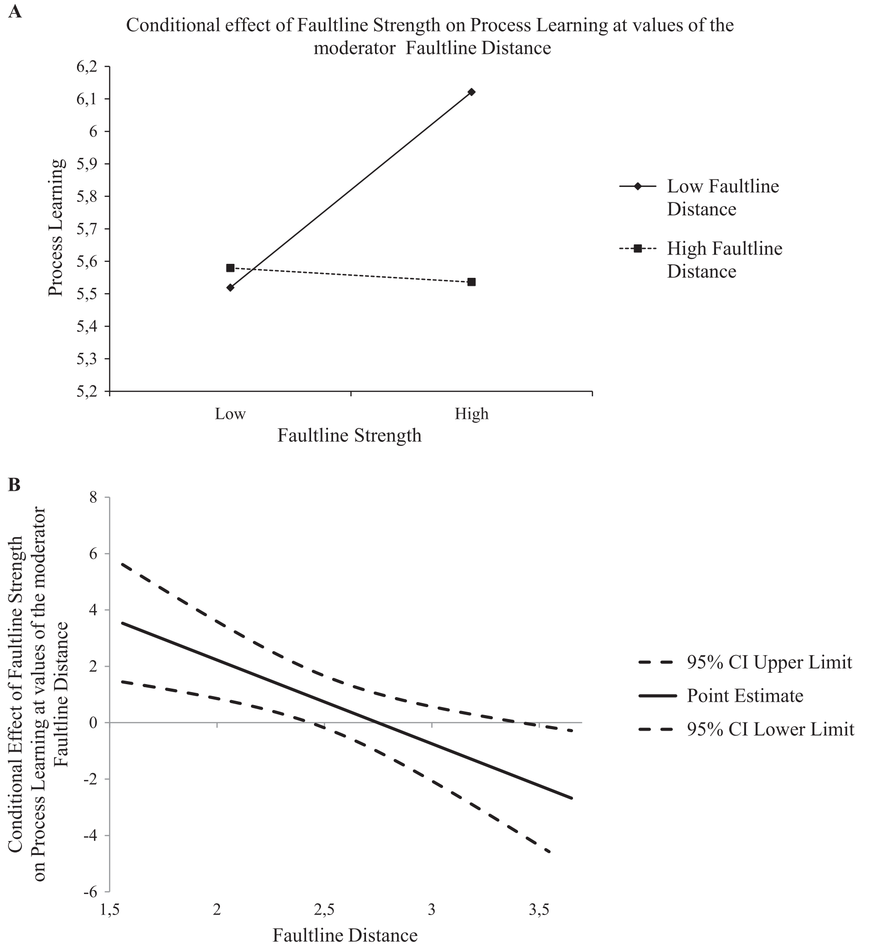

Figure 4 Process learning as a function of faultline strength and faultline distance (A) and John–Neyman regions of significance for the conditional effect of faultline strength at values of faultline distance (B).

this past work by demonstrating that faultline strength can enhance team processes and outcomes under certain conditions, thereby adding to the growing amount of studies that indicates that faultlines may have positive effects (cf. Meyer *et al*., 2014; Thatcher and Patel, 2011; 2012). We found that faultline strength can boost team learning, through an accurate development of transactive memory based on different prior educational and work experiences, as long as subgroups are not too far apart. To date, transactive memory has proven an important facilitator of team learning, the formation of which is generally assumed to be influenced by group composition. Nevertheless, our study is the first to test transactive memory as a potential mechanism, thereby responding to the call from faultline research to unravel the underlying processes explaining the relationships between faultlines and team outcomes (e.g., Thatcher and Patel, 2012).

The existing literature focuses largely on the effects of faultline strength on group processes and outcomes, largely neglecting the effect of faultline distance (for exceptions see Bezrukova *et al*., 2009; 2010; Zanutto *et al*., 2011). The results of this study suggest that the group dynamics of a team with two subgroups having lower and higher vocational training and having a difference of five years of work experience are indeed likely to differ from those of a team consisting of members with lower vocational training and university education and with a 20-year difference in work experience. Although the faultline strength of these groups is the same, the faultline distance is likely to determine whether these teams will have different group processes. When team members form strong but close informational cohorts, they are more likely to bring forth their knowledge and opinions in the team. This can help them to build a transactive memory system, which will subsequently promote team learning.

