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Diversity Composition and Team Learning: The Moderating Role of Error Culture

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Abstract

Although there are many potential benefits to diverse teams, the way in which diversity characteristics are aligned in teams may influence whether teams exploit this potential. In this experimental study, we examined the relationship between diversity composition and the process and outcome of team learning by comparing faultline teams (in which diversity characteristics are aligned) with teams in which diversity characteristics cross-categorize each other. We investigated whether this relationship would be influenced by the teams' beliefs regarding error handling (i.e., error culture). We assigned 268 participants to 67 four-person groups with faultline or cross-categorized compositions. We hypothesized and found that the relationship between diversity composition and team learning was moderated by error culture, only in faultline teams, not in cross-categorized teams. An error management culture (i.e., a culture in which members value the open discussion of errors) was found to promote inclusive communication and the team learning process in faultline teams. In contrast, an error prevention culture (i.e., a culture in which members believe that errors are harmful and must be prevented) decreased inclusive communication and the processes of team learning in faultline teams. Contrary to our expectations, we found a reversed effect for the outcome of team learning. In line with our prediction, cross-categorized teams were unaffected by error culture.

Keywords Diversity composition · Faultlines · Error culture · Team learning

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1 Introduction

To maintain or enhance effectiveness in a changing world, organizations increasingly rely on teams carrying out critical strategic and operational tasks. Teams, defined as work groups that exist within the context of a larger organization and share responsibility for a team product or service (Hackman 1987), are a fundamental organizational unit in accomplishing work. By implication, the organization's ability to adapt and learn depends on the team's ability to learn. As a result, there is a growing interest in understanding how teams learn (Goodman and Dabbish 2011). However, empirical studies of team learning present a generative and occasionally confusing variety of terms, concepts, and methods (cf. Edmondson et al. 2007). For instance, some definitions focus on the process of learning, capturing behaviors such as the sharing of and reflecting upon task-relevant knowledge or activities related to learning how to work together as a group (e.g., reflecting on performance, creating routines), while other definitions focus on learning outcomes (e.g., productivity improvement, cost decrease; see Edmondson et al. 2007; Jehn and Rupert 2007; Wilson et al. 2007 for reviews of definitions).

In this study, we define team learning both as a *process* and as an *outcome*, thereby integrating different research areas. In our definition of team learning as a process, we build upon past experimental research that has typically studied how newly formed groups learn new tasks and that has defined team learning in terms of task mastery (i.e., how well a team has learnt its task; see Edmondson et al. 2007). We adopt this task-focused approach and define team learning as the process of enlarging the team's understanding of the content of the task, by sharing and reflecting upon task-relevant information, knowledge, and ideas (based on the definition of task learning in Jehn and Rupert 2007 and Rupert et al. 2016) Additionally, following group learning-curve research (e.g., Adler 1990; Edmondson et al. 2003, 2007) that has operationalized team learning in terms of performance improvements, our outcome definition of team learning reflects the change in the team´s performance from one task to a successive task.

One of the factors that may promote or hamper team learning is the team´s diversity composition. On the one hand, the optimistic "value-in-diversity" hypothesis presumes that teams may learn through the integration of different views and perspectives, thus producing better team results. On the other hand, in a more pessimistic view, diversity creates social divisions which can lead to social disintegration, hampered learning processes, and reduced performance (Williams and O'Reilly 1998). Several meta-analyses and reviews conducted over the years on the performance of diverse teams have found support for both arguments (for overviews, see Bell et al. 2011; Van Dijk et al. 2012). That is, diversity can both harm and benefit team outcomes.

In an attempt to reconcile the mixed findings of past diversity research, Lau and Murnighan (1998) advanced the conceptualization of diversity composition. Traditionally, diversity effects were studied from the concept of heterogeneity, which captured the degree to which a team differs on one diversity attribute at a time, thus ignoring potential interactions between attributes (Jehn and Rupert 2007). In their conceptualization of faultlines, Lau and Murnighan consider the *alignment* of members' diversity characteristics, leading to homogeneous subgroups within a team. For instance, when all females in a team are psychologists and all males are economists, homogeneous sub-

groups may originate based on the alignment of gender and educational background. These "faultlines" can potentially disrupt team learning and performance, due to the fact that a faultline team is more prone to split up into subgroups and experience intergroup biases. However, diversity characteristics can also be crossed within the team (e.g., when there are both male and female psychologists and both male and female economists in a team), which is less likely to result in the development of subgroups within a team (Homan et al. 2007b). Such a team is labelled a cross-categorized team. Previous research has examined how these different types of diversity constellations may differentially affect team processes and outcomes.

The findings for cross-categorization are relatively consistent. In general, cross-categorized teams have been found to experience more positive effects of diversity than faultline teams, as cross-categorized teams are less likely to split up into subgroups, which is conducive to the effective use of differences, improving performance (e.g., Homan et al. 2007b; Sawyer et al. 2006). Although some evidence from faultline studies suggests that cross-categorization is beneficial for team learning (cf. Gibson and Vermeulen 2003; Lau and Murnighan 2005), research explicitly testing the link between cross-categorization and team learning is scarce.

When we look at the effects of faultlines, the picture is more ambiguous. On the one hand, support has been found for the theoretical assumption that faultlines would negatively affect team processes and performance (cf. Bezrukova et al. 2009; Homan et al. 2007b; Li and Hambrick 2005; Sawyer et al. 2006). On the other hand, there is also evidence for curvilinear effects (Chen et al. 2017; Gibson and Vermeulen 2003; Thatcher et al. 2003) and even for positive effects of faultlines on information elaboration, reflective reframing (i.e., sense making), employees' loyalty, and team performance (cf. Ellis et al. 2013; Hutzschenreuter and Horstkotte 2013; Iseke et al. 2015).

More importantly, researchers have started to identify contextual factors that increase negative faultline effects (cf. Molleman 2005) or decrease them (Homan et al. 2007a, 2008), or even promote positive effects resulting from faultlines (Bezrukova et al. 2012). In line with these results, previous studies pertaining specifically to team learning have shown mixed effects of diversity faultlines (see Gibson and Vermeulen 2003; Lau and Murnighan 2005; Rupert et al. 2016; Vora and Markóczy 2012), with some of them identifying contextual factors that influence the direction of faultline effects. These mixed results point to the complexities and dependencies that are involved in managing diverse teams and specifically to the importance of identifying contextual factors that may specify the effects of diversity faultlines in teams (Meyer et al. 2014).

We extend this past research by studying a team climate factor that might influence the team learning process and outcome in diverse teams, and faultline teams in particular: error culture. We draw on the work of Van Dyck et al. (2005) who distinguished two types of organizational error cultures: error management versus error prevention. In an error management culture, organizational members discuss errors openly, they share error knowledge, and they quickly detect and correct errors. In contrast, an error prevention culture is characterized by individuals covering up errors and experiencing strain from errors. We expect error culture to be a relevant contextual factor for team learning in diverse groups, and faultline groups in particular, because team members

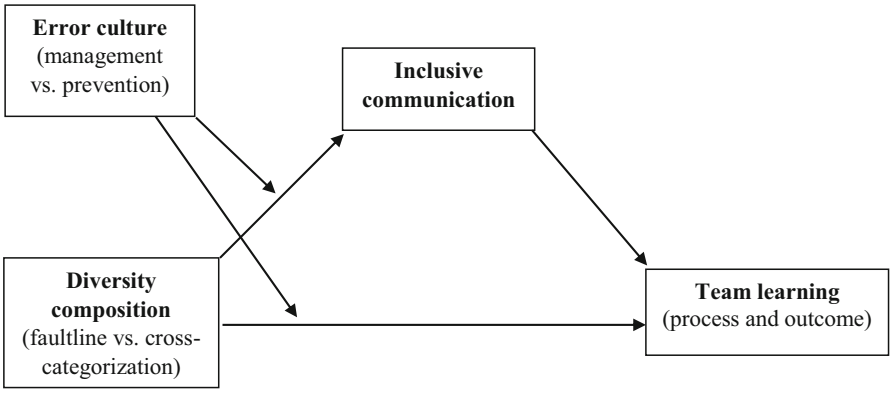

Fig. 1 Schematic research model with proposed relationships

will be better able to benefit from each other's diverse knowledge and ideas when their culture promotes the open sharing of mistakes rather than inducing strain from errors.

