

FACING DIFFERENCES WITH AN OPEN MIND: OPENNESS TO EXPERIENCE, SALIENCE OF INTRAGROUP DIFFERENCES, AND PERFORMANCE OF DIVERSE WORK GROUPS

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This study examined how the performance of diverse teams is affected by member openness to experience and the extent to which team reward structure emphasizes intragroup differences. Fifty-eight heterogeneous four-person teams engaged in an interactive task. Teams in which reward structure converged with diversity (i.e., “faultline” teams) performed more poorly than teams in which reward structure cut across differences between group members or pointed to a “superordinate identity.” High openness to experience positively influenced teams in which differences were salient (i.e., faultline and “cross-categorized” teams) but not teams with a superordinate identity. This effect was mediated by information elaboration.

When important decisions have to be made, organizations often turn to teams because teams are expected to have more and better informational resources than individuals (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Teams in organizations have become more diverse in terms of their demographic composition over the years and will con-

tinue to become more diverse in years to come (Triandis, Kurowski, & Gelfand, 1994). As diversity has become a fact of organizational life, homogeneous teams are not only undesirable, but in many cases impossible to create. Because diversity has a pervasive impact on team functioning and performance (e.g., Guzzo & Dickson, 1996; van Knippenberg & Schippers, 2007), understanding the processes that underlie these effects—and managing them—has become a major challenge for organizational theory and practice.

Previous research on diversity has shown inconsistent results, which led Milliken and Martins to dub diversity “a double-edged sword” (1996: 403). On the one hand, diversity has potential value for teams because diverse teams generally possess more (diverse) information and knowledge, which may enhance team performance. On the other hand, diversity may also disrupt team processes and performance, because the potential emergence of subgroups may hinder the use of available information (van Knippenberg, De Dreu, & Homan,

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2004; Williams & O'Reilly, 1998). Although existing models of diversity seem to be able to explain the effects of diversity as they occur, they are less able to predict *when* positive or negative effects will occur. Van Knippenberg et al. (2004) attributed this to the "main effects" approach that has characterized much of diversity research and argued that it is impossible to understand the effects of diversity without taking moderators into account (see also Pelled, Eisenhardt, & Xin, 1999).

The main effects approach is incapable of fully explaining the effects of diversity in teams for two reasons. First, the focus on main effects cannot explain the inconsistent effects of diversity because it ignores moderating variables that determine whether diversity has positive or negative effects. Second, and relatedly, the main effects approach fails to elucidate the underlying processes that are responsible for the effects of diversity on team performance, which may differ depending on the characteristics of a situation. This lack of understanding is disturbing in light of the key role that diversity plays within organizations. In an attempt to enhance understanding of the consequences of team diversity, we draw on the model put forward by van Knippenberg et al. (2004). Following their recommendations, we identify moderators that determine *when* and *why* diversity has positive or negative effects on performance. Specifically, we attempt to increase the understanding of diversity dynamics by exploring how team composition and structural aspects of a situation interact to influence the performance of diverse teams.

Although diversity is omnipresent in organizations, it may be more or less apparent to team members, depending on situational characteristics such as spatial arrangements, task requirements, and reward structure (Van der Vegt & Van de Vliert, 2005). Accordingly, van Knippenberg et al. (2004) argued that it is important to consider the *salience* of diversity when trying to understand its effects on team functioning. The present study contributes to the understanding of diversity salience by using variations in reward structure to create three conditions of diversity salience: (1) salience of two distinct subgroups (i.e., a diversity "faultline"); (2) salience of differences per se, but lower salience of potential subgroups (i.e., "cross-categorization"); and (3) salience of a team as a whole (i.e., "superordinate identity"). In this way, we provide novel insights into the diversity-performance link by demonstrating that teams that are objectively identical in terms of diversity exhibit different levels of performance as a function of diversity salience. We focus on a demographic, visible diversity dimension—sex—because this dimension is often salient

to people (Stangor, Lynch, Duan, & Glass, 1992) and is related to team functioning (Milliken & Martins, 1996).

Additionally, we argue that the effects of diversity salience depend on a team's personality composition. The impact of team personality composition on group functioning is an important area in the study of organizational behavior and one of the key topics of research on team functioning (Moynihan & Peterson, 2001). Team personality composition has important main effects on team outcomes (Barrick, Stewart, Neubert, & Mount, 1998; Bell, 2007; Kichuk & Wiesner, 1997). However, little is known about the possible moderating influence of team personality composition on the link between team diversity and performance. In this respect, it is important to note that organizations, teams, and individuals can differ in their attitudes and feelings toward working in diverse teams (Ely & Thomas, 2001). Indeed, in the best-established framework for understanding personality—the "five-factor model"—the factor "openness to experience" is dedicated to the degree to which people are broad-minded, like novelty, and are not conservative (McCrae & Costa, 1987). We argue that teams with higher levels of openness to experience are more open to diversity than teams with lower levels of openness to experience. Incorporating openness to experience in research on diversity is an important contribution, because as we will show, the effect of diversity salience is contingent upon openness to experience.

Finally, although the importance of information elaboration as a mediator of the positive effects of diversity on team performance has been stressed in past theorizing, this variable has received little research attention. To fill this void, we examine information elaboration as the process leading to differential performance between diverse teams that differ in diversity salience and personality composition. Building on the theoretical model put forward by van Knippenberg et al. (2004), we propose that certain combinations of compositional and structural aspects of diverse teams are more conducive to information elaboration than others and show that these variations in information elaboration can account for differences in performance.

LITERATURE REVIEW AND HYPOTHESES

Work Group Diversity

Diversity may be seen as a characteristic of a social grouping (i.e., group, organization, society) that reflects the degree to which there are actual or perceived differences between people within the

group (without presuming that group members are necessarily aware of actual differences or that perceived differences are strongly related to actual differences) (van Knippenberg & Schippers, 2007). In a comprehensive review of the literature, Williams and O'Reilly (1998) discussed several theoretical viewpoints regarding the positive (information/decision making perspective) and negative (social categorization perspective and similarity/attraction paradigm) effects of diversity.

According to the information/decision making perspective, diversity can enhance the elaboration of task-relevant information and perspectives within a group—that is, the exchange, discussion, and integration of ideas, knowledge, and insights relevant to the group's task (van Knippenberg et al., 2004). The potential positive effect of diversity thus lies in the thorough and elaborate processing of diverse information, especially for tasks that require the combination and integration of different perspectives and ideas. Previous research has shown that diversity may indeed stimulate error detection (Davis, 1969), information processing (Phillips, Mannix, Neale, & Gruenfeld, 2004), group problem solving (Tjosvold & Poon, 1998), and group effectiveness (Gruenfeld, Mannix, Williams, & Neale, 1996). Thus, the existence of diverse perspectives within a work group can lead to enhanced team functioning through information elaboration.

On the other hand, from a social categorization perspective (Brewer & Brown, 1998), it can be expected that within demographically diverse teams, subgroup categorization creates “we-they” distinctions that may, in turn, lead to intergroup bias, such as in-group favoritism or prejudice. Along similar lines, similarity/attraction perspectives (e.g., Byrne, 1971) imply that people favor working with and are attracted to similar rather than dissimilar people. In support of these ideas, a number of studies report *negative* effects of diversity on group functioning, such as interpersonal tensions and conflict (Chatman, Polzer, Barsade, & Neale, 1998; Pelled et al., 1999), stronger “turnover intentions” (Jackson, Brett, Sessa, Cooper, Julin, & Peyronnin, 1991), and lower group performance (Gruenfeld et al., 1996; Harrison, Price, Gavin, & Florey, 2002).

Clearly, the effects of diversity in teams are inconsistent; this poses a problem for theory development as well as for diversity management in organizations. Demographic differences have been found to be sometimes positively related (e.g., Cox, Lobel, & McLeod, 1991), sometimes negatively related (e.g., Gruenfeld et al., 1996), and sometimes unrelated (e.g., Jehn, Northcraft, & Neale, 1999) to group performance. The competing theoretical per-

spectives described above cannot account for these inconsistent effects. Integrating these perspectives, van Knippenberg et al. (2004) proposed that the performance of diverse teams is determined by the interplay between categorization processes and information elaboration. When subgroup categorization gives rise to intergroup bias, they argued, information elaboration is hindered, and group performance deteriorates. However, subgroup categorization and concomitant intergroup bias do not always occur within diverse groups. Whether diverse groups indeed experience subgroup categorization is determined by the salience of social categories within the groups.

Salience of Intragroup Differences

Diversity is more likely to negatively influence team functioning to the degree that a work group's members are aware of subgroups and dissimilarities within the group. Whether diverse groups experience subgroup categorization is determined, among other things, by the *salience* of subgroups (van Knippenberg et al., 2004). The salience of subgroups is influenced by the “comparative fit” of the subgroup categorization (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Comparative fit reflects the extent to which a categorization results in clear between-group differences and within-group similarities. Comparative fit increases with smaller perceived differences within groups and greater perceived differences between groups. The higher the comparative fit, the more likely subgroup categorization will occur, which may result in intergroup bias and deteriorated group functioning (Gaertner, Mann, Murrell, & Dovidio, 1989).