Limitations and future research directions

This study is subject to several limitations. First, it is cross-sectional, which limits the ability to draw any causal conclusions. Future studies should therefore collect longitudinal data and test the relationship between faultlines and team learning in an experimental setting in

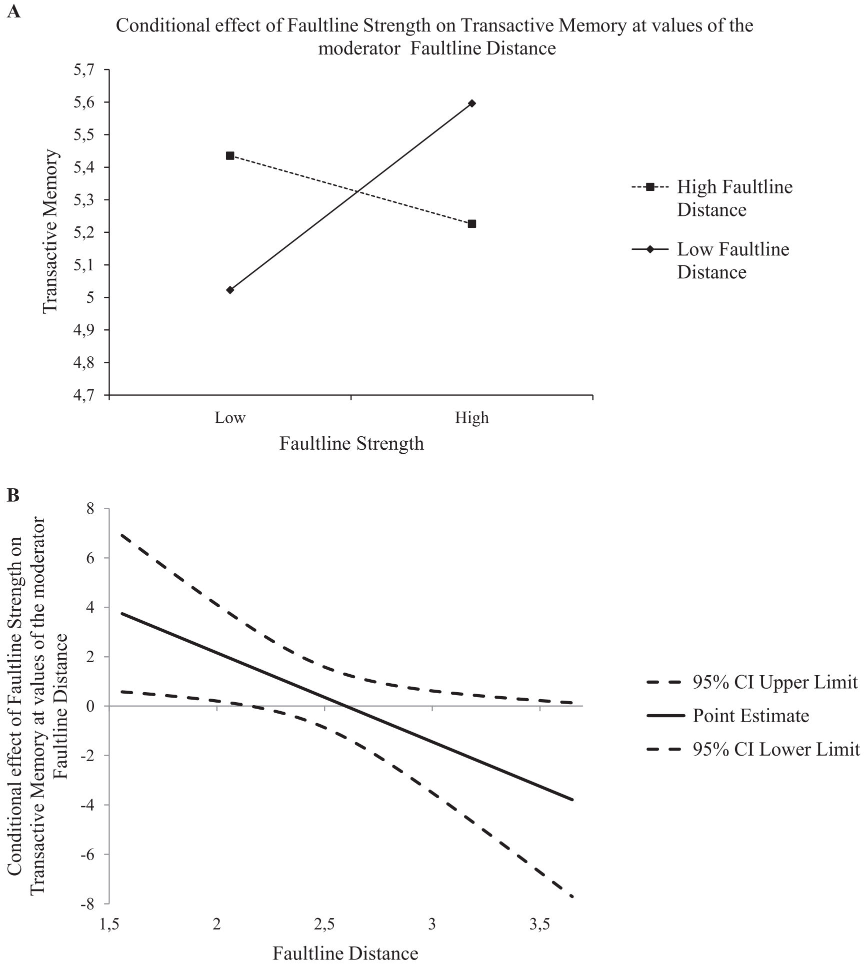

Figure 5 Transactive memory as a function of faultline strength and faultline distance (A) and John–Neyman regions of significance for the conditional effect of faultline strength at values of faultline distance (B).

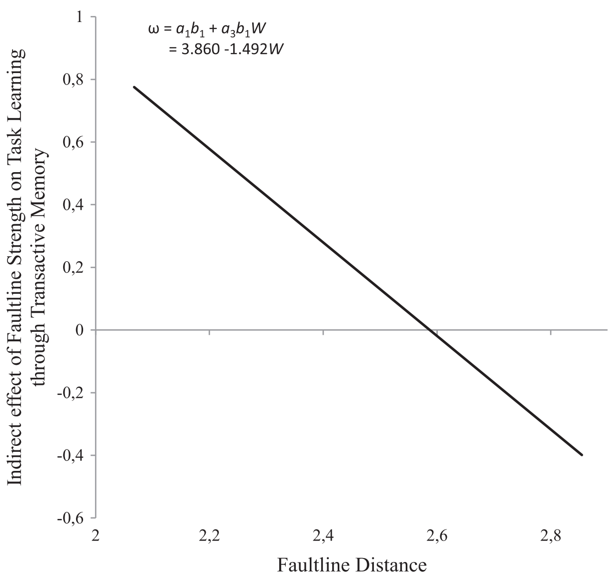

Figure 6 Indirect effect of faultline strength on task learning through transactive memory at values of the moderator faultline distance.