In the current experimental team study, we created teams in which diversity characteristics (gender and educational background) are aligned (faultline condition) and cross-cut each other (crossed-categorized condition) and manipulated team members' beliefs regarding error handling (error management culture versus error prevention culture). We investigated the resulting team learning (processes and outcome) in all four conditions. Our expectation was that the impact of error culture would be greater in faultline teams than in cross-categorized teams. Additionally, and in response to calls for faultline research to explore mediational processes that may explain faultline effects on team outcomes (e.g., Meyer et al. 2014), we explored whether inclusive communication—the extent to which *all* members participate and contribute fully—mediates the contextual relationship between diversity composition and error culture on team learning (see Fig. 1 for a schematic overview of proposed relationships).

2 Diversity Composition and Team Learning

Team members usually differ from each other on more than one dimension (van Knippenberg et al. 2004). Despite this fact, traditional diversity research is based on a dispersion or heterogeneity view of diversity composition, focusing on one attribute at a time and assuming that members' diversity attributes are independent (Bezrukova et al. 2009). For instance, when gender is studied, educational background is ignored, leading to the assumption that female psychologists and economists have similar experiences in a team. That diversity attributes may interact with each other, thus creating different team dynamics, has received attention in research on faultlines and cross-categorization (cf. Brown and Turner 1979; Lau and Murnighan 1998).

2.1 Faultlines

Faultlines are hypothetical dividing lines that may split up a team into relatively homogeneous subgroups based on the alignment of members' diversity character-

istics (definition adapted from Lau and Murnighan 1998). Faultlines can go unnoticed for years, until the task context activates them. For instance, retirement and pension policies can activate faultlines based on age, and a university's resource allocation decision in favor of certain study programs can activate study backgrounds. Faultline theory argues that when a faultline is activated, typically when a team is recently formed, diversity attributes become salient to team members. As a result, members start to categorize and identify themselves with subgroups based on the activated diversity attributes instead of the team as a whole. These social categorization and identification processes are likely to instigate stereotypes and biases between subgroups, which can lead to polarization between subgroups and may negatively impact sense making and performance in the team as a whole (Lau and Murnighan 1998).

Although there is quite some empirical evidence that faultlines do indeed have negative consequences for teams (cf. Bezrukova et al. 2009; Homan et al. 2007b; Li and Hambrick 2005; Sawyer et al. 2006), an increasing number of studies have recently found that faultline effects might be more complex than previously assumed, which is visualized in the evidence for curvilinear and even positive faultline effects (for reviews and meta-analyses, see Meyer et al. 2014; Thatcher and Patel 2011, 2012). To reconcile these inconsistent findings, researchers have started to investigate contextual factors specifying the direction of faultline effects on team outcomes. Some studies found factors that activated faultlines or further exacerbated disruptive processes resulting from faultlines, such as the team's personality composition (Jehn and Bezrukova 2010), social category salience (Meyer et al. 2011; Pearsall et al. 2008), and team autonomy (Molleman 2005). Other studies found de-activators that decreased negative faultline effects, for instance when team members identified with some superordinate (team) identity (Bezrukova et al. 2009; Homan et al. 2008; Jehn and Bezrukova 2010), had shared objectives (Van Knippenberg et al. 2011), held positive diversity beliefs (Chung et al. 2015; Homan et al. 2007a), perceived their team as psychologically safe (Chen et al. 2017), or were led by a transformational leader (Kunze and Bruch 2010). Finally, some studies even found contextual factors under which faultlines could have positive effects on information processing and performance, such as a shared organizational culture (Bezrukova et al. 2012), task motivation and pro-diversity beliefs (Meyer and Schermuly 2012), and the number and balance of subgroups (Xie et al. 2015).

2.2 Faultlines and Team Learning

When we zoom in on the effects of faultlines on team learning, so far encompassed in only four studies, data show inconclusive patterns similar to those listed above. Again, in some of these studies, contextual factors appeared to specify the direction of faultline effects.

Contrary to their expectations, in their empirical test of the faultline framework, Lau and Murnighan (2005) did not find the relationship between faultlines and team learning to be negative, but neutral. Interestingly, cross-sex and cross-ethnicity work communications appeared particularly effective in cross-categorized groups, improving several group outcomes, including team learning. In faultline teams, these cross-communications did not affect team outcomes (i.e., a null effect). In a different

study, Vora and Markóczy (2012) investigated the moderating role of faultlines on the relationship between team learning and performance. They conceptualized team learning based on the content of team communication (i.e., task, personal, and performance communications). Contrary to their expectation that faultlines would hinder the positive relationship between team learning and performance, the results were mixed. Faultlines instigated positive effects of task and personal communication on performance, but strengthened negative effects of performance communication on performance.

More recently, Rupert et al. (2016) found that subgroups formed along informational lines (i.e., educational level and work experience) stimulated task and process learning, but only when the distance between subgroups was small (e.g., a therapist team consisting of two junior nurses with vocational training and two senior therapists with Ph.D. degrees has a higher faultline distance than a team consisting of two senior doctors and two senior behavioral therapists with Ph.D. degrees). When distance increased, the effect was neutralized. Transactive memory—members' knowledge of who knows what in the team (Liang et al. 1995)—appeared to mediate these positive effects of faultline groups with smaller subgroup distances. Finally, Gibson and Vermeulen (2003) proposed and found a curvilinear relationship between faultlines and team learning, indicating that cross-categorized groups displayed higher levels of team learning than either faultline groups or extremely diverse or homogeneous groups, in which subgroups were absent. Additionally, they found three organizational design features—performance management by an external leader, team empowerment, and the availability of knowledge management systems—to moderate this effect. The results indicated that faultline teams benefited from a leader promoting performance management (e.g., goal setting, planning, self-evaluation) with higher levels of learning as a result, while in cross-categorized groups learning was impaired due to the performance management of the leader. In contrast, cross-categorized teams benefited from team empowerment initiated by the organization (e.g., receiving more autonomy) and the availability of formal knowledge management systems (e.g., capturing best practices). These design features appeared to support the team learning processes that cross-categorized teams were already inclined to engage in, while they inhibited team learning in faultline teams.