Inevitably, work group members differ on a variety of dimensions. These differences may be correlated to a greater or lesser degree (for instance, gender differences in a group may be independent of age differences, but gender and age may also covary). The more differences covary, the higher the comparative fit, and hence, the more people will perceive the group as consisting of subgroups (that is, make a subgroup categorization [Hewstone, Rubin, & Willis, 2002]). Recently, this notion of social category salience has received increasing research attention in the diversity literature (e.g., Earley & Mosakowski, 2000; Homan, van Knippenberg, Van Kleef, & De Dreu, 2007b; Lau & Murnighan, 1998; Thatcher, Jehn, & Zanuto, 2003). Extending this line of research, we argue that the salience of intragroup differences depends not only on correlations among diversity-related variables but also on aspects of a situation that are unrelated to diversity. Specifically, we suggest that one way in which

organizations can influence the salience of diversity is through the reward structures adopted.

Within organizations, reward structures are important tools for influencing team effectiveness (DeMatteo, Eby, & Sundstrom, 1998; Wageman, 1995). The design of reward systems can, for example, be based on the performance of individuals, parts of teams, or a team as a whole (Kerrin & Oliver, 2002). The effects of reward systems on team performance have been extensively studied (DeMatteo et al., 1998). For example, rewarding teams on the basis of team performance rather than individual performance can improve team functioning, depending on the degree of task interdependence, cultural values, and employee receptivity to team-based rewards (Kirkman & Shapiro, 2000; Wageman, 1995). Although reward structures are often used as a management tool to motivate people, they also have the potential to influence the salience of intragroup differences (Gaertner et al., 1989). Rewarding a diverse team on the basis of team performance may decrease the salience of intragroup differences, because the team reward creates a commonality within the team that diverts attention away from differences between group members (Beersma, Hollenbeck, Humphrey, Moon, Conlon, & Ilgen, 2003; cf. Sherif, 1958). Conversely, rewards may be targeted at the performance of subgroups within the team—for instance, when subgroups from different departments work together within a project team and the reward structure differentiates between subgroups by rewarding the subgroups from the different departments independently. Following this reasoning, reward structures may influence the salience of diversity and therefore the performance of diverse teams in several ways. First, a reward structure can reinforce a division between subgroups by creating a diversity faultline. Second, rewards can cut across demographic differences, thus lowering the salience of subgroups. Third, reward structures can emphasize the superordinate identity of a team, thus lowering the salience of intragroup differences.

Faultlines. The comparative fit of potential subgroup categorizations increases when multiple diversity dimensions converge within a team (that is, when the team has a diversity faultline) (Lau & Murnighan, 1998). Under these conditions, teams may suffer from the detrimental effects of diversity. Gaertner et al. (1989) found that when subgroups were made salient by rewarding teams on the basis of subgroup performance, intersubgroup processes deteriorated (see also Homan et al., 2007b). Similarly, Lau and Murnighan (2005) showed that convergence of multiple diversity characteristics—in their study, ethnicity and sex—increased the sa-

lience of subgroups, resulting in deteriorated group functioning. Thus, diversity can undermine group performance, and this is most likely to occur when several dimensions of diversity converge to activate diversity faultlines (Thatcher et al., 2003). Therefore, in line with faultline theory, we propose that when diversity is reinforced by reward structure, team performance is impeded. Below, we propose a number of hypotheses comparing faultline teams with teams in which rewards either cross-cut diversity or create a superordinate identity.

Cross-categorization. Cross-categorization refers to a situation in which group members differ on more than one dimension and differences are uncorrelated (that is, they cross-cut each other). There are a number of reasons why cross-categorization has positive effects. First, cross-cutting categories makes social categorization more complex and decreases the distinction between in-group and out-group (that is, it lowers comparative fit [Turner et al., 1987]). Second, partially overlapping group memberships undermine the motivational bases that people have for intergroup comparison (Brewer & Brown, 1998). Because people are members of multiple categories at the same time, there is both less need and less opportunity to make a distinction based on category membership. Thus, cross-categorizing multiple dimensions of diversity reduces perceptions of subgroup differences, making subgroup categorization less likely. That is, although cross-categorization does not reduce the differences between group members per se, the perceived salience of subgroups is reduced (Brewer, 1995).

Illustrative of this idea, a meta-analysis by Migdal, Hewstone, and Mullen (1998) showed that convergence of attributes (i.e., a diversity faultline) leads to an accentuation of the differences between and similarities within categories (i.e., high comparative fit), whereas the crossing of category dimensions accentuates similarities between the categories and differences within each category (i.e., low comparative fit). Migdal et al.'s (1998) analysis further showed that intergroup bias is reduced when diversity attributes are crossed, which reduces intragroup conflict and enhances information elaboration (Homan et al., 2007b). Finally, Marcus-Newhall, Miller, Holtz, and Brewer (1993) showed that crossing existing subgroups with role expectancies led to less intergroup bias than converging subgroups with roles. Thus, we predict:

Hypothesis 1. Diverse teams in which diversity is cross-cut by reward structure perform better than diverse teams in which reward structure contributes to a diversity faultline.

Superordinate group identity. When situational/structural factors emphasize a group as a whole, within-group differences become less salient (Brown & Turner, 1981). The resulting inclusive superordinate identity transforms potential “we-they” categorizations into a “we” categorization (Brown & Turner, 1981; Sherif, 1958). As stated above, salient intragroup differences can lead to intergroup biases and deteriorated performance. Creating a superordinate identity, thereby obscuring differences and lowering comparative fit, should thus decrease the likelihood that negative effects of diversity occur.

In an experimental illustration of this principle, Gaertner et al. (1989) manipulated several factors, such as spatial arrangement of members, assignment of names, and the nature of interdependence among group members. When these context factors emphasized a group as a whole (i.e., the superordinate identity), people reported significantly less intergroup bias than when the context emphasized the subgroups. Although Gaertner et al.’s work does not pertain to effects on team functioning and performance, we expect, given these findings, that diverse teams in which reward structure makes superordinate identity salient perform better than diverse teams in which reward structure enforces diversity faultlines.

Hypothesis 2. Diverse teams in which reward structure emphasizes a superordinate identity perform better than diverse teams in which reward structure contributes to a diversity faultline.

Above, we introduced the idea that structural aspects of a situation can influence the salience of diversity, which in turn determines the performance of diverse teams. The next step in our analysis is to incorporate the nature of the diverse teams in terms of personality composition. Research has shown that people differ in their attitudes and beliefs toward working in diverse teams (Strauss, Connerley, & Ammermann, 2003; van Knippenberg & Haslam, 2003). Below, we develop the argument that attitudes toward diversity are rooted in individual differences in openness to experience and that these differences moderate the relationship between diversity and team performance.

Openness to Experience

According to the social categorization and similarity/attraction perspectives, diversity may negatively affect teams because people tend to respond more favorably to similar rather than dissimilar

others (Williams & O’Reilly, 1998). However, these perspectives do not take into account that people differ in their reactions to diversity in groups. Especially for task groups, personality characteristics of the team members may affect the favorability of responses to diversity. One of the most widely used taxonomies in personality research is the five-factor model, which describes five fundamental factors underlying personality: agreeableness, neuroticism, extraversion, conscientiousness, and openness to experience (McCrae & Costa, 1987). In addition to appearing prominently in an impressive body of research in individual psychology, the five-factor model has been widely used in studies on the personality composition of teams (e.g., Barrick & Mount, 1991).

Although several of the five personality factors are relevant to team functioning, openness to experience, in particular, is likely to be related to responses to team diversity. Openness to experience refers to an individual’s willingness to explore, tolerate, and consider new and unfamiliar ideas and experiences (McCrae & Costa, 1987). Costa and McCrae (1992) distinguish among six facets of openness to experience, three of which are important in terms of reactions to dissimilarities: ideas (e.g., intellectual curiosity and open-mindedness), actions (e.g., being adaptable, valuing experimentation, and liking novelty), and values (e.g., fluid political and religious beliefs). People who score high on openness to experience tend to be less dogmatic in their ideas, more willing to consider different opinions, more open to all kinds of situations, and less likely to deny conflicts than people who score low on openness to experience (Costa & McCrae, 1992; LePine, 2003; McCrae, 1987). All these aspects of openness to experience are closely related to the essence of working in a diverse team, as members of diverse teams are more likely to have different viewpoints, attitudes, and ideas (and therefore conflict) than members of homogeneous teams (Cox et al., 1991; van Knippenberg et al., 2004). Therefore, openness to experience should enable diverse teams to make better use of these differences and perform better.

Indirect evidence for the idea that openness to experience improves the functioning of diverse teams comes from several studies focusing on situational determinants of attitudes toward diversity. For instance, Ely and Thomas (2001) reported that when an organization’s diversity perspective emphasized cultural diversity as a valuable resource for the organization, group members reported feeling more valued and respected; reported a higher quality of intergroup relations; and felt that they were more successful than when the organization’s

perspective was not focused on the potential value of diversity. Other work has shown that demographically diverse groups make better use of diverse information and perform better when they have value-in-diversity rather than value-in-similarity beliefs (Homan, van Knippenberg, Van Kleef, & De Dreu, 2007a). Moreover, pointing to the importance of openness to experience, Ekehammar and Akrami (2003) demonstrated that openness to experience, more than any of the other four factors in the five-factor model, is related to beliefs about and attitudes toward diversity. Similarly, Flynn (2005) showed that people who have high levels of openness to experience have more positive attitudes toward minority members than people who score low on openness to experience. Building on this research, we predict that diverse teams consisting of team members who score high on openness to experience are more likely to see the value in their differences, resulting in better performance.