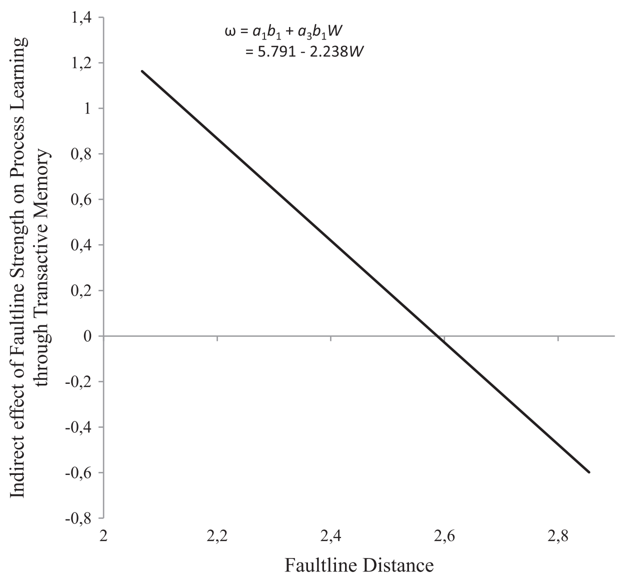

Figure 7 Indirect effect of faultline strength on process learning through transactive memory at values of the moderator faultline distance.

order to facilitate causal inference. Second, this study was conducted in two health-care organizations with the same types of teams, performing similar tasks. The findings of this study might have limited generalizability to teams in other sectors performing different tasks. Future research should therefore attempt to replicate these findings in other settings.

Future research should consider different demographic attributes on which objective faultlines can be based. In this study, we addressed faultlines based on educational level and prior work experience, given our interest in informational characteristics that are relevant to team learning (Hinsz *et al*., 1997; Van der Vegt and Bunderson, 2005). Given that some of the participants in our sample had gained a relatively high level of relevant work experience prior to joining the team, faultlines based on prior work experience were much more influential than faultlines calculated based on total work experience (which consists of the sum of work experience prior to and after entering the team). The fact that our findings hold for faultlines based on educational level and prior work experience makes sense, as work experience gained outside the team represents a form of expertise that is unique and different from work experience gained together with other members in the team. This expertise is relevant to the concepts of transactive memory and team learning, which we have investigated in this study. Future research should therefore specify the type of work experience that is being studied, in addition to identifying the demographic characteristics that are most relevant given the constructs under study.

Future research should also examine other moderators and mediators that may specify the conditions under which subgroup formation can promote team learning and disentangle the processes underlying this effect. For example, past research has indicated that moderators such as diversity beliefs and super-ordinate identity can help to weaken negative faultline effects (c.f. Thatcher and Patel 2012, e.g. Homan *et al*., 2007; Bezrukova *et al*., 2009). In addition, information sharing has been identified as an important mediator in the relationship between faultlines and team performance (Homan *et al*., 2007; 2008; Sawyer *et al*., 2006), although it has yet to be related to team learning in faultline groups. Furthermore, future research should add objective performance data, to test the assumption that enhanced levels of team learning that may occur in small but close subgroups are related to higher levels of performance.

Conclusion and managerial implications

For managers, it is important to realize that subgroup formation can promote team learning, as long as the distances between subgroups are not too great. Similarities based on educational level and prior work experience between members within the same subgroup can help team members to advance their expertise and views within the team as a whole. When these opportunities exist within the team, and when members from different subgroups listen to each other, team members are more likely to have accurate perceptions of who knows what in the team, through which learning is stimulated.

An implication of this study is that when teams are composed, managers should avoid combining members with extreme differences in the level of prior work experience in particular, that are likely to form a subgroup within a team, given their similarities based on other diversity characteristics. In teams that are already formed and may have strong and distant informational subgroups, managers should facilitate knowledge exchange to help the team to build an accurate transactive memory system. Past research has indicated several managerial actions to mitigate potential negative faultline effects, such as the setting of shared objectives (Van Knippenberg *et al*., 2011), organizing informal meetings where members can exchange social information (Rupert and Jehn, 2008 Tuggle *et al*., 2010), by promoting pro-diversity beliefs (Homan *et al*., 2007, 2010) and the teams' superordinate identity (Homan *et al*., 2008; Jehn and Bezrukova, 2010), for instance by team building activities. Through these actions, managers can help mitigate the potential process losses and coordination processes that may disrupt team learning in strong but distant faultlines. To conclude, in order to benefit from the informational differences available to the team, team members must be different, but close enough to relate to each other. It is the task for managers and leaders to help facilitate this interaction process.