To summarize, the results of the above studies challenge the prevailing theoretical assumption of the faultline framework that faultlines will impair team learning. Although team learning might be hindered in faultline teams, there is also support that the relationship can be neutral, curvilinear, or even positive under certain circumstances. Most importantly, in some cases contextual factors seem to specify the direction of faultline effects. So far, aspects of group composition (e.g., faultline distance) and of organizational design (e.g., leader performance management, knowledge management systems, team empowerment) have provided insight into the contextual relationship between faultlines and team learning. However, an important omission in the faultline-team learning relationship is the contextual influence of team beliefs that are particularly relevant for team learning. Previous faultline research, has so far provided evidence for the importance of team beliefs, climates, or cultures as a contextual factor influencing team outcomes (e.g., performance and loyalty; see Bezrukova et al. 2012; Chen et al. 2017; Chung et al. 2015; Homan et al. 2007a; Meyer and Schermuly

2012). However, the impact of beliefs that are particularly relevant for team learning on the relationship between faultlines and team learning still needs to be examined.

2.3 Cross-Categorization

Cross-categorized teams are less prone to subgroup formation, because demographic similarities exist across subgroups. These overlapping social category memberships reduce the psychological distance between divergent social categories, decreasing members' perception of "us" versus "them" (Bezrukova et al. 2009; Brewer and Brown 1998). Past research on cross-categorization has shown that when social categories are crossed, the salience of social categories is reduced because individuals are more likely to share at least one membership with one another (Eurich-Fulcer and Schofield 1995; Wit and Kerr 2002). This can be illustrated with the help of our example of a team consisting of male and female economists and psychologists. In this team, a male psychologist can relate to other men (either psychologists or economists), because they belong to the same gender subgroup. Additionally, he can relate to other psychologists (either male or female), because they have the same educational background. As such, the cognitive and comparative fit of either subgroup categorization is weakened, and positive interpersonal relationships among all the team members are more likely.

In line with the above, multiple studies conducted so far have demonstrated the beneficial effects of cross-categorization in terms of reduced intergroup bias and discrimination (e.g., Brown and Turner 1979; Deschamps 1977; Marcus-Newhall et al. 1993). With regard to team learning, some faultline studies provided suggestive evidence for a positive relationship between cross-categorization and team learning (e.g., Gibson and Vermeulen 2003; Lau and Murnighan 2005). Additionally, some studies on cross-categorization investigated aspects of team functioning that are relevant for team learning. For example, Homan et al. (2007b, 2008) found that cross-categorized teams elaborated more on information and subsequently performed better than faultline teams. Similarly, Sawyer et al. (2006) found enhanced levels of information sharing in teams with a cross-categorized diversity structure, compared to faultline teams, with better decisions as a result. Furthermore, in a qualitative study on R&D teams, Iseke et al. (2015) found interorganizational teams with cross-cutting demographic divides to perform better when information sharing was high. Recently, Chen et al. (2017) found a curvilinear relationship between faultlines and performance, indicating that cross-categorized teams performed better than faultline teams. Interestingly, psychological safety appeared to moderate this relationship, bringing the performance of faultline teams to the same level as that of cross-categorized teams.

Given the more consistent positive effects of cross-categorization, we argue that contextual factors are more likely to be relevant in understanding and predicting faultline effects than cross-categorized effects. Building upon and expanding this previous work, we thus investigate team learning in teams with faultline versus cross-categorized compositions and propose that the teams' beliefs regarding error handling (e.g., error culture) will specifically moderate the effects of faultlines on team learning.

3 The Contextual Impact of Error Culture

Error culture can be conceptualized as a system of shared norms, values, and common practices in an organization regarding individual reactions to errors and to their consequences (Van Dyck et al. 2005). For team learning to occur, team members must be willing to discuss errors openly and question certain information or knowledge that might be erroneous, which is typical for an error *management* culture (Van Dyck et al. 2005; Frese 1991). In an error *prevention* culture, in contrast, team members typically cover up errors and experience strain from errors, out of fear that they will be blamed or that their errors will be attributed to undesirable personality traits, lack of knowledge and abilities, or low intelligence (Van Dyck et al. 2005; Cannon and Edmondson 2001). This covering up of errors is likely to result in repeated mistakes and limited learning (Van Dyck et al. 2005).

Some studies provide evidence for the potentially beneficial effect of an error management culture on various outcomes. For instance, Van Dyck et al. (2005) empirically assessed the effects of error culture and found error management culture to contribute to firm performance and survivability, while error prevention culture was unrelated to firm performance. The beneficial effect of an error management culture on other outcomes was also supported in two other studies: employees' turnover intentions decreased (Guchait et al. 2016) and a team's safety performance improved (Fruhen and Keith 2014).

Other studies provide suggestive evidence for the potentially harmful effects of an error prevention culture, indicating that organizational members tend to cover up errors under circumstances in which shared beliefs may be especially impactful. For instance, Edmondson (1996) found patient care unit climates to vary significantly in their members' perceptions of the psychological risk involved in discussing mistakes and the consequent willingness to discuss these openly, influencing error detection and reporting. Moreover, Homsma et al. (2009) found employees to be less likely to communicate about errors when error consequences were severe, and they suggested this may be due to shared beliefs regarding error handling. However, to our knowledge, studies explicitly testing the (contextual) impact of error culture on team learning are lacking.

Nevertheless, the above evidence points to the importance of error culture and suggests that a team's error culture based on openness or fear may influence the team's communication pattern, which may consequently promote either learning or else defensiveness (Edmondson 1996; Homsma et al. 2009). Given the importance of error culture for the learning of diverse teams, and the lack of evidence regarding this relationship, we extend past research by investigating its contextual impact on the relationship between diversity composition and team learning. Given the tendency of members in diverse teams, and faultline teams in particular, to stereotype and bias against different others, members of these teams might be especially hesitant to display such vulnerable behaviors. Therefore, we expect the beliefs regarding error handling to be especially influential for learning in faultline teams, but less so for learning in cross-categorized teams.

4 Research Model and Hypotheses

As is predicted in faultline theory, once faultlines are activated, team members tend to categorize themselves with the social categories the faultline is based on and to identify with their own demographic subgroup (Lau and Murnighan 1998). Our expectation is that an error prevention culture, in which team members are likely to experience strain from errors, will strengthen this activation process. This strain implies that cognitive load is imposed on team members (Russel and Grealy 2010) and that people are more likely to categorize, stereotype, and discriminate under cognitive load (Macrae et al. 1993; Van Knippenberg et al. 1999). Consequently, team members will feel safer in a subgroup with similar others, and therefore the sharing and reflecting upon task-relevant information, knowledge, and ideas is more likely to occur within subgroups rather than within the team as a whole (Lau and Murnighan 1998, 2005; Nesdale and Mak 2003). As a result, task-relevant information, knowledge, and ideas are less likely to be mentioned and processed in the team as a whole, which will make team learning deteriorate.

In contrast, an error management culture explicitly promotes communication about errors and stimulates team members to voice their views and openly discuss mistakes as a team (Edmondson 1996; Frese 1991). Due to this open atmosphere with respect to sharing error knowledge, activated subgroups are more likely to act as "healthy divides" or "supportive cohorts", with members considering, exploring, and reflecting upon knowledge and viewpoints that are expressed by members from each subgroup (Gibson and Vermeulen 2003; Larson et al. 2004; Rupert et al. 2016). In line with this, research on shared and unshared information has shown that members are more likely to share and listen to certain views when these are held by multiple people (e.g., Azzi 1993; Wittenbaum and Stasser 1996). Therefore, when information comes from a coalition of people supporting each other's views, this information is more likely to be considered in the team as a whole. In sum, task-relevant information is more likely to be shared and reflected upon in faultline teams with an error management culture, compared to faultline teams with an error prevention culture. We therefore expect that an error management culture will contribute more to the team's collective understanding of the task (team learning process) and to the ability to make better decisions (team learning outcome) than an error prevention culture.