Hypothesis 3. Diverse teams with higher levels of openness to experience perform better than diverse teams with lower levels of openness to experience.

Salience of Intragroup Differences and Openness to Experience

Earlier we distinguished among three conditions of diversity salience: faultline teams, cross-categorized teams, and superordinate identity teams. These different constellations of diversity render team diversity more or less salient to group members (Brewer & Brown, 1998). Specifically, a reward structure that contributes to a diversity faultline increases the salience of diversity in general, and of subgroups in particular. Second, a reward structure that emphasizes a team as a whole decreases the salience of diversity and of subgroups. Third, a reward structure that cross-cuts diversity is associated with relatively high diversity salience but low subgroup salience (Brewer, 1995; Migdal et al., 1998). Because individuals with high levels of openness to experience are more open to differences and value these differences more, openness to experience can be expected to moderate the effects of diversity salience on team performance; that is, when a team consists of strong subgroups, appreciating differences within the group may help to overcome the negative effects of subgroup categorization (Hornsey & Hogg, 2000). Similarly, when the salience of diversity within a team is highlighted by cross-categorization, being open to differences should have beneficial effects on team functioning. In contrast, however, when a superor-

dinate identity reduces the salience of interpersonal differences, openness to experience should have less impact on team performance. After all, if there are no salient differences to be open to, there should be less room for openness to experience to improve performance. Thus, we propose:

Hypothesis 4. Diversity salience and openness to experience interact to predict team performance: relative to teams in which diversity salience is low (a superordinate identity condition), teams in which diversity is salient (faultline and cross-categorization conditions) benefit from higher levels of openness to experience.

The Mediating Role of Information Elaboration

Finally, we argue that information elaboration mediates the positive effect of openness to experience in diverse teams. Van Knippenberg et al. (2004) argued that diverse teams need to engage in information elaboration to mobilize the resources provided by their diversity of information, perspectives, and ideas (cf. Williams & O'Reilly, 1998). At the same time, however, salient differences between group members may disrupt information elaboration because individuals tend to be less willing to share ideas with, and less open to the communications of, diverse others (van Knippenberg et al., 2004). By engendering a more open-minded approach to dissimilar others, openness to experience thus fosters information elaboration in diverse groups. In accordance with this theorizing, Homan et al. (2007a) showed that information elaboration mediated the positive effects of diversity beliefs on the performance of diverse teams. Accordingly, we predict:

Hypothesis 5a. Information elaboration mediates the impact of openness to experience on the performance of diverse teams.

Extending this line of reasoning, we also propose that the mediating effect of information elaboration is more evident in teams in which diversity is more salient (i.e., under faultline and cross-categorization conditions, as compared to superordinate identity conditions). Whereas salient diversity may draw attention to diverging perspectives that require elaboration, it is also likely to disrupt elaboration, because the more that differences are salient, the greater the likelihood that information elaboration is disrupted by subgroup categorization (van Knippenberg et al., 2004). Accordingly, openness to experience may be especially important in

fostering information elaboration in teams in which diversity is salient. Therefore, we predict:

Hypothesis 5b. Information elaboration mediates the interactive effect of openness to experience and diversity salience on the performance of diverse teams.

METHODS

Sample

Research participants were 232 business students from a large midwestern university who were arrayed into 58 four-person teams. Their mean age was 20.91 (s.d. = 1.26), and 80.6 percent indicated they were Caucasian. In exchange for their participation, participants earned class credit and were eligible for cash prizes (\$10 per student) based upon their performance (see the manipulations and measures section). The teams were randomly assigned to one of the experimental conditions. The teams were composed in such a way that all teams were sex-diverse (i.e., two males, two females) and were thus exactly alike in terms of sex diversity. We used sex to create diverse teams because sex is often used as a basis for categorization (Stangor et al., 1992), and ample research indicates that sex diversity influences team functioning (e.g., Chatman et al., 1998).

Procedures

Participants entered a computer laboratory in groups of 4 to 12 people. The laboratory space had exactly enough room available to train two teams at the same time. Depending on the number of participants in a group, one or two 4-person teams were created, and the remaining participants performed an individual task. Participants were randomly assigned to conditions and to teams. The participants took their places behind computer screens and filled out a number of questionnaires. After a training session, the participants performed a 30-minute task. After the task, the participants filled out a number of electronic questionnaires.

Task

The participants engaged in a modified version of the Distributed Dynamic Decision-Making (DDD) simulation (see Miller, Young, Kleinman, & Serfaty, 1998), which was originally developed for the Department of Defense for research and training. The DDD is an interactive team task using a dynamic command-and-control simulation. The task requires coordination and interaction between team members, as they need to be highly interdependent

to perform well on the task. The specific variant used in the present experiment requires little or no military experience and involves skills that emphasize vigilance and monitoring.¹ The object of the networked computer task is to monitor and defend a restricted airspace within a geographic region against an invasion from unfriendly ground or air targets. A depiction of the computer screen and a comprehensive description of the task appears in Beersma et al. (2003).

Four decision makers (DMs) are responsible for defending a geographic region by identifying and attacking unfriendly targets. They have to work as a team to coordinate their actions. The geographic region was divided into four quadrants of equal size, and each area was assigned to one of the team members (designated DM1–DM4), with DM2 being located in the northwest, DM4 in the northeast, DM3 in the southwest, and DM1 in the southeast. The region was divided into three zones: a highly restricted zone, a restricted zone, and a neutral zone. The object of the task was to monitor and defend the restricted zones by identifying and attacking unfriendly forces moving into these zones, while allowing friendly forces to move in and out of the areas freely. If an unfriendly force entered a team's restricted zone, the team began to lose points. Twice as many points per second were lost for unfriendly forces located in the highly restricted zone than for unfriendly forces in the restricted zone. Points were also lost for attacking forces in the neutral space and attacking friendly forces. Cash prizes were awarded to teams who lost the fewest points.

Each team member's location was indicated by a base that had a detection ring and an identification ring, which were used to monitor the air space around the base. Within the detection ring, DMs could detect forces, and within the identification ring, DMs could discern the nature of the forces (i.e., friendly or unfriendly). Any force outside the detection ring was invisible to the DMs from their base. To see and identify forces outside of the detection and identification ring around the base,

¹ To examine whether the task was gender-biased, we analyzed the individual-level performance data. This analysis showed no difference in performance between men and women on the task, suggesting that the task is not gender-related ($F[1, 226] = 1.66$, n.s.; $\eta^2 = .01$). Additionally, we asked all participants how much experience they had in using computers and handling a computer mouse. Analyses of these questions showed that there were no differences between men and women in their self-reported computer skills ($F[1, 226] = 3.07$, n.s.; $\eta^2 = .01$) or in their self-reported mouse skills ($F[1, 226] = 0.001$, n.s.; $\eta^2 = .00$).

each DM could launch vehicles and move them near forces anywhere on the screen. Assigned to each base were four vehicles that could be used to identify forces and defend the space. As each individual team member thus only had limited information available, they needed to ask the other team members for information and assistance. Teams were allowed to talk during the task at all times, and all teams made use of this possibility.

Before working on the task, all participants received extensive training. First, team members were introduced to the task by means of a standardized PowerPoint presentation, which lasted approximately 20 minutes. In the presentation, the theoretical aspects of the task were explained in words and pictures, and by recorded narration. Second, the participants received hands-on training in the simulation for approximately 60 minutes. In this hands-on part of the training, the participants learned the basic mouse movements and operations, how to identify and engage forces, and how to move and use vehicles. After the training, teams engaged in the experimental task, which lasted for 30 minutes and was exactly the same for each team, whatever its experimental condition (see the account of the reward structure below).

Performance scores were kept on three different levels: individual, pair, and group. The individual score was based on the amounts of points lost and gained in each DM's individual quadrant. The geographical pair score was based on points gained and lost in the southern quadrants (DM1 and DM3) and northern quadrants (DM2 and DM4). Finally, the group score was based on points gained and lost in all four quadrants (the restricted zone). Each DM could see his or her individual score, his or her pair score, and the group score.

Manipulations and Measures

Group personality composition: Openness to experience. Prior to the experimental task, we measured openness to experience using a 12-item scale taken from the Revised NEO Personality Inventory—Short Form. This is one of the most widely used operationalizations of the five-factor model, and Costa and McCrae (1992) provided ample evidence on the reliability and construct validity of this questionnaire. Exemplary statements are, "Once I find the right way to do something, I stick to it" (reverse-coded), "I believe letting students hear controversial speakers can only confuse and mislead them" (reverse-coded), and "I often try new and foreign foods." The coefficient alpha estimate of reliability for the 12 items was .70.