Appendix: Team learning and transactive memory items

Task learning

1. By working together as a team, we learn more about the content of the task.
2. By reflecting upon knowledge about the task, we improve our performance.
3. As a team, we learn about the task at hand.
4. We improve our performance on the task by sharing task-related knowledge with each other.
5. Through sharing insights with each other, we learn as a team about the content of the task.
6. As a team, we improve our performance by learning about the task.
7. Through interaction with each other, we increase our potential to perform the task.

(Continues)

Appendix (Continued)

8. As a team, we improve our performance by learning about the task.

Process learning

9. In our team, we learn about different ways to do our work.
10. By talking about the way we do our work, we learn to improve our performance.
11. As a team, we develop work routines that help us to improve the performance of our work.
12. We improve our performance by reflecting upon the way we do our work.
13. We adjust our work processes when they are no longer effective.

Transactive memory

14. As a team, we know who is good in what.
15. As a team, we know each other's expertise well.
16. If I want to know something about a particular topic, I know exactly who to go to.

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References

Allen, N. J., D. J. Stanley, H. M. Williams and S. J. Ross, 2007, "Assessing the impact of non-response on work group diversity effects". *Organizational Research Methods*, **10**: 262–286.

Arbuckle, J. L., 2015. *Amos 23 User's Guide*. Crawfordville, FL: IBM.

Argote, L., D. Gruenfeld and C. Naquin, 2001. "Group learning in organizations". In Turner M. E. (ed.), *Groups at work: Advances in theory and research*. New York: Erlbaum, pp. 369–411.

Azzi, A. E., 1993, "Implicit and category-based allocations of decision-making power in Majority-minority relations". *Journal of Experimental Social Psychology*, **29**: 203–228.

Bauer, D. J. and P. J. Curran, 2005, "Probing interactions in fixed and multilevel regression: Inferential and graphical techniques". *Multivariate Behavioral Research*, **40**: 373–400.

Bell, S. T., A. J. Villado, M. A. Lukasik, L. Belau and A. L. Briggs, 2011, "Getting specific about demographic diversity variable and team performance relationships: A meta–analysis". *Journal of Management*, **37**: 709–743.

Bezrukova, K., S. M. B., Thatcher, and K. A., Jehn, 2007. Group heterogeneity and faultlines: Comparing alignment and dispersion theories of group composition. In K. J. Behfar and L.L. Thompson (Eds.)., *Conflict in organizational groups: New directions in theory and practice* (pp. 57–92) Evanston, IL: Northwestern University Press.

Bezrukova, K., K. A. Jehn, E. L. Zanutto and S. M. B. Thather, 2009, "Do workgroup faultlines help or hurt? A moderated model of faultlines, team identification, and group performance". *Organization Science*, **20**: 35–50.

Bezrukova, K., C. Spell and J. Perry, 2010, "Violent splits or healthy divides? Coping with injustice through faultlines". *Personnel Psychology*, **63**: 719–751.

Bezrukova, K., S. M. B. Thatcher, K. A. Jehn and C. S. Spell, 2012, "The effects of alignments: Examining group faultlines, organizational cultures, and performance". *Journal of Applied Psychology*, **97**: 77–92.

Biemann, T., M. S. Cole and S. Voelpel, 2012, "Within-group agreement: On the use (and misuse) of r WG and r WG (J) in leadership research and some best practice guidelines". *The Leadership Quarterly*, **23**: 66–80.

Bunderson, J. S. and K. M. Sutcliffe, 2002, "Comparing alternative conceptualizations of functional diversity in management teams: Process and performance effects". *Academy of Management Journal*, **45**: 875–893.

Carlile, P. R., 2002, "A pragmatic view of knowledge and boundaries: Boundary objects in new product development". *Organization Science*, **13**: 442–445.

Carton, A. M. and J. N. Cummings, 2012, "A theory of subgroups in work teams". *Academy of Management Review*, **37**: 441–470.

Carton, A. M. and J. N. Cummings, 2013, "The impact of subgroup type and subgroup configurational properties on work team performance". *Journal of Applied Psychology*, **95**: 732–758.

Cheung, G. W. and R. B. Rensvold, 2002, "Evaluating goodness-of-fit indexes for testing measurement invariance". *Structural Equation Modeling*, **9**: 233–255.