Cross-categorized groups have less potential to split up into subgroups than faultline teams, since social categories partly overlap and team members have more commonalities with each other (Brewer and Brown 1998). As a result, cross-categorized groups are more likely to exchange and elaborate upon relevant information, knowledge, and views in the team as a whole (Gibson and Vermeulen 2003; Homan et al. 2007a, 2008; Sawyer et al. 2006). Cross-categorized teams will therefore be more likely to display stable levels of team learning processes and improve team performance over time (team learning outcome), independent of the team's error culture. In sum, we expect the potentially positive effect of an error management culture and the potentially negative impact of an error prevention culture to be greater for faultline groups than for cross-categorized groups. These considerations bring us to our first hypothesis.

Hypothesis 1 Faultline teams show higher levels of team learning (process and outcome) when the team culture is focused on error management rather than on error prevention, whereas team learning (process and outcome) in cross-categorized teams is less affected by error culture.

Furthermore, we examine the role of inclusive communication, which we define as the extent to which *all* team members are allowed to participate, have their voices heard, and contribute fully (Miller 1998; Wasserman et al. 2008). We expect that the categorization and identification processes that result from activated faultlines, and that are strengthened by an error prevention culture, influence the team´s communication pattern. Based on optimal distinctiveness theory, it can be argued that the fear of rejection that is strengthened by an error prevention culture may activate team members' need for belongingness, while suppressing the need for uniqueness (Pickett and Brewer 2001; Shore et al. 2011). This may motivate team members to remain silent or to communicate with similar subgroup members only, rather than with all members in the team.

Additionally, the stereotyping and discriminating processes that occur when team members experience cognitive load from stressors may lead to cognitive disintegration in the team with members being incapable of understanding each other's perspectives (Carton and Cummings 2012; Cronin et al. 2011). The resulting lack of communality may frustrate members in their desire for inclusion (Echterhoff et al. 2009; Levine and Kerr 2007; Shore et al. 2011), which may manifest itself in the team's communication pattern, excluding certain members instead of including them. As a result, the level of inclusive communication is likely to diminish in the team as a whole.

In contrast, members in faultline teams with an error management culture are explicitly invited to voice their knowledge, ideas, and opinions, promoting open communication about errors. The questioning of dominant assumptions is not experienced as a stressor, but as a value-enhancing proposition, actively eliminating potential barriers that perpetuate team members' silence (Morrison and Milliken 2000; Nishii 2013). Categorization and identification processes that normally result from activated faultlines are inhibited, enabling subgroups to act as healthy divides and stimulating inter-subgroup communication and listening to each other (Azzi 1993; Gibson and Vermeulen 2003). Team members' belongingness needs are satisfied by their subgroup with similar others, and uniqueness needs are fulfilled at the same time, as members are explicitly invited to speak up (Shore et al. 2011; Van Dyck et al. 2005). As a result, inclusive communication is likely to be promoted, allowing *all* team members to participate, have their voices heard, and contribute fully (Miller 1998; Wasserman et al. 2008).

In cross-categorized groups, relational ties cut across genders and educational backgrounds, and team members start to categorize each other in more complex and personalized ways, enhancing their ability to accept each other's differences (Lau and Murnighan 1998; Nishii 2013). Cross-categorization in teams provides team members with the opportunity to find commonalities with each other, due to overlapping categories, while at the same time holding a more differentiated view of the characteristics of each member. Therefore, team members are able to balance their need for belongingness and uniqueness at the same time (Pickett and Brewer 2001). As a result, team

members in cross-categorized teams are more likely to participate themselves and to include others, facilitating more inclusive communication patterns in general (Shore et al. 2011). As such, an error culture is less likely to influence the degree of inclusive communication in cross-categorized teams. This leads us to propose the following:

Hypothesis 2 Faultline teams communicate more inclusively when the team culture is focused on error management rather than error prevention, whereas inclusive communication in cross-categorized teams is less affected by error culture.

Finally, when all team members are able to express themselves, they have more opportunities to engage in double-looped learning (Argyris and Schon 1978) and to develop a differentiated and personalized understanding of their group members, which is critical for the reduction of stereotypes and biases (Nishii 2013). When stereotypes and biases are reduced, team members are better able to accept and consider information, knowledge, and ideas that come from different others (Van Knippenberg et al. 2004). As a result, team members are more likely to cognitively integrate as a team (Cronin et al. 2011), which stimulates them to engage in team learning behaviors that improve the team's collective understanding of the task (team learning process) and that improve the team's ability to make decisions over time (team learning outcome). This leads us to propose the following:

Hypothesis 3 Inclusive communication mediates the interaction between diversity composition and error culture and the team learning process and outcome.

5 Method

5.1 Sample and Design

A total of 268 students (134 men and 134 women) from a Dutch university participated in the experiment for course credits or monetary compensation (9 euros, approximately $12 US). The mean age of participants was 21 years (SD 2.85). Participants were randomly assigned to one of the conditions of a 2 (diversity composition: faultline versus cross-categorized team) $\times$ 2 (error culture: error management culture versus error prevention culture) factorial design. A total of 67 four-person teams participated in the experiment.

5.2 The Task

We used an existing cognitive task that required team information processing and decision making skills (Jehn and Shah 1997). The study was advertised as research on decision making by admission committees. We informed teams that they represented an admission committee that had to decide which candidates were to be invited for a job interview. We gave participants three applications including résumés, letters of reference, and mark lists, and a job ad for the position of a research program coordinator. We told participants that they had 20 min to rate the applicants on the basis of four criteria (secretarial potential, research skills, language abilities, and social skills).

The short timespan put severe pressure on the teams' cognitive skills to accurately process the large amount of information, which made this task suitable for studying team learning in varying error cultures and with varying diversity compositions (De Grada et al. 1999; Kruglanski and Webster 1991).

The team had to indicate its final decision to invite, wait-list, or reject applicants on a team decision agreement form that each individual team member had to sign. We did not inform teams how many of the three candidates should be invited, wait-listed, or rejected. Participants had to come to a decision by a careful reading of the assignment and consideration of information about the candidates in light of the selection criteria. To come to a deliberate decision, they had to discuss the information to determine what was the most relevant and how candidates should be prioritized relative to each other and the criteria. Performance was determined by the degree to which team decisions matched the official admissions committee's decisions (Jehn and Shah 1997): comparison with experts' performance is a common way to assess team performance (McGrath 1984).

In order to assess team learning (process and outcome), the team performed the selection task twice. The second task was performed in close succession to the first task. Each task consisted of different application letters for the same job opening. Participants did not receive performance feedback after completing the tasks. Task order was counterbalanced, and a pretest indicated that the tasks were equally difficult.[1] Team members knew beforehand that the three best teams would each receive a team prize of 80 euros per team for their performance on Task 2 (approximately $85 U.S.). Teams were videotaped during both tasks. After Task 2, participants were debriefed and thanked for their efforts. The experiment lasted 1.5 h in total, including instructions and debriefing.