For our present purposes, we focus on openness

to experience at the team level. There is ample research indicating that the theoretically appropriate operationalization of personality variables depends on the team task (e.g., Barrick et al., 1998; LePine, 2003; Moynihan & Peterson, 2001). Following these authors' recommendations, we examined the nature of the task to determine how openness to experience was to be aggregated to the group level. This aggregation procedure is rooted in the theoretical works of Steiner (1972), who distinguished among disjunctive, conjunctive, and additive tasks. Of Steiner's three categories, the additive model best represents the team task used in our study. Each member could access a certain set of information common to all team members; however, he or she also had knowledge of certain aspects of the task that were specific to his or her post; that is, each team member had an equal level of responsibility and an equal share of input into the team's output. This additive task is fundamentally different from a disjunctive task (e.g., problem solving), where the team's best member determines the output of the team. It is also different from a conjunctive task (e.g., mountain climbing), where the team's weakest member determines the team's output. Summarizing, if a team wanted to perform at a high level, all team members had to interact with each other to exchange information, thereby increasing the team's knowledge base. Thus, in light of the additive nature of the task, we used the average of the team member's scores to represent openness to experience at the team level (mean = 3.26, s.d. = 0.26; see, e.g., Barrick et al., 1998).

Reward structure: Faultline, cross-categorization, and superordinate reward. All groups were heterogeneous on sex and always consisted of two males and two females. We manipulated diversity salience by using reward structures to create (1) faultline groups, (2) cross-categorization groups, and (3) superordinate identity groups.

To create the faultline and cross-categorization experimental conditions, we broke a team down into two subteams, one that managed the Northern Region (the "Northern subteam"; i.e., participants in the NW and NE quadrants) and one that managed the Southern Region (the "Southern subteam"; i.e., participants in the SW and SE quadrants). The performance of these subteams could be assessed independently, and financial awards made to the participants who were in the faultline and cross-categorization conditions were based upon the performance of these subteams. The highest-performing subteam would receive an award of \$20. To prevent competition between subteams within one team, we created a situation in which a Northern subteam competed with the other Northern sub-

teams and a Southern subteam competed with the other Southern subteams. This distinction based on geographic subteams, which is an existing characteristic of the task, was necessary to converge or cross-cut reward structure with sex diversity. In the *faultline* condition, the Northern subteam was managed by two men and the Southern subteam was managed by two women (or vice-versa), thus reinforcing the sex difference. In the *cross-categorization* condition, the Northern subteam and Southern subteam were composed of a mixed-sex subteam, thus de-emphasizing the salience of the sex diversity.

To create a *superordinate* reward condition, we provided teams with a team-level reward by informing them that the top-performing teams would receive a reward of \$40; in these teams, the sex composition within either region should not make any difference. Still, in order to control for unanticipated differences, we ran half of the teams in the superordinate condition with mixed-sex Northern/Southern subteams and half with same-sex Northern/Southern subteams. We expected that members of these teams would not be aware of Northern/Southern distinctions. Results indeed showed no difference in performance between the two superordinate reward conditions ($F[1, 26] = 0.89, n.s.$), nor did they reveal differential effects of openness to experience in these conditions ($\beta = 0.19, t[23] = 0.74, n.s.$). We therefore chose to simplify the presentation and conserve degrees of freedom by combining these conditions into one superordinate condition.

To check the composition manipulation, we asked participants whether the sex of the team member who was based next to them (i.e., in the Northern or Southern subteam) during the game was similar or dissimilar to their own sex. To check the adequacy of the reward structure manipulation, we asked participants how they would be rewarded: "on the basis of the performance of my team" or "on the basis of the performance of my geographic pair."

Measures

Performance. Each team started the simulation with 50,000 points and lost 1 point for each second that any unfriendly force was in the restricted zone and 2 points per second for each force in the highly restricted zone. A team also lost 300 points for disabling any friendly force. The same calculation of team performance was used by Hollenbeck et al. (2002) and Moon et al. (2004). Average performance across teams was 41,400.33 (s.d. = 3,520.36).

Information elaboration. After the experiment, we assessed information elaboration using a three-item self-report measure and aggregated this to the

group level using the mean (mean = 3.64, s.d. = 0.65, $\alpha = .85$). This measure is based on the definition of information elaboration provided by van Knippenberg et al. (2004).² It was adapted for this specific task from the questionnaire used by Homan et al. (2007b). The items were "The group members contributed a lot of information during the group task," "The group members contributed unique information during the group task," and "During the task, we tried to use all available information." To control whether aggregation to the group level was appropriate, we computed ICC(1), ICC(2), and r_{wg} (Bliese, 2000). All three measures were acceptable, supporting aggregation to the group level: (ICC[1] = .39, $F[58, 179] = 3.53, p < .01$; ICC[2] = .72; $r_{wg} = .87$) (Glick, 1985).

Control variables. We used an additive measure of openness to experience at the group level to see whether teams whose members scored high on openness to experience were less negatively affected by diversity. Authors have argued that it is important to control for dispersion effects of the personality trait when using mean scores of personality (Klein & Kozlowski, 2000). We therefore used the standard deviation of openness as a control variable in our analyses.³

Although we had no theoretical rationale to include the other four personality traits of the five-factor model, we did measure them, also using the Revised NEO Personality Inventory—Short Form (Costa & McCrae, 1992). Considering the importance of those other four traits, we felt that it was important to control for their effects in this study. Supporting our claim that openness was theoretically most interesting in relation to diversity, we

² Using the same definition of information elaboration, Homan et al. (2007a) coded information elaboration from videotapes. In both of two studies (Homan et al., 2007a, 2007b), information elaboration was found to be similarly affected by diversity and showed comparable effects on team functioning.

³ Additionally, we wanted to check whether heterogeneity in openness to experience could serve as a sole predictor in our model. We therefore repeated our analysis with the variance in openness to experience as a predictor. We found no main effect ($\beta = 0.25, t[55] = 1.93, n.s.$) or interaction effects between variance in openness to experience and our dummy variables representing the cross-categorization and the superordinate identity conditions (cross-categorization: $\beta = -0.17, t[51] = -1.14, n.s.$; superordinate identity: $\beta = -0.28, t[51] = -1.67, n.s.$) on team performance. This analysis bolsters our belief that it is the mean level of openness rather than heterogeneity on openness that creates the effects.

TABLE 1
Means, Standard Deviations, and Correlations^a

Variable	Mean	s.d.	1	2	3	4	5	6
1. Openness to experience, standard deviation	0.45	0.20						
2. Openness to experience, mean	3.26	0.26	.32*					
3. Cross-categorization, dummy	0.25	0.44	-.24	-.19				
4. Superordinate reward, dummy	0.49	0.50	.14	.05	-.57***			
5. Faultline, dummy	0.25	0.44	.09	.14	-.34**	-.57***		
6. Performance	41,400.33	3,520.36	.25	.34**	-.03	.34**	-.37**	
7. Information elaboration	3.64	0.65	.28*	.33*	.02	.11	-.14	.44**

^a $n = 58$; the three dummy variables representing the experimental conditions are incorporated in the table for sake of comprehensiveness. For each dummy variable, the name indicates the condition coded 1 (e.g. for the cross-categorization dummy, the cross-categorization condition was 1 and the other two conditions, faultline and superordinate, were 0). Please note that correlations among the three dummy variables are redundant as they share similar groups (i.e., faultline teams are represented by a 0 in the cross-categorization dummy as well as in the superordinate dummy). Additionally, the correlations between the three dummy variables and performance do not take the full design into account, leading to slightly different results than the regression analysis.

* $p < .05$

** $p < .01$

*** $p < .001$

found—in separate analyses—that none of the other personality traits significantly predicted performance (neither alone nor in interaction with the salience manipulation). Additionally, the original effects did not change when the other personality traits were controlled for simultaneously or separately (using mean levels as well as standard deviations). Since none of the dimensions had any effect on team performance, we proceeded to test our hypotheses without these dimensions in order to preserve degrees of freedom and to minimize the chances for a type I error.

Finally, because participants were randomly assigned to conditions and to teams, we would not expect any effects of age and race composition. Still, as an additional check, we controlled for heterogeneity in age (using the standard deviation) and ethnic diversity (using Blau's [1977] index; also see Harrison & Klein [2007]). Neither of these variables had main effects ($\beta = 0.13$, $t[53] = 0.94$, n.s. for age; $\beta = -0.20$, $t[53] = 1.99$, n.s. for ethnic diversity) on performance, nor did their inclusion change the results concerning our hypotheses. Again, to minimize the probability of type I errors, we chose not to incorporate these variables in the analyses reported below.

RESULTS

All questionnaires were filled out electronically. Some participants experienced technical problems, which resulted in a crash of the last webpage that contained the manipulation checks, whereas others just overlooked these questions, which resulted in some nonresponse (37 missing for the reward structure check; 36 missing for the sex composition

check). Because the nonresponse was evenly distributed across conditions and groups, it did not seem to be an issue.⁴ Manipulation checks were analyzed individually, but team-level analysis rendered similar results.

Table 1 presents the means, standard deviations, and correlations for the variables of interest. We analyzed the results using hierarchical linear regression, standardizing the dependent variable, performance. We centered information elaboration and openness to experience and created two dummy variables comprising the three conditions. The comparison condition (that is, the condition that scored a 0 on all dummies) was the condition in which same-sex subteams were aligned with a pair reward: the *faultline* condition. This condition was compared with the condition with a pair reward for mixed-sex subteams (the *cross-categorization* condition; dummy 1), and

⁴ To examine whether the nonresponse on the manipulation check questions was influenced by our manipulations, we performed chi-square tests. Results indicated that nonresponse on the sex composition manipulation check was not affected by the sex composition manipulation ($\chi^2[1, n = 232] = 0.13$, n.s.; 17 missing values in the mixed-sex subgroup condition vs. 19 in the same-sex subgroup condition), nor by the reward manipulation ($\chi^2[1, n = 232] = 0.52$, n.s.; 20 missing values in the team reward condition vs. 16 in the subgroup reward condition). Likewise, nonresponse on the reward structure manipulation check was unaffected by the reward structure manipulation ($\chi^2[1, n = 232] = 1.57$, n.s.; 15 missing values in the team reward condition vs. 22 in the subgroup reward condition) and the sex manipulation ($\chi^2[1, n = 232] = .29$, n.s.; 17 missing values in the mixed-sex subgroup condition vs. 20 in the same-sex subgroup condition).