Chung, Y., H. Liao, S. Jackson, M. Subramony, S. Colakoglu and Y. Jiang, 2015, "Cracking but not breaking: Joint effects of faultline strength and diversity climate on loyal behavior". *Academy of Management Journal*, **58**: 1495–1515.

Cronin, M. A., K. Bezrukova, L. R. Weingart and C. H. Tinsley, 2011, "Subgroups within a team: The role of cognitive and affective integration". *Journal of Organizational Behavior*, **32**: 831–849.

Dijkstra, T. K. and J. Henseler, 2015, "Consistent partial least squares path modeling". *MIS Quarterly*, **39**: 297–316.

Dougherty, D., 1992, "Interpretive barriers to successful product innovation in large firms". *Organization Science*, **3**: 179–202.

Edmondson, A. C., J. R. Dillon and K. S. Roloff, 2007, "Three perspectives on team learning: Outcome improvement, task mastery, and group process". *The Academy of Management Annals*, **1**: 269–314.

Ellis, A. P. J., K. M. Mai and J. S. Christian, 2013, "Examining the asymmetrical effects of goal faultlines in groups: A categorization-elaboration approach". *Journal of Applied Psychology*, **98**: 948–961.

Gibson, C. and F. Vermeulen, 2003, "A healthy divide: Subgroups as a stimulus for team learning behavior". *Administrative Science Quarterly*, **28**: 202–239.

Hayes, A. F., 2015, "An index and test of linear moderated mediation". *Multivariate Behavioral Research*, **50**: 1–22.

Hayes, A. F., 2013, *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press.

Hayes, A. F. and J. Matthes, 2009, "Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations". *Behavior Research Methods*, **41**: 924–936.

Harrison, D. A. and K. J. Klein, 2007, "What's the difference? Diversity constructs as separation, variety, or disparity in organizations". *Academy of Management Review*, **32**: 1199–1228.

Hinkin, T. R., 1998, "A brief tutorial on the development of measures for use in survey questionnaires". *Organizational Research Methods*, **1**: 104–121.

Hinkin, T. R., 1995, "A review of scale development practices in the study of organizations". *Journal of Management*, **21**: 967–988.

Hinsz, V. B., R. S. Tindale and D. A. Vollrath, 1997, "The emerging conceptualization of groups as information processors". *Psychological Bulletin*, **121**: 43–64.

Hollingshead, A. B. and S. Fraidin, 2003, "Gender stereotypes and assumptions about expertise in transactive memory". *Journal of Experimental Social Psychology*, **39**: 355–363.

Homan, A. C., L. L. Greer, K. A. Jehn and L. Koning, 2010, "Believing shapes seeing: The impact of diversity beliefs on the construal of group composition". *Group Processes and Intergroup Relations*, **13**: 477–493.

Homan, A. C., J. R. Hollenbeck, S. E. Humphrey, D. Van Knippenberg, D. R. Ilgen and G. A. Van Kleef, 2008, "Facing differences with an open mind: Openness to experience, salience of intragroup differences, and performance of diverse work groups". *Academy of Management Journal*, **51**: 1204–1222.

Homan, A. C., D. Van Knippenberg, G. A. Van Kleef and C. K. W. De Dreu, 2007, "Bridging faultlines by valuing diversity: Diversity beliefs, information elaboration, and performance in diverse work groups". *Journal of Applied Psychology*, **92**: 1189–1199.

Hu, L. T. and P. M. Bentler, 1998, "Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification". *Psychological Methods*, **3**: 424–453.

Hu, L. T. and P. M. Bentler, 1999, "Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives". *Structural Equation Modeling: A Multidisciplinary Journal*, **6**: 1–55.

Hutzschenreuter, T. and J. Horstkotte, 2013, "Performance effects of top management team demographic faultlines in the process of product diversification". *Strategic Management Journal*, **34**: 704–726.

Iseke, A., B. Kocks, M. R. Schneider and C. Schulze-Bentrop, 2015, "Cross-cutting organizational and demographic divides and the performance of research and development teams: Two wrongs can make a right". *R & D management*, **45**: 23–40.

Jackson, S. E. and A. Joshi, 2011. "Work team diversity". In Zedeck S. (ed.), *APA handbook of industrial and organizational psychology, Vol.1: Building and developing the organization. APA Handbooks in Psychology*. Washington, DC: APA, pp 651–686.