5.3 Procedure

5.3.1 Manipulation of Diversity Composition

To create faultline versus cross-categorized teams, we converged and cross-cut existing demographic characteristics of participants. We focused on demographics as these are the most easily noted for members from newly formed teams (Lau and Murnighan 1998). We recruited men and women with study majors in social sciences versus life sciences and randomly assigned them to the faultline and cross-categorized conditions.[2] Gender is a visual characteristic and therefore likely to be a salient basis for

[1] To test whether the tasks were equally difficult, we conducted a pilot test on 19 individuals performing both tasks. We assessed how many correct answers individuals reported on each task (range 0-4), and we asked individuals to rank how difficult they found each task on a 1-5 point scale. A paired sample t test indicated that both tasks were considered equally difficult, with a similar number of correct answers for each task, $t(18) = 1.29$, $p = .22$, and team members reporting similar levels of difficulty for each task, $t(18) = 0.77$, $p = .45$. The means for the number of correct answers were 1.74 ($SD = 1.15$) on Task 1 and 1.32 ($SD = 0.89$) on Task 2. The means for perceived difficulty of the task were 2.89 ($SD = 1.10$) on Task 1 and 2.74 ($SD = 0.93$) on Task 2.

[2] Social sciences included psychology, pedagogy, anthropology, and political science; life sciences included physics, biology, medical sciences, and (technical) mathematics.

categorization (Stangor et al. 1992). Educational background represents differences in knowledge, views, and information (Harrison et al. 1998; Jackson et al. 1995), which is needed to be able to learn in and from cognitive tasks. The task context was likely to activate educational backgrounds, as students were not used to working in multidisciplinary teams. There was no overlap between the curricula that social sciences and life sciences students followed, and their classes were held in separate buildings.

In the faultline condition, females from social sciences and males from life sciences were seated next to each other at a rectangular table, facing the participants with a different gender and study major, thus further enhancing the faultline (Homan et al. 2007a, b). In the cross-categorization condition, gender and study major were crossed, with teams consisting of male and female social science students and male and female life science students. Again, the seating further enhanced the cross-categorization effect, placing double-outsiders next to each other and students with the same study major but different genders opposite each other.

Upon arrival in the lab, team members were asked to attach a name tag to their clothes in a visible way. The badge indicated the participants' full name and specified their study major ("social sciences" or "life sciences"). To further enhance the manipulation of diversity composition, the experimenter asked participants to read their badge out loud while looking into one of the cameras; this was said to be done for administrative reasons (the experimenter explained that the researchers would not be able to read the badges from the video recordings). After these procedures, which were necessary to make diversity composition salient (Pearsall et al. 2008), participants received task instructions. In the upper left corner of the sheet, their diversity composition was specified in a box, further enhancing the manipulation of diversity composition. Using these procedures, we created a clear compositional faultline by converging multiple diversity characteristics (i.e., gender, study major) in the faultline condition and crossing these characteristics in the cross-categorized condition.

To check our manipulation of diversity composition, we asked team members to fill out how their team was composed after they had received task instructions and before they started the task ("My team consists of (include yourself): __males __females" and "All males are life/social sciences yes/no"). We also asked team members how many persons from each social category were present in the team ("My team has (include yourself): __males life sciences, __females life sciences", etc.).

5.3.2 Manipulation of Error Culture

Before participants started to work on the task, they received additional information about working in teams. This information included our manipulation of error culture. Based on the work of Van Dyck et al. (2005), teams in the error prevention condition read that "team research shows that making errors is bad for team performance. The more you prevent errors, the better you perform as a team. (…) So when you work together as a team, make sure that you prevent errors as much as possible, and do not discuss errors with each other". Teams in the error management condition read that "team research shows that making errors is good for team performance. The more you discuss errors, analyse, and correct them, the better you perform as a team. (…). So when you work together as a team, make sure that you analyse and share your errors,

resolve them, and correct errors that have been made". Following this information, participants received information about the task.

We checked the manipulation of error culture using an adaptation of existing scales developed by Van Dyck et al. (2005). We asked participants to fill out a short questionnaire after reading the task instructions and before starting on the task; this questionnaire contained items on both cultures. To measure error management, we used four items (e.g., "One can learn a lot from making mistakes"; "It is important to discuss the causes of errors with each other"; "Errors point us at what we can improve"; "When a team member makes an error, (s)he shares it with other team members so that they don't make the same mistake"). The manipulation of error prevention culture was also checked with four items (e.g., "Errors are bad for team performance"; "Errors should be prevented as much as possible"; "Team members often feel embarrassed after making a mistake"; "Team members prefer to keep errors to themselves"). Principal Component Analysis (PCA) with Kaiser oblimin rotation technique extracted two factors based on eigenvalues above 1, indicating that the two error cultures were distinct (factor loadings for error management culture between .82 and .93, variance explained 50%; factor loadings for error prevention culture between .69 and .77, variance explained 17%). The items formed reliable scales (error management $\alpha = .87$, $M = 5.39$, SD 3.71; error prevention $\alpha = .80$, $M = 3.71$, SD 1.30). All responses were given on 1–7 Likert scales (1 = totally disagree; 7 = totally agree).

We aggregated individuals' answers on the manipulation checks to the team level, as the answers from team members are not likely to be independent (Kashy and Kenny 2000). We computed ICC[1] and ICC[2] scores and *rwg* scores to check whether aggregation was appropriate (e.g., Bliese 2000). For error management culture, we found an ICC[1] value of .06, and ICC[2] was .20, with a *rwg* value of .65. Although these aggregation values are relatively low, they are considered acceptable for team research (LeBreton and Senter 2008). The aggregation measures for error prevention culture justified aggregation to the team level (ICC[1] = .42, ICC[2] = .74, *rwg* = .75).

5.4 Measures

We performed triangulation of multiple measurements, which provided a rigorous examination of team processes (Denzin 1978). To measure inclusive communication and the process of team learning, we asked independent coders to rate the videotapes. The outcome of team learning was measured based on the number of correct decisions made on Task 2 versus Task 1. The video ratings of inclusive communication and the process of team learning and the team learning outcome measure provided direct and unobtrusive measures (see Jehn and Shah 1997). The manipulation check questionnaire provided self-report responses from the participants.

5.5 Coding of Behavioral Interactions

In total, 67 videos were coded by two independent coders who were unaware of the goals of the experiment and blind to the hypotheses and research conditions. Raters

were given definitions of inclusive communication and team learning (process) with a few examples of high and low ratings on these variables. Coders were instructed to watch the video on the first task and take notes of instances of behaviors indicative for specific variables. After watching Task 1, they gave a final rating on a scale from 1 *(strongly disagree)* to 7 *(strongly agree),* based on these instances and their overall impression of overall team interaction. After Task 1, coders rated Task 2 according to the same procedure. As a result of this process, behavioral examples were added for each rating level, which they regularly shared and checked with each other and with the researchers for consistency with the definitions (see descriptions below).

After the coders had viewed the entire video separately, they met to discuss their ratings. When video ratings on a variable were more than 1 point apart (which was the case in only 5 instances), the item and behavior were discussed until the raters reached agreement (Jehn and Shah 1997). This agreement could mean that the rating of one coder was selected in favor of the other coder's rating, for instance because one coder had reported instances more accurately than the other. Sometimes, a mean score was given between two ratings when their codings together identified instances of both high and low behavior during team interaction. To validate their codings with the definitions, the coders kept a codebook in which they listed behavioral examples for each level of the particular variable they rated, which they regularly discussed and enriched during the process. We had overlapping ratings for 44% of the teams to determine inter-rater agreement. We assessed inter-rater reliability by computing the intra-class correlations (Shrout and Fleiss 1979). The ICCs for the two raters ranged from .74 to .90 (inclusive communication ICC[1] = .90, team learning (process) ICC[1] = .74), which according to the criteria determined by Cicchetti and Sparrow (1981) is considered excellent.