TABLE 2
Team Performance as a Function of Reward Structure and Openness to Experience^a

Step	Variables	Performance			
		1	2	3	4
1	Openness to experience, standard deviation (<i>Control</i>)	0.25 (0.64)	0.28* (0.66)	0.18 (0.61)	0.08 (0.58)
2	Contrasts between reward structure conditions				
	Cross-categorization vs. faultline (<i>Hypothesis 1</i>)		0.34* (0.34)	0.38* (0.33)	0.47** (0.31)
	Superordinate reward vs. faultline (<i>Hypothesis 2</i>)		0.51** (0.29)	0.52** (0.28)	0.57*** (0.26)
	(Superordinate reward vs. cross-categorization) ^b		0.13 (0.30)	0.10 (0.28)	0.03 (0.27)
3	Openness to experience, mean (<i>Hypothesis 3</i>)			0.31* (0.47)	0.73** (0.85)
4	Two-way interactions (<i>Hypothesis 4</i>)				
	Cross-categorization vs. faultline × openness				0.12 (1.46)
	Superordinate reward vs. faultline × openness				-0.53** (0.98)
	(Superordinate reward vs. cross-categorization × openness) ^b				-0.79** (1.33)
Total R^2		.06	.24**	.32*	.46**
ΔR^2			.17**	.08*	.14**

^a $n = 58$; standardized coefficients (β s) are reported in models 1–4 with standard errors in parentheses. Unless otherwise indicated, the faultline condition was the reference group (dummy-coded 0).

^b For the sake of completeness, we reran the analysis with the cross-categorization condition as the reference group (i.e., the cross-categorization condition was dummy-coded 0). Because the contrast between the faultline condition and the cross-categorization condition in this additional analysis is similar to the contrast between the faultline and cross-categorization conditions in the central analysis pertaining to our hypothesis tests, we only report the contrast between the superordinate reward and cross-categorization conditions that is unique to the additional analysis.

* $p < .05$

** $p < .01$

*** $p < .001$

with the combined *superordinate* condition in which mixed-sex and same-sex subteams were rewarded on the basis of their team performance (dummy 2). To test the effects of openness to experience combined with the different reward structure conditions, we calculated the product of openness to experience and the two dummy variables.⁵

Manipulation Checks

We checked the manipulation of the sex composition of the subgroups by performing a Pearson

chi-square test, which indicated that participants were aware of the sex of the other person in their geographical pair ($\chi^2[1, n = 196] = 169.02, p < .01$). Participants that were in a same-sex subteam correctly indicated that the sex of the person in their subteam was the same as their own. Participants in a mixed-sex subteam indicated that the sex of their subteam member was different from their own. The perceived sex composition of the team was not affected by the manipulation of reward structure ($\chi^2[1, n = 195] = 0.00, n.s.$).

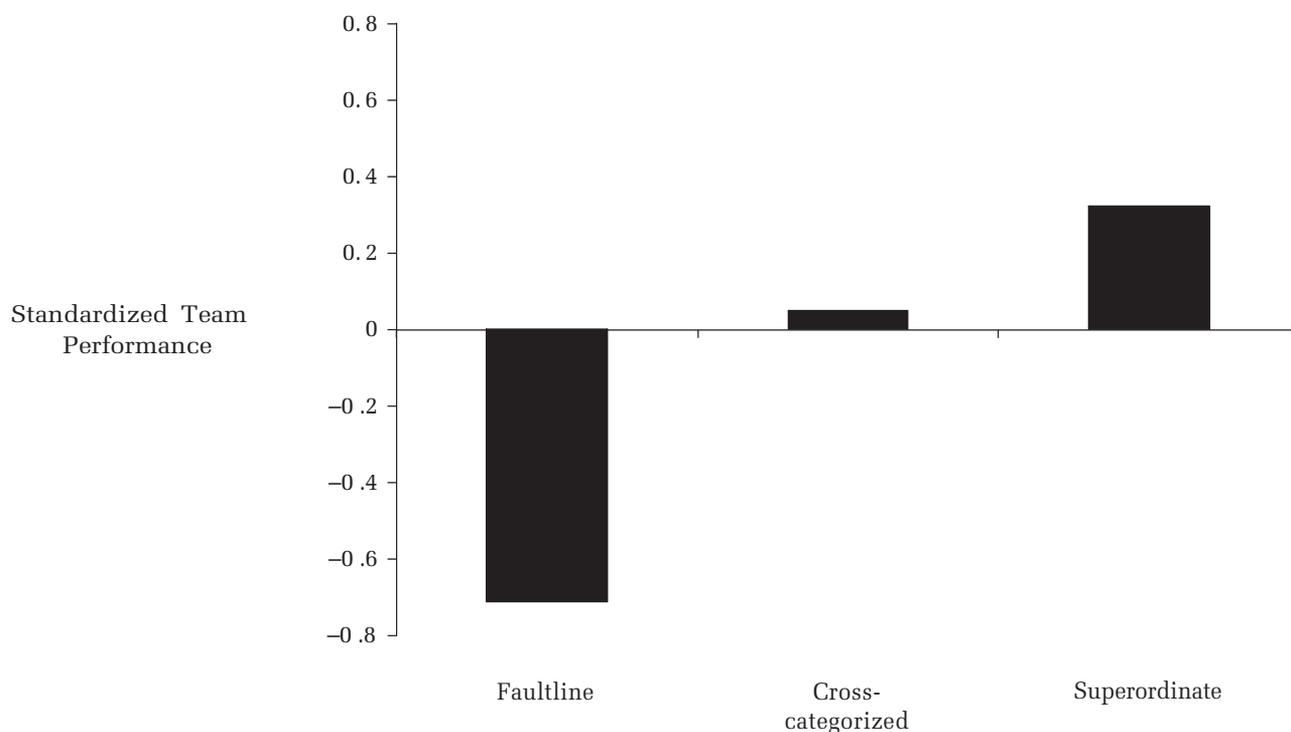
A Pearson chi-square test showed that the manipulation of reward structure was also successful ($\chi^2[1, n = 195] = 36.88, p < .01$). Participants in the team reward condition thought that the chances to obtain the reward were dependent on the performance of the team as a whole, and participants in the pair reward condition thought that the chances to obtain the reward were dependent on the performance of their subteam. This manipulation was not affected by the sex composition of the subteams ($\chi^2[1, n = 196] = 0.74, n.s.$).

Test of Hypotheses

Control: Dispersion of openness to experience. Table 2 shows the results of the hierarchical regres-

⁵ As per a reviewer's suggestion, we reanalyzed the data using a two (reward structure: subteam vs. team) by two (sex seating: sex and region aligned vs. sex and region crossed) by openness to experience design. The analysis results in similar conclusions concerning our hypotheses. However, the sex seating dummy is meaningless without the reward structure dummy, and by running this analysis we incorporate an extra main effect and an interaction effect in our regression analysis for which we did not expect nor find any effects. We therefore decided not to report this analysis in this article, as it would not provide the most parsimonious or straightforward test of our hypotheses. Results of this test are available from the first author.

FIGURE 1
Effects of Reward Structure on Performance in Diverse Teams (Hypotheses 1 and 2)



sion used to test our hypotheses. In step 1, we entered the standard deviation of openness to experience as a control variable, and we found that it did not predict performance.

Hypotheses 1 and 2. In step 2, we regressed team performance on the two dummy variables representing the superordinate reward and cross-categorization conditions. In keeping with Hypothesis 1, we found that groups in the cross-categorization condition performed significantly better than groups in the faultline condition. In line with Hypothesis 2, groups with a superordinate reward also performed better than faultline groups. The main effect of reward structure, which explained an incremental 18 percent of the variance beyond heterogeneity in openness to experience, is graphically depicted in Figure 1.

Hypothesis 3. In step 3 we entered openness to experience. Supporting Hypothesis 3, groups with a higher level of openness performed better than groups with a lower level of openness. Openness to experience explained an additional 8 percent of the variance in performance.