Jehn, K. A. and K. Bezrukova, 2010, "The faultline activation process and the effects of activated faultlines on coalition formation, conflict, and group outcomes". *Organizational Behavior and Human Decision Processes*, **112**: 24–42.

Jehn, K. A. and J. Rupert, 2007. ""Group faultlines and team learning: How to benefit from different perspectives". In Sessa V. and M. London (eds.), *Work group learning: Understanding, improving and assessing how groups learn in organizations*. Lawrence Erlbaum Asssociates: Mahwah, NJ, pp 121–149.

Joshi, A. and H. Roh, 2009, "The role of context in work team diversity research: A meta-analytic review". *Academy of Management Journal*, **52**: 599–627.

Kameda, T., Y. Ohtsubo and M. Takezawa, 1997, "Centrality in sociocognitive networks and social influence: An illustration in a group decision making context". *Journal of Personality and Social Psychology*, **73**: 296–309.

Klein, K. J. and S. W. J. Kozlowski, 2000. *Multilevel theory, research, and methods in organizations: foundations, extensions, and new directions*. San Francisco CA: Jossey-Bass.

Larson, J. R., E. G. Sargis and C. W. Bauman, 2004, "Shared knowledge and subgroup influence during decision–making discussions". *Journal of Behavioral Decision Making*, **17**: 245–262.

Lau, D. and J. K. Murnighan, 1998, "Demographic diversity and faultlines: The compositional dynamics of organizational groups". *Academy of Management Review*, **23**: 325–340.

Lau, D. and J. K. Murnighan, 2005, "Interactions within groups and subgroups: The effects of demographic faultlines". *Academy of Management Journal*, **48**: 645–659.

LeBreton, J. M. and J. L. Senter, 2008, "Answers to 20 questions about interrater reliability and interrater agreement". *Organizational Research Methods*, **11**: 815–852.

Lewis, K., 2003, "Measuring transactive memory systems in the field: Scale development and validation". *Journal of Applied Psychology*, **884**: 587–604.

Liang, D. W., R. Moreland and L. Argote, 1995, "Group versus individual training and group performance: The mediating role of transactive memory". *Personality and Social Psychology Bulletin*, **21**: 384–393.

Marquardt, M. J., 1996. *Building the learning organization: A systems approach to quantum improvement and global success*. New York: McGraw Hill.

Mathieu, J. E., T. S. Heffner, G. F. Goodwin, E. Salas and J. A. Cannon-Bowers, 2000, "The influence of shared mental models on team process and performance". *Journal of Applied Psychology*, **85**: 273–283.

Mathieu, J. E., S. I. Tannenbaum, J. S. Donsbach and G. M. Alliger, 2014, "A review and integration of team composition models: Moving toward a dynamic and temporal Framework". *Journal of Management*, **40**: 130–160.

Meyer, B., A. Glenz, M. Antino, R. Rico and A. González-Romá, 2014, "Faultlines and subgroups: A meta–review and measurement guide". *Small Group Research*, **45**: 633–670.

Meyer, B. and C. C. Schermuly, 2012, "When beliefs are not enough: Examining the interaction of diversity faultlines, task motivation, and diversity beliefs on team performance". *European Journal of Work and Organizational Psychology*, **21**: 456–487.

Mohammed, S. and B. C. Dumville, 2001, "Team mental models in a team knowledge framework: Expanding theory and measurement across disciplinary boundaries". *Journal of Organizational Behavior*, **22**: 89–106.

Mohrman, S. A., S. G. Cohen and A. M. Mohrman, 1995. *Designing Team-based Organizations*. San Francisco, CA: Jossey-Bass.

Moreland, R. L., 1999. "Transactive memory: Learning who knows what in work groups and organizations". In Thompson L. L., J. M. Levine and D. M. Messick (eds.), *Shared cognition in organizations: The management of knowledge*. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 3–32.

Morgan-Lopez, A. A. and D. P. MacKinnon, 2006, "Demonstration and evaluation of a method for assessing mediated moderation". *Behavior Research Methods*, **38**: 77–87.

Podsakoff, P. M., S. B. MacKenzie, J. Y. Lee and N. P. Podsakoff, 2003, "Common method biases in behavioral research: a critical review of the literature and recommended remedies". *Journal of Applied Psychology*, **88**: 879–903.