5.6 Mediating Variable

5.6.1 Inclusive Communication

Inclusive communication is the extent to which *all team* members are allowed to participate, have their voices heard, and are enabled to contribute fully (Miller 1998; Wasserman et al. 2008). In line with Homan et al. (2007a), these behaviors were scored on a 7-point scale ranging from "no inclusive communication" to "much inclusive communication." Raters gave a lower score when there was little or no communication at all between the team members; when one person was excluded from the discussion or when someone excluded himself or herself from the discussion; but also when one person led the entire discussion and others remained quiet (e.g., "this person is very dominant, he is leading the whole discussion while others don't participate"). A relatively medium score was given when the communication regularly took place between two team members and/or when communications switched between the level of the subgroup and the team as a whole ("sometimes they communicate in subgroups and sometimes everyone takes part in the discussion"). A relatively higher score was given when all team members evenly contributed to the discussion (e.g., "everyone shares information with everyone and every person takes an even part in the discussion").

5.7 Dependent Variables

5.7.1 Team Learning (Process)

Coders rated the extent to which the teams improved their understanding of the content of the task (Jehn and Rupert 2007), for instance by sharing and reflecting together upon information, knowledge, and ideas about candidates, vacancy, selection criteria, and/or the assignment (Jehn and Rupert 2007). Again, this construct was rated on a 7-point scale, and higher ratings indicated higher levels of team learning. A relatively lower score was given when team members hardly acquired, shared, and combined the information and their ideas about the assignment, the vacancy, selection criteria, or candidates (e.g., "they don't discuss the assignment together, but just start"; "they only identify one or two aspects of candidates and do not validate these with the selection criteria"). A moderate score was given when the team acquired, shared, and combined information about candidates, but missed important information regarding the assignment, or when the team was not able to discuss all candidates ("some aspects of the assignment or vacancy text are discussed, but they miss important parts"; "they thoroughly discuss information about candidates but they do not reflect upon it and they do not ask questions to each other"). A relatively higher score was given when participants acquired, shared, and combined a great deal of relevant information and exchanged their opinions about the assignment and candidates, with better structured discussions leading to the highest possible rating (e.g., "information about the candidates is thoroughly discussed, prioritized and reflected upon in light of the selection criteria"; "they use a structured way to come to a decision by carefully reflecting upon and combining information about the assignment, the selection criteria, and the candidates and they kept their evaluations of the information in an overview").

5.7.2 Team Learning (Outcome)

Following group learning-curve research (e.g., Adler 1990; Edmondson et al. 2003) that has operationalized team learning outcomes in terms of objective improvement rates (e.g., yield improvement, productivity improvement, cost decrease), the outcome of team learning was calculated as the change in performance from Task 1 to Task 2. Team performance scores were based on the number of times that team decisions matched those of the admissions committee. For instance, when the team correctly decided to invite a candidate, they earned one point. For each task, a team could earn a maximum of 3 points (i.e., when all decisions concerning the three candidates were correct). To calculate the final team learning outcome, a difference score was calculated between Task 1 and Task 2 (range − 3 to 3), with positive scores indicating team learning.

6 Results

6.1 Manipulation Checks

Our manipulation check of diversity composition was successful. All participants correctly indicated how their team was composed. The manipulation of error culture also had the desired effect. Teams in the error management condition ($M = 5.63$, SD 0.45) indicated that their team culture was more focused on error management than did teams in the error prevention conditions ($M = 5.19$, SD 0.76), F (1,40) = 5.89, p = .03, $\eta^2 = .10$. Teams in the error prevention condition ($M = 4.38$, SD 0.87) indicated that their team culture was more focused on error prevention than did teams in the error management condition ($M = 2.99$, SD 0.42), F (1,40) = 5.58, $p < .001$, η^2 = .48. Perceived error culture was not affected by the diversity composition manipulation (error management $F(1,40) = 0.16$, $p = .69$, $\eta^2 = .00$; error prevention $F(1,40)$ = 0.42, $p = .52$, $\eta^2 = .01$) and the interaction between diversity composition and error culture (error management $F(1,40) = 0.73$, $p = .40$, $\eta^2 = .02$; error prevention $F(1,40)$ = 0.62, $p = .44$, $\eta^2 = .02$).

6.2 Testing the Hypotheses

We used analysis of variance to test Hypotheses 1 and 2 (see Table 1) and regression-based conditional process analysis to test Hypothesis 3. In Hypothesis 1, we proposed that faultline teams would show higher levels of team learning when team culture was focused on error management rather than on error prevention, whereas team learning in cross-categorized teams would be less affected by error culture. We found no main effect of diversity composition on team learning (process): faultline teams ($M = 4.65$, SD 1.09) showed levels of team learning that were similar to those shown by cross-categorized teams ($M = 4.77$, SD 1.20), F (1, 63) = 0.31, $p = .58$, $\eta^2 < .001$. We did find a significant main effect of error culture, indicating that teams with an error management culture ($M = 5.01$, SD 1.04) had higher levels of team learning (process) than did teams with an error prevention culture ($M = 4.43$, SD 1.18), F (1,63) = 5.40, $p = .02$, $\eta^2 = .08$. Moreover, we found a marginally significant interaction between error culture and diversity composition, F (1, 63) = 3.35, $p = .07$, $\eta^2 = .05$. In support of Hypothesis 1, we found a significant effect of error culture within faultline teams, indicating that faultline teams with an error management culture displayed higher levels of team learning (process) than did faultline teams with an error prevention culture, F (1,63) = 8.04, $p = .006$, $\eta^2 = .11$ (see Table 1). In line with what was hypothesized, cross-categorized teams were not influenced by error culture, F (1,63) = 0.16, $p = .72$, $\eta^2 < .001$ (see Table 1). These results are displayed in Fig. 2.

For the outcome of team learning, we found no main effects of diversity composition or error culture. There was no difference in performance improvement between faultline (M = − 0.26, SD 1.46) and cross-categorized teams ($M = -0.28$, SD 1.45), F (1,63) < 0.001, $p = .95$, $\eta^2 = .00$. Similarly, error management teams ($M = -0.39$, SD 1.50) did not significantly differ from error prevention teams ($M = -0.15$, SD 1.40), F (1,63) = 0.81, $p = .37$, $\eta^2 < .001$. We found a significant interaction effect

Table 1 Effects of diversity composition and error culture on inclusive communication and team learning (process and outcome)

Measures	Faultline teams				Cross-categorized teams			
	Error management ($N = 16$)		Error prevention ($N = 15$)		Error management ($N = 17$)		Error prevention ($N = 19$)	
	M	SD	*M*	SD	*M*	SD	*M*	SD
Inclusive communication	5.00^{a}	1.30	3.80^{b}	1.91	4.41^{ab}	1.69	4.76^{ab}	1.34
Team learning (*Process*)	5.19^{a}	0.87	4.07^{b}	1.02	4.84^{ab}	1.18	4.71^{ab}	1.25
Team learning (*Outcome*)	-0.81^{a}	1.28	0.33^{b}	1.45	0.00^{ab}	1.51	-0.53^{ab}	1.14

Means within a row with a different subscript differ at $p < .05$. Inclusive communication and team learning (process) are videoratings ranging from 0 to 7. The team learning outcome is measured by the change in performance from task 1 to task 2, based on the number of correct answers (range − 3 to 3)