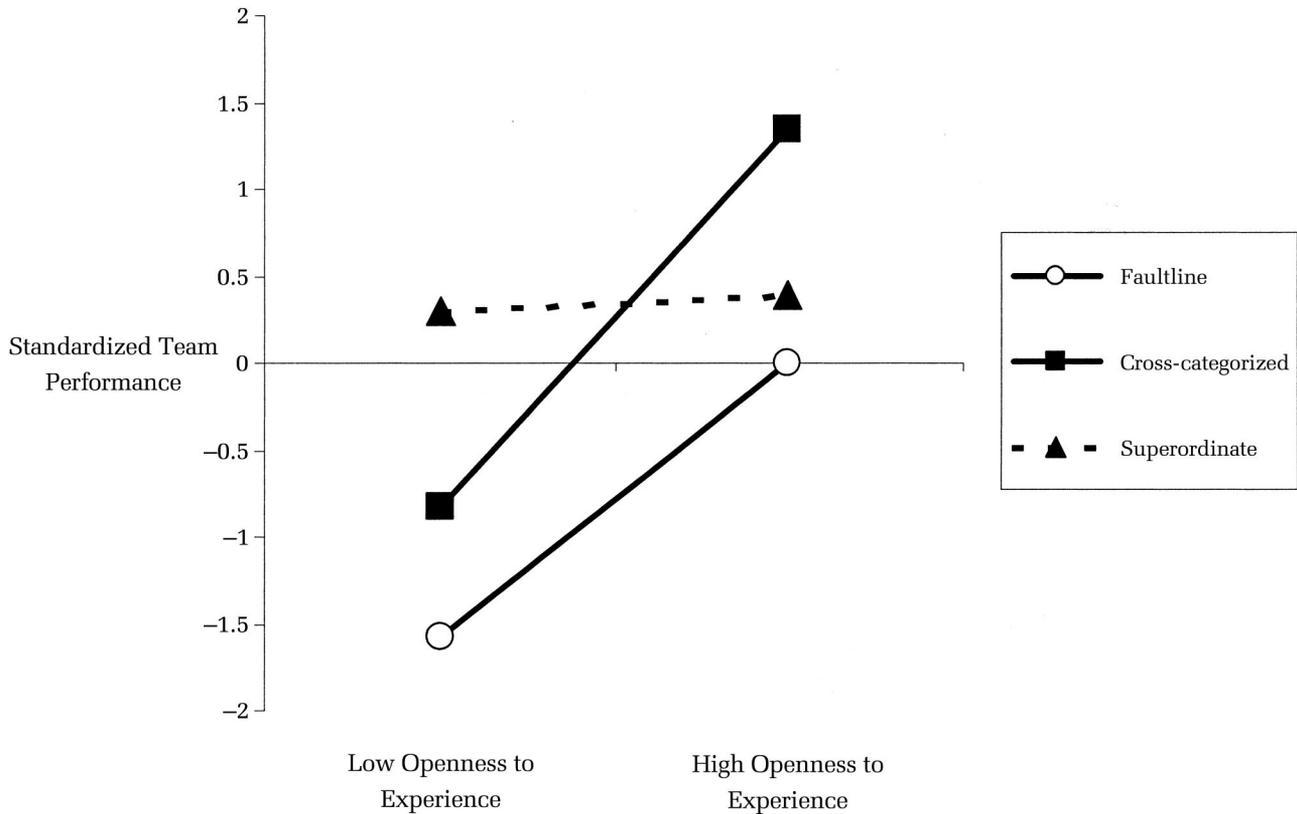
Hypothesis 4. In step 4 of the hierarchical regression, we examined the interaction between group composition and reward structure by adding the products of openness to experience and both of the dummy variables. This addition revealed a significant interaction between openness to experience

and reward structure on team performance (see step 4 in Table 2), which accounted for 16 percent of the incremental variance in performance beyond the main effects. To understand this interaction, we plotted the effect of openness to experience for each of the three levels of reward structure. As can be seen in Figure 2, openness to experience was more positively related to performance in the faultline condition and the cross-categorization condition than in the superordinate identity condition (to compute the latter contrast, we recoded the dummy variables in such a way that the cross-categorization condition was represented by a 0).

There was no differential effect of openness to experience between the faultline condition and the cross-categorization condition. That is, in keeping with Hypothesis 4, for both conditions in which differences were made relatively salient by reward structure, high openness to experience equally promoted team performance, compared to the condition in which differences were obscured. Supporting our theorizing, and as is apparent from Figure 2, the worst performance occurred within faultline teams that scored low in openness to experience, the best performance occurring within cross-categorized teams that scored high in openness to experience.

Hypotheses 5a and 5b. To test whether information elaboration mediated the positive effect of

FIGURE 2
Interactive Effects of Openness to Experience and Reward Structure on Performance in Diverse Teams (Hypothesis 4)



openness to experience in diverse teams (Hypothesis 5a), we followed the procedure suggested by Baron and Kenny (1986). We had already established that openness to experience affected performance (see Table 2). Second, we found that openness to experience increased information elaboration ($\beta = 0.27, p < .05$) and that more information elaboration inspired greater performance ($\beta = 0.44, p < .01$). Third, when we added information elaboration into the regression equation ($\beta = 0.35, p < .01$), the originally significant effect of openness to experience on performance was reduced to nonsignificance ($\beta = 0.19, p = .17$), and this reduction itself was significant, according to a Sobel test ($z = 1.88, p < .05$, one-tailed).

Finally, we examined whether information elaboration mediated the effect of the interaction between openness to experience and the salience of intragroup differences on team performance. The interaction between openness and reward structure showed that in the faultline and cross-categorization conditions, higher levels of openness led to higher performance, but that openness did not affect performance in the superordinate identity condition (see Hypothesis 4). As elaborated above, this is

because diversity is less salient in the superordinate identity condition, which makes it more difficult to harvest the value in diversity. In other words, as differences are salient in the faultline and cross-categorization conditions, information elaboration is likely to act as a mediator in these conditions, but not in the superordinate identity condition.

In this respect, it has been suggested that it is possible that the proposed mediator is more strongly related to the dependent variable under some conditions than others (Hull, Tedlie, & Lehn, 1992; also see Muller, Judd, & Yzerbyt, 2005). In this case, simply entering the mediator as a covariate violates the statistical assumption of homogeneity of regression slopes (that is, the assumption that the slopes of the regression lines are the same in each group). Inclusion of the “covariate interaction” (i.e., the interaction between an independent variable and the proposed mediator) then yields a more appropriate test of mediation than an analysis that only includes the “main effect” of the proposed mediator (Hull et al., 1992; Muller et al., 2005).

To test our mediational model, we included the covariate interaction between information elaboration and our dummies representing the reward

structure conditions. In the first step, we showed a significant interaction between reward structure and openness to experience on performance (Hypothesis 4). In the second step, openness to experience was found to predict information elaboration (Hypothesis 5a). In the final step, the interactions between the reward structure dummies and openness to experience (including the main effects) and the covariate interactions between the reward structure dummies and information elaboration (including the main effect of information elaboration) were simultaneously entered into the equation to predict performance. This analysis produced a significant effect of the covariate interaction ($\beta = -1.54, p < .05$); the originally significant interaction between the dummy representing the superordinate identity condition and openness was reduced to nonsignificance ($\beta = -0.38, n.s.$); and this reduction itself was significant (Sobel's $z = 1.75, p < .05$, one-tailed).

DISCUSSION

As a result of an increasingly diverse workforce, work groups are inevitably composed of members with different demographic backgrounds, values, expertise, and perspectives. As previous research on the effects of diversity in teams has shown inconsistent results, we set out to broaden our understanding of diversity by taking important moderators into account. Perhaps our most compelling finding is that in both the highest- and lowest-performing teams, diversity was salient, but in the highest-performing teams, reward structure cross-cut sex diversity and members scored high on openness, whereas the worst-performing teams had a diversity faultline and scored low on openness.

Theoretical Implications and Contributions

Past inconsistent findings regarding diversity have been attributed to the main effects approach that has characterized a lot of diversity research (van Knippenberg et al., 2004). In line with this idea, our findings support the notion that in teams that are identical in terms of sex diversity, performance differs depending on structural aspects of a situation and a team's personality composition. As outlined early in this article, prevailing theories in diversity research are very capable of explaining why positive or negative effects of diversity occur. Positive effects of diversity are assumed to be caused by information/decision making processes, whereas negative effects of diversity are assumed to result from disruptive social categorization processes (Williams & O'Reilly, 1998). However, these

perspectives are less able to predict *when* positive or negative effects of diversity will occur. That is, given a certain level of diversity, it is difficult to forecast, on the basis of these theories, what the performance of a team will be. Using the framework developed by van Knippenberg et al. (2004), we showed that the outcomes of diversity are contingent upon the salience of the diversity, as well as upon how people feel about diversity. These findings contribute to the literature in several ways.

First, our findings point to the importance of diversity salience. Comparing three conditions of salience, we showed that within sex-diverse teams, increasing the salience of sex-based subgroups by aligning sex with reward structure leads to lower levels of performance, whereas cross-cutting sex with reward structure or providing a superordinate identity leads to higher levels of performance. These findings represent an important qualification of the social categorization perspective because they indicate that teams with similar levels of diversity do not necessarily experience similar social categorization processes and exhibit similar performance. This suggests that the relation between diversity and performance is more complex than is assumed in the social categorization perspective, as diversity does not necessarily hamper group processes and consequential group performance. Our findings also address the information/decision making perspective, according to which diversity stimulates the use of information and thereby enhances performance. The present study indicates that such positive effects of diversity are likely to occur when the salience of subgroups within a team is reduced, but not when subgroup salience is reinforced. Our findings thus help to integrate these divergent perspectives by specifying when diversity will have positive effects and when it will have negative effects.

Second, we show that there are differences in how teams experience their diversity. Ours is the first study to explicitly show that diverse teams that score high on openness to experience perform better than diverse teams that score low on this characteristic. We also show that when differences within a team are salient, openness to experience helps teams to capitalize upon their differences. This again is an important qualification of the aforementioned theories, as it suggests that one should take people's ideas about diversity into account when examining diversity effects.