Rau, D., 2005, "The influence of relationship conflict and trust on the transactive memory–performance relation in top management teams". *Small Group Research*, **36**: 746–771.

Rico, R., E. Molleman, M. Sánchez–Manzanares and G. S. Van der Vegt, 2007, "The effects of diversity faultlines and team task autonomy on decision quality and social integration". *Journal of Management*, **33**: 111–132.

Rupert, J. and K. A. Jehn, 2008, "Diversity and team learning: The role of faultlines and psychological safety". *Behavior and Organization*, **21**: 184–206.

Sawyer, J. E., M. A. Houlette and E. L. Yeagley, 2006, "Decision performance and diversity structure: Comparing faultlines in convergent, crosscut, and racially homogeneous groups". *Organizational Behavior and Human Decision Processes*, **99**: 1–15.

Siebdrat, F. M., Hoegl and H., Ernst. 2014, Subjective distance and team collaboration in distributed teams. *Journal of Product Innovation Management*, **31**(4), 765–779.

Stasser, G. and W. Titus, 1985, "Pooling of unshared information in group decision making: Biased information sampling during discussion". *Journal of Personality and Social Psychology*, **48**: 1467–1478.

Stewart, G. L., 2006, "A meta-analytic review of relationships between team design features and team performance". *Journal of Management*, **32**: 29–54.

Thatcher, S. M. B. and P. C. Patel, 2011, "Demographic faultlines: A meta-analysis of the literature". *Journal of Applied Psychology*, **96**: 1119–1139.

Thatcher, S. M. B. and P. C. Patel, 2012, "Group faultlines: A review, integration, and guide to future research". *Journal of Management*, **38**: 969–1009.

Tsui, A. S., T. D. Egan and C. A. O'Reilly, 1992, "Being different: Relational demography and organizational attachment". *Administrative Science Quarterly*, **37**: 549–579.

Tuggle, C. S., K. Schnatterly and R. A. Johnson, 2010, "Attention patterns in the boardroom: How board composition and processes affect discussion of entrepreneurial issues". *Academy of Management Journal*, **53**: 550–571.

Van Der Vegt, G. S. and J. S. Bunderson, 2005, "Learning and performance in multidisciplinary teams: The importance of collective team identification". *Academy of Management Journal*, **48**: 532–547.

Van Dijk, H., M. L. Van Engen and D. Van Knippenberg, 2012, "Defying conventional wisdom: A meta-analytical examination of the differences between demographic and job-related diversity relationships with performance". *Organizational Behavior and Human Decision Processes*, **119**: 38–53.

Van Knippenberg, D., C. K. W., De Dreu, and A. C., Homan, 2004. Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, **98**: 1008–1022.

Van Knippenberg, D., J. F. Dawson, M. A. West and A. C. Homan, 2011, "Diversity faultlines, shared objectives, and top management team performance". *Human Relations*, **64**: 307–336.

Van Knippenberg, D. and M. C. Schippers, 2007, "Workgroup diversity". *Annual Review of Psychology*, **58**: 515–541.

Vora, D. and L. Markóczy, 2012, "Group learning and performance: The role of communication and faultlines". *The International Journal of Human Resource Management*, **23**: 2374–2392.

Wegner, D. M., 1987, "Transactive memory: A contemporary analysis of the group mind". In Mullen G. and G. Goethals (eds.), *Theories of group behaviour*. New York: Springer, pp. 185–208.

Withey, M., R. L. Daft and W. H. Cooper, 1983, "Measures of Perrow's work unit technology: An empirical assessment and a new scale". *Academy of Management Journal*, **26**: 45–63.

Wilson, J. M., P. S. Goodman and M. A. Cronin, 2007, "Group learning". *Academy of Management Review*, **32**: 1041–1059.

Wittenbaum, G. M. and G. Stasser, 1996. "Management of information in small groups". In Nye J. L. and A. M. Brower (eds.), *What's social about social cognition? Social cognition research in small groups*. Thousand Oaks, CA: Sage, pp 3–28.

Xie, X. Y., W. L. Wang and Z. J. Qi, 2015, "The effects of TMT faultline configuration on a firm's short-term performance and innovation activities". *Journal of Management and Organization*, **21**: 558–572.

Zanutto, E., K. Bezrukova and K. A. Jehn, 2011, "Revisiting faultline conceptualization: Measuring faultline strength and distance". *Quality and Quantity*, **3**: 701–714.