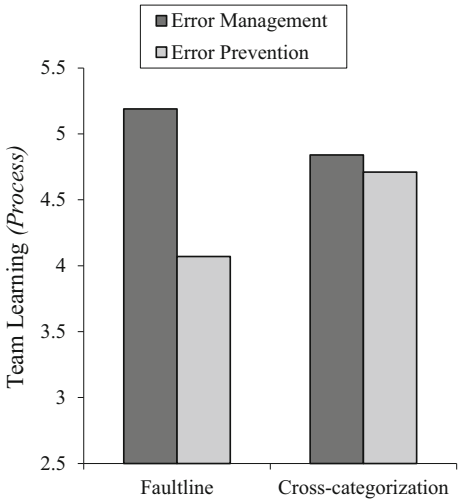

Fig. 2 Team learning (process) as a function of diversity composition and error culture

between diversity composition and error culture on team learning (outcome), $F(1,63) = 5.88$, $p = .02$, $\eta^2 = .08$. Even though this effect was qualified by a significant effect of error culture within the faultline condition, $F(1,63) = 5.14$, $p = .03$, $\eta^2 = .07$, its direction was opposite to what we expected, indicating that faultline teams with an error prevention culture did in fact show significant *higher* learning outcomes over time compared to faultline teams with an error management culture (see Table 1). For cross-categorized teams, there was no significant effect of error culture on the outcome of team learning, $F(1,63) = 1.26$, $p = .27$, $\eta^2 = .02$. These effects are displayed in Fig. 3.

In Hypothesis 2, we proposed that faultline teams would communicate more inclusively within an error management culture than within an error prevention culture, whereas inclusive communication in cross-categorized teams would be less affected by error culture. We did not find main effects of diversity composition, F (1, 63) =

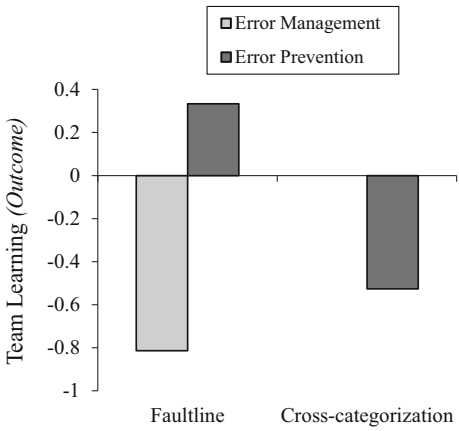

Fig. 3 Team learning (outcome) as a function of diversity composition and error culture. *N.B.* The outcome of team learning is determined by the level of performance improvement from Task 1 to Task 2. The mean change in performance for the cross-categorization team is 0.00

0.23, $p = .63$, $\eta^2 = .00$, and error culture, F (1, 63) = 1.18, $p = .28$, $\eta^2 = .02$. Faultline teams ($M = 4.42$, SD 1.71) displayed similar levels of inclusive communication, as did cross-categorized teams ($M = 4.64$, SD 1.55). Similarly, teams with an error management culture ($M = 4.70$, SD 1.55) did not significantly differ on inclusive communication from teams with an error prevention culture ($M = 4.34$, SD 1.69). In support of Hypothesis 2, we found a significant interaction effect of diversity composition and error culture, F (1,63) = 3.95, $p = .051$, $\eta^2 = .06$, which was explained by an effect of error culture within faultline teams, F (1,63) = 4.40, $p = .04$, $\eta^2 = .06$ (see Table 1). Faultline teams with an error management culture had higher levels of inclusive communication than faultline teams with an error prevention culture. This effect is displayed in Fig. 4. Error culture did not significantly affect inclusive communication in the cross-categorized condition, F (1,63) = 0.44, $p = .51$, $\eta^2 < .001$ (see Table 1).

In Hypothesis 3, we proposed that inclusive communication would mediate the interaction between diversity composition and error culture and the team learning process and outcome. More specifically, we predicted a mediational effect of inclusive communication on team learning (process and outcome), occurring in the faultline condition, for different types of error culture (i.e., conditional indirect effect or mediated moderation, Edwards and Lambert 2007). We used the PROCESS macro (Hayes 2013; Model 8) to test this moderated mediation model. We resampled 10,000 times and used the bias corrected method to create 95% intervals (Preacher and Hayes 2008). If zero falls outside the 95% confidence interval, the conditional indirect effect is significant. For team learning, we found support for a conditional indirect effect, index = .6144, SE = .3487, 95% CI [0.0204, 1.4120], such that for faultline teams an error management culture resulted in more inclusive communication than was the case for an error prevention culture, which in turn positively influenced the process of team learning, effect = .4752, SE = .2429, 95% CI [0.0379, 1.0156]. For cross-categorized teams, no evidence was found for mediation, effect = − .1392, SE = .2181, 95% CI [− 0.6295, 0.2307]. In line with the inconsistent findings for the team learning outcome, we found no evidence for a conditional indirect effect for this dependent

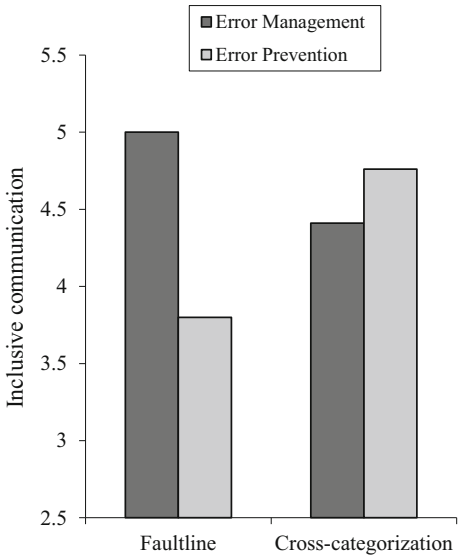

Fig. 4 Inclusive communication as a function of diversity composition and error culture

variable, index = .1081, SE = .1947, 95% CI [− 0.2063, 0.6198]. These analyses thus provided partial support for Hypothesis 3.

7 Discussion

In this study, we experimentally investigated team learning (process and outcome) in teams with faultline and cross-categorized compositions. In an attempt to reconcile past contradictory findings of faultline research, we explored the possibility that the norms and beliefs that team members hold regarding error handling—error culture—would moderate the relationship between diversity composition and team learning (process and outcome). Our expectation was that error culture would have a greater impact in faultline teams than in cross-categorized teams. Additionally, we tested whether inclusive communication mediated these relationships.

We did indeed find that team learning (process and outcome) in faultline teams was more strongly affected by error culture than was the case in cross-categorized teams. In line with our expectations, faultline teams with an error management culture displayed higher levels of team learning processes than faultline teams with an error prevention culture. Contrary to our expectations, however, the team learning outcome in faultline teams was improved by an error prevention culture, while the team learning outcome was inhibited by an error management culture. As we expected, inclusive communication was found to mediate the relationship between diversity composition and the process of team learning, indicating that all members in faultline teams with an error management culture were more likely to participate, have their voices heard, and contribute fully, with higher levels of team learning processes as a result, than did members in faultline teams with an error prevention culture. In cross-categorized teams, the teams' error culture did not influence these processes and outcomes.