Third, our study qualifies and extends the similarity/attraction paradigm, superordinate identity models, and faultline theory. Whereas the similarity/attraction paradigm leads to the prediction that people will be more attracted to similar than to dissimilar others, our results show that there are

individual differences in people's reactions to dissimilar others. One can therefore not simply predict that within diverse teams, people will be more attracted to their in-group than to an out-group; rather, such attraction depends on people's openness to experience. As to the superordinate identity model, our findings show that installing a superordinate identity can help to overcome some of the negative consequences of diversity (Chatman et al., 1998), even when groups score low on openness to experience. Finally, regarding faultline theory, our results indicate that the positive effects of openness to experience were quite manifest under faultline conditions, which have been shown in previous work to be detrimental to group functioning (Thatcher et al., 2003). This finding not only sheds new light on faultline theory (Lau & Murnighan, 1998) but also gives us a more positive outlook on diversity in teams (see also Gibson & Vermeulen, 2003)—diversity faultlines need not disrupt team processes, as long as team members score high on openness to experience.

Fourth, the present study adds to the diversity literature by showing that information elaboration is an important process by which diverse teams can improve their performance. Although it has been proposed that effective use of information is vital for the functioning of diverse teams (van Knippenberg et al., 2004), little research has examined the underlying processes driving diversity effects. Our findings are in line with previous work showing that the extent to which teams attempt to be inclusive in making and integrating strategic decisions partially mediates the effects of diversity on team functioning (Simons, Pelled, & Smith, 1999). Moreover, the fact that openness to experience engendered information elaboration in groups in which differences were salient corroborates our proposition that positive attitudes towards diversity enable group members to capitalize on their diversity.

Fifth, the finding that openness to experience is positively related to the performance of diverse teams represents a substantial contribution to existing theory on the personality composition of teams, because we have shown that an individual difference variable has important implications for the functioning of diverse teams. Our study was built upon the idea that particular personality characteristics are related to beliefs and attitudes about diversity (Flynn, 2005). However, although several authors have argued that individual differences are important determinants of attitudes toward differences in teams (e.g., Strauss et al., 2003), previous studies have focused mainly on how personality characteristics predict stereotyping and intergroup bias at the *individual* level. Following previous suggestions that it is important to consider group

personality composition when examining group functioning (e.g., Humphrey, Hollenbeck, Meyer, & Ilgen, 2007), the present study showed that a group's composition, in terms of openness to experience, also affects performance and the way diversity is dealt with at the *group* level.

Sixth, we focused on openness to experience as a moderator of diversity effects in teams, as this variable seems most closely related to attitudes and feelings toward working in diverse teams. Of all the personality traits of the five-factor model, openness to experience has received the least research attention, and numerous authors have pointed to the complicated definition and inconsistent effects of this trait (e.g., Barrick & Mount, 1991). Many authors who have recently examined the five traits have therefore chosen to exclude openness to experience as a predictor or to examine it only in an exploratory fashion (e.g., Barrick et al., 1998; Kichuk & Wiesner, 1997). The fact that we find a positive and significant effect of openness to experience could mean a revival for this trait. Our findings indicate that openness to experience might be extremely valuable, especially if teams or individuals are faced with something that requires an open mind. That is, our findings indicate that the effects of openness to experience might be contingent upon situational factors, which may account for the null effects that have been found in previous research.

Practical Implications

Our findings suggest several possible diversity management strategies. First, selecting team members who score high on openness to experience might help teams make use of the value in diversity. Second, when diverse teams contain members low in openness, a solution would be to advocate prodiversity beliefs, in order to stimulate information elaboration and team performance (Homan et al., 2007a; van Knippenberg, Haslam, & Platow, 2007). Third, another practical solution for managing diverse teams low in openness to experience would be to install a superordinate identity, so as to decrease diversity salience and prevent subgroup categorization. One way in which management could accomplish this would be to use reward structures that emphasize a team's superordinate identity (cf. Li & Hambrick, 2005). Finally, in teams high in openness, reward structures may be used to create a cross-categorized identity that highlights diversity but reduces the salience of subgroups.

Although a strong focus on superordinate identity can result in better performance, as compared to a faultline group (cf. Chatman et al., 1998), it

might also decrease the positive effects of openness to experience. Polzer, Milton, and Swann (2002) argued that in order for diverse teams to capitalize on their differences, people should feel that their self-conceptions and social views are verified. Emphasizing a superordinate identity could cause group members to replace their personalized self-conceptions with a cognitive representation of themselves as embodiments of the work-group prototype (Polzer et al., 2002). Creating a strong superordinate identity alone may therefore not always be the best decision, especially when groups are potentially better off when elaborating on their diverse perspectives and ideas. In contrast, it might be more fruitful to create cross-categorized teams in which the focus is on interpersonal rather than intersubgroup differences or, alternatively, to instigate a dual identity, focusing on the superordinate identity as well as on subgroup identities within the superordinate group (Gaertner & Dovidio, 2000).

Limitations and Future Directions

Although the main aim of experimental studies is not to obtain external validity (Berkowitz & Donnerstein, 1982), reports of experimental research tend to elicit questions of external validity. Obviously, then, confidence in the conclusions advanced here would be strengthened if the current results were replicated in a study of teams in actual organizations, and seeking such replication would indeed seem an important avenue for future research. On the other hand, the highly controlled nature of our research context promoted internal validity, and the ability to randomly assign teams to conditions and obtain objective measures of performance provided a stronger base from which to draw causal inferences (Ilgen et al., 2005). Additionally, prior research using this task has shown that participants are motivated to perform well to increase their chances of a bonus (Beersma et al., 2003). Thus, we believe that the task used in our study had considerable psychological realism. Moreover, from a theory-testing perspective, there is no indication within existing theories of faultlines or cross-categorization that these theories would not hold in an experimental context.

Our reward structure manipulation created either a strong faultline or no faultline at all. Previous work has distinguished between differences in faultline strength (Gibson & Vermeulen, 2003; Lau & Murnighan, 2005), stating that faultlines have detrimental effects especially when they are strong—that is, when a faultline creates very distinct subgroups. Our study does not speak to this issue, in that we compared a condition with a

strong faultline with conditions in which there was no-active faultline. As predicted on the basis of faultline theory, we found more positive outcomes under no-faultline conditions. From this, we should not conclude, however, that the relationship between faultline strength and outcomes is linear. It is possible that weak to moderate faultlines yield outcomes that are comparable to no-faultline conditions. Future research could study this issue in more detail by incorporating distinct manipulations of faultline strength.

Finally, because we wanted to examine the contingencies affecting the performance of diverse teams, we studied only heterogeneous teams. This focus means that we must be careful not to conclude that our findings pertain to differences between sex-homogeneous and -heterogeneous teams. Furthermore, it is important to note that sex is not the only dimension on which team members may differ. Teams differ on numerous dimensions, ranging from highly visible characteristics such as race and age to more invisible ones such as perspectives, functional backgrounds, and values. Our sample was relatively homogeneous with regard to these other factors. Future research could focus on other diversity dimensions. Whether the effects of other types of diversity are the same may depend, among other things, on the salience of the diversity dimension. Van Knippenberg et al. (2004) proposed that all types of diversity can possibly result in salient subgroups within teams. Therefore, besides incorporating diversity characteristics other than sex, future research should determine the salience of the diversity dimensions of interest.

REFERENCES

- Baron, R. M., & Kenny, D. A. 1986. The moderator-mediator distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51: 1173–1182.
- Barrick, M. R., & Mount, M. K. 1991. The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44: 1–26.
- Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. 1998. Relating member ability and personality to work-team processes and team effectiveness. *Journal of Applied Psychology*, 83: 377–391.
- Beersma, B., Hollenbeck, J. R., Humphrey, S. E., Moon, H., Conlon, D. E., & Ilgen, D. R. 2003. Cooperation, competition, and team performance: Toward a contingency approach. *Academy of Management Journal*, 46: 572–590.
- Bell, S. T. 2007. Deep-level composition variables as predictors of team performance: A meta-analysis. *Journal of Applied Psychology*, 92: 595–615.