The present findings endorse the importance of adopting a contingency approach when studying the effects of work team diversity, and demographic faultlines in particular (Meyer et al. 2014; Thatcher and Patel 2012). As the results indicate, potentially negative faultline effects on the process of team learning can be overcome by an error management culture, which encourages the sharing of error knowledge. In contrast, an error prevention culture, which leads members to cover up errors, can activate negative faultline effects, impeding the process of team learning. These findings also provide support for past research that has found the effects in faultline teams to be more dependent on the circumstances (cf. Bezrukova et al. 2009; Chen et al. 2017; Homan et al. 2007a, 2008), whereas cross-categorized teams benefited more from diversity as a baseline (Chen et al. 2017; Gibson and Vermeulen 2003; Homan et al. 2007b, 2008; Iseke et al. 2015; Sawyer et al. 2006). Future research should continue to investigate the role of other contextual factors influencing faultline effects on various outcomes, and on team learning in particular.

Contrary to our expectations, the results for the team learning outcome showed a reversed pattern. Faultline teams with an error prevention culture made better decisions over time than did faultline teams with an error management culture. A possible explanation for this finding might be that the learning process, which took place under high time pressure, negatively influenced the teams' ability to make accurate decisions. Past research suggests that the performance benefits of team reflection may be weak, especially in the early phases of a team's development (Moreland and McMinn 2010), and that the process of team learning may distract teams from effective performance (Bunderson and Sutcliffe 2003).

An alternative explanation might be a weakness in the operationalization of the learning outcome. We operationalized the learning outcome as an improvement in team performance over time. However, this operationalization might come with an important downside. In our current operationalization, the team learning outcome reflects the change in performance from Task 1 to Task 2, indicated by a range between − 3 and 3. A negative score means that the teams' performance worsened on the second task compared to the first task; a positive score means that the teams improved their performance in the second task compared to the first task. Teams who remained stable in their performance received a score 0, since no change in performance took place. This implies that our operationalization does not distinguish between stable low-performing versus stable high-performing teams. Moreover, teams which start with high performance are restricted in the range of what they can improve. Given these limitations, future research should consider alternative operationalizations of objective team learning that more accurately reflect the performance improvement of teams.

7.1 Limitations and Future Research

Besides weaknesses in the operationalization of the learning outcome, the research design had elements of a cross-sectional nature, as the two tasks were performed in close succession to each other. This might have limited the possibilities to establish objective learning effects accurately over time. It might also have limited the robust-

ness of the mediation effect found. Therefore, in order to assess the effects of group composition on learning outcomes over time, a longitudinal approach must be chosen. Additionally, future experimental research should try to replicate these findings in a similar setting and provide a further test on the robustness of the effects, by testing the hypotheses on a larger sample in order to increase statistical power.

To increase the external validity of this study, the current findings should also be replicated in the field. In a field setting, team members will be more familiar to each other and will work together on a task for a longer period of time, which can lead to different team dynamics. Future research may investigate to what extent existing error cultures differ in teams in organizations and how they affect the relationship between diversity composition and team learning. Alternatively, an error management culture could be manipulated in a field training setting to see to what extent this can help faultline teams to learn.

Furthermore, in line with the original conceptualization of faultlines (Lau and Murnighan 1998), we created faultline and cross-categorized teams solely based on demographic characteristics. By doing so, we extended past experimental research that manipulated diversity characteristics by partly using bogus personality feedback (cf. Homan et al. 2007a, b; Meyer et al. 2011). Using objective demographic characteristics increases the generalizability to the field where gender and educational background are considered to be relevant characteristics of diversity composition (cf. Gibson and Vermeulen 2003; Thatcher et al. 2003). Nevertheless, the results might be different when using other (combinations of) diversity characteristics. In this respect, previous research has shown that social-category faultlines and informational faultlines might have different effects (Bezrukova et al. 2009) and that diversity effects may change over time (Watson et al. 1993; Joshi and Roh 2009). Future research should therefore try to replicate these findings in the field, where teams work together for a longer period of time and with constellations based on different diversity characteristics.

Additionally, alternative mediating processes should be considered that can explain the relationship between diversity composition and team learning (process and outcome) under different error cultures. As suggested in the Introduction, the contextual influence of an error prevention culture in faultline teams might be due to increased cognitive load and inter-subgroup bias, whereas an error management culture might instigate supportive cohorts through which members are more likely to voice their views. Future research should investigate these social categorization dynamics in greater detail, to see whether these processes do indeed explain these effects.

Furthermore, future studies should consider alternative types of team learning. Following Jehn and Rupert's (2007) typology of team learning, teams can learn about the content of the task (task learning), about the process of working together as a team (process learning), and about each other's personal life and personality (social learning). In this experiment, we followed past experimental research on team learning and adopted a task-focused approach (Edmondson et al. 2007). In this type of study, the task typically promotes the use of cognitive skills, and time constraints limit the opportunities for more time-consuming processes such as process and social learning. In a setting where more time is available, and where a different type of task is involved, it would be beneficial to also study process and social learning to see if the observed effects can be extended to other types of learning.

Finally, the results in this experiment might have been stronger if error consequences had been more severe and/or more visible for respondents. When error consequences are severe, the need to communicate and act upon the process is higher, while at the same time the perceived risk of communication about errors is higher as well (Homsma et al. 2009), which may inhibit learning processes. In the current task, errors were more implicit and revealed, for instance, when team members asked questions about inaccurate information that was brought up by others. Therefore, future research should examine teams showing varying levels of severity of error consequences. Additionally, including performance feedback could reveal errors and consequently make the results stronger. We did not examine the role of performance feedback, because this would have extended the design with another factor. However, research indicates that when teams receive appropriate levels of performance feedback, members put more effort in the task, which might influence their levels of learning (process and outcome) as a result (Lam et al. 2011). We therefore also recommend future researchers to replicate the experiment while including performance feedback.

7.2 Practical Implications

The present findings have implications for the management of diverse teams in organizations. The results contribute to past research indicating that contextual factors can bridge faultlines (e.g., Chen et al. 2017; Homan et al. 2007a; Rupert et al. 2016) and suggest that positive faultline effects on team learning can be stimulated by promoting specific beliefs regarding error handling. For instance, practitioners can stimulate inclusive communication and team learning in faultline teams by promoting the belief that sharing error knowledge is beneficial. These beliefs could be stimulated in a specific training program on error management or by sharing best error handling practices, in which members experience the benefits of learning from past errors. An error management approach can thus be adopted in order to help faultline teams overcome potentially negative social categorization effects and to stimulate effective communication patterns and team learning. In contrast, the results also suggest that short-term performance of faultline teams may suffer in this type of culture. An error prevention culture might therefore be helpful when accurate performance in the short run is important, although one should realize that this culture may negatively impact communication and learning processes.

Finally, we should also realize, however, that changing culture is inherently difficult (Trice and Beyer 1993) and that there might be limitations to the extent and ease with which team members in organizations can be convinced of the value of a certain way of error handling. The present findings were obtained in ad hoc teams of students who presumably carried no strong beliefs about error handling in information processing tasks. In the field, members may, by comparison, hold stronger beliefs regarding error handling due to past experiences. The severity of error consequences may vary according to different types of tasks or due to individual preferences (e.g., regulatory focus; Higgins 1997). Furthermore, although this study has shown that error culture can be applied at the team level, it was originally conceptualized as an aspect of organizational culture (Van Dyck et al. 2005). Therefore, team members may already have adopted

a dominant organizational view on error handling. As research suggests (Bezrukova et al. 2012), misalignments at different cultural levels in the organization may elicit negative faultline effects, indicating that changing team culture might be detrimental when values are misaligned with the organizational culture. In sum, although the present study suggests that fostering certain error cultures in faultline teams may contribute to the successful management of diversity, more work needs to be done on the origins of error culture to enhance our understanding of the possibilities for promoting error culture in teams.

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