- Berkowitz, L., & Donnerstein, E. 1982. External validity is more than skin deep: Some answers to criticisms of laboratory experiments. *American Psychologist*, 37: 245–257.
- Blau, P. M. 1977. *Inequality and heterogeneity*. New York: Free Press.
- Bliese, P. D. 2000. Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 349–381. San Francisco: Jossey-Bass.
- Brewer, M. B. 1995. Managing diversity: The role of social identities. In M. N. Ruderman & S. E. Jackson (Eds.), *Diversity in work teams: Research paradigms for a changing workplace*: 47–68. Washington, DC: American Psychological Association.
- Brewer, M. B., & Brown, R. J. 1998. Intergroup relations. In D. T. Gilbert & S. T. Fiske (Eds.), *The handbook of social psychology* (4th ed.), vol. 2: 554–594. New York: McGraw-Hill.
- Brown, R. J., & Turner, J. C. 1981. Interpersonal and intergroup behavior. In J. C. Turner & H. Giles (Eds.), *Intergroup behavior*: 33–64. Chicago: University of Chicago Press.
- Byrne, D. 1971. *The attraction paradigm*. New York: Academic Press.
- Chatman, J. A., Polzer, J. T., Barsade, S. G., & Neale, M. A. 1998. Being different yet feeling similar: The influence of demographic composition and organizational culture on work processes and outcomes. *Administrative Science Quarterly*, 43: 749–780.
- Costa, P. T., & McCrae, R. R. 1992. *Revised NEO Personality Inventory*. Odessa, FL: Psychological Assessment Resources.
- Cox, T. H., Lobel, S. A., & McLeod, P. L. 1991. Effects of ethnic group cultural differences on cooperative and competitive behavior on a group task. *Academy of Management Journal*, 34: 827–847.
- Davis, J. H. 1969. *Group performance*. Reading, MA: Addison-Wesley.
- DeMatteo, J. S., Eby, L.T., & Sundstrom, E. 1998. Team-based rewards: Current empirical evidence and directions for future research. In R. I. Sutton & B. M. Staw (Eds.), *Research in organizational behavior*, vol. 20: 141–183. Greenwich, CT: JAI Press.
- Earley, P. C., & Mosakowski, E. 2000. Creating hybrid team cultures: An empirical test of transnational team functioning. *Academy of Management Journal*, 43: 26–49.
- Ekehammar, B., & Akrami, N. 2003. The relation between personality and prejudice: A variable- and person-centered approach. *European Journal of Personality*, 17: 449–464.
- Ely, R. J., & Thomas, D. A. 2001. Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes. *Administrative Science Quarterly*, 46: 229–273.
- Flynn, F. J. 2005. Having an open mind: The impact of openness to experience on interracial attitudes and impression formation. *Journal of Personality and Social Psychology*, 88: 816–826.
- Gaertner, S. L., & Dovidio, J. F. 2000. *Reducing intergroup bias: The common ingroup identity model*. New York: Psychology Press.
- Gaertner, S. L., Mann, J. A., Murrell, A. J., & Dovidio, J. F. 1989. Reduction of intergroup bias: The benefits of recategorization. *Journal of Personality and Social Psychology*, 57: 239–249.
- Gibson, C., & Vermeulen, F. 2003. A healthy divide: Subgroups as a stimulus for team learning behavior. *Administrative Science Quarterly*, 48: 202–239.
- Glick, W. H. 1985. Conceptualizing and measuring organizational and psychological climate: Pitfalls in multilevel research. *Academy of Management Journal*, 10: 601–616.
- Gruenfeld, D. H., Mannix, E. A., Williams, K. Y., & Neale, M. A. 1996. Group composition and decision making: How member familiarity and information distribution affect process and performance. *Organizational Behavior and Human Decision Processes*, 67: 1–15.
- Guzzo, R., & Dickson, M. 1996. Teams in organizations: Recent research on performance and effectiveness. In J. T. Spence (Ed.), *Annual review of psychology*, vol. 47: 307–338. Palo Alto, CA: Annual Reviews.
- Harrison, D. A., & Klein, K. J. 2007. What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review*, 32: 119–1228.
- Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. 2002. Time, teams, and task performance: Changing effects of surface- and deep-level diversity on group functioning. *Academy of Management Journal*, 45: 1029–1045.
- Hewstone, M., Rubin, M., & Willis, H. 2002. Intergroup bias. In S. T. Fiske, D. L. Schachter, & C. Zahn-Waxler (Eds.), *Annual review of psychology*, vol. 53: 575–604. Palo Alto, CA: Annual Reviews.
- Hollenbeck, J. R., Moon, H., Ellis, A. P. J., West, B. J., Ilgen, D. R., Sheppard, L., Porter, C. O. L. H., & Wagner, J. A. 2002. Structural contingency theory and individual differences: Examination of external and internal person-team fit. *Journal of Applied Psychology*, 87: 599–606.
- Homan, A. C., van Knippenberg, D., Van Kleef, G. A., & De Dreu, C. K. W. 2007a. Bridging faultlines by valuing diversity: The effects of diversity beliefs on information elaboration and performance in diverse work groups. *Journal of Applied Psychology*, 92: 1189–1199.
- Homan, A. C., van Knippenberg, D., Van Kleef, G. A., & De Dreu, C. K. W. 2007b. Interacting dimensions of

- diversity: Cross-categorization and the functioning of diverse work groups. *Group Dynamics: Theory, Research, and Practice*, 11: 79–94.
- Hornsey, M. J., & Hogg, M. A. 2000. Subgroup relations: A comparison of mutual intergroup differentiation and common ingroup identity models of prejudice reaction. *Personality and Social Psychology Bulletin*, 26: 242–256.
- Hull, J. G., Tedlie, J. C., & Lehn, D. A. 1992. Moderator variables in personality research: The problem of controlling for plausible alternatives. *Personality and Social Psychology Bulletin*, 18: 115–117.
- Humphrey, S. E., Hollenbeck, J. R., Meyer, C. J., & Ilgen, D. R. 2007. Trait configurations in self-managed teams: A conceptual examination of the use of seeding to maximize and minimize trait variance in teams. *Journal of Applied Psychology*, 92: 885–892.
- Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. 2005. Teams in organizations: From I-P-O Models to IMO models. In S. T. Fiske, A. E. Kazdin, & D. L. Schacter (Eds.), *Annual review of psychology*, vol. 56: 517–543. Palo Alto, CA: Annual Reviews.
- Jackson, S., Brett, J., Sessa, V., Cooper, D., Julin, J., & Peyronnin, K. 1991. Some differences make a difference: Individual dissimilarity and group heterogeneity as correlates of recruitment, promotions, and turnover. *Journal of Applied Psychology*, 76: 675–689.
- Jehn, K. A., Northcraft, G. B., & Neale, M. A. 1999. Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. *Administrative Science Quarterly*, 44: 741–763.
- Kerrin, M., & Oliver, N. 2002. Collective and individual improvement activities: The role of reward systems. *Personnel Review*, 31: 320–337.
- Kichuk, S. L., & Wiesner, W. H. 1997. The Big Five personality factors and team performance: Implications for selecting successful product design teams. *Journal of Engineering and Technology Management*, 14: 195–221.
- Kirkman, B. L., & Shapiro, D. L. 2000. Understanding why team members won't share: An examination of factors related to employee receptivity to team-based rewards. *Small Group Research*, 31: 175–209.
- Klein, K. J., & Kozlowski, S. W. J. 2000. (Eds.). *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*. San Francisco: Jossey-Bass.
- Lau, D., & Murnighan, J. K. 1998. Demographic diversity and faultlines: The compositional dynamics of organizational groups. *Academy of Management Review*, 23: 325–340.
- Lau, D., & Murnighan, J. K. 2005. Interactions with groups and subgroups: The effects of demographic faultlines. *Academy of Management Journal*, 48: 645–659.
- LePine, J. A. 2003. Team adaptation and postchange performance: Effects of team composition in terms of members' cognitive ability and personality. *Journal of Applied Psychology*, 88: 27–39.
- Li, J., & Hambrick, D. C. 2005. Factional groups: A new vantage on demographic faultlines, conflict, and disintegration in work teams. *Academy of Management Journal*, 48: 794–813.
- Marcus-Newhall, A., Miller, N., Holtz, R., & Brewer, M. B. 1993. Cross-cutting category membership with role assignment: A means of reducing intergroup bias. *British Journal of Social Psychology*, 32: 125–146.
- McCrae, R. R. 1987. Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology*, 52: 1258–1265.
- McCrae, R. R., & Costa, P. T. 1987. Validation of the five factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52: 81–90.
- Migdal, M. J., Hewstone, M., & Mullen, B. 1998. The effects of crossed categorization on intergroup evaluations: A meta-analysis. *British Journal of Social Psychology*, 37: 303–324.
- Miller, D. L., Young, P., Kleinman, D., & Serfaty, D. 1998. *Distributed dynamic decision-making simulation: Phase 1. Release notes and user's manual*. Woburn, MA: Aptima.
- Milliken, F. J., & Martins, L. L. 1996. Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review*, 21: 402–433.
- Moon, H., Hollenbeck, J. R., Humphrey, S. E., Ilgen, D. R., West, B., Ellis, A. P. J., & Porter, C. O. L. H. 2004. Asymmetric adaptability: Dynamic team structures as one-way streets. *Academy of Management Journal*, 47: 681–695.
- Moynihan, L. M., & Peterson, R. S. 2001. A contingent configuration approach to understanding the role of member personality in organizational groups. In B. M. Staw (Ed.), *Research in organizational behavior*, vol. 23: 327–378. Greenwich, CT: JAI Press.
- Muller, D., Judd, C. M., & Yzerbyt, V. Y. 2005. When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, 89: 852–863.
- Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. 1999. Exploring the black box: An analysis of work group diversity, conflict and performance. *Administrative Science Quarterly*, 44: 1–28.
- Phillips, K. W., Mannix, E. A., Neale, M. A., & Gruenfeld, D. H. 2004. Diverse groups and information sharing: The effects of congruent ties. *Journal of Experimental Social Psychology*, 40: 497–510.
- Polzer, J. T., Milton, L. P., & Swann, W. B., Jr. 2002. Capitalizing on diversity: Interpersonal congruence in small work groups. *Administrative Science Quarterly*, 47: 296–324.
- Sherif, M. 1958. Superordinate goals in the reduction of

- intergroup conflict. *American Journal of Sociology*, 63: 349–356.
- Simons, T., Pelled, L. H., & Smith, K. A. 1999. Making use of difference: Diversity, debate, and decision comprehensiveness in top management teams. *Academy of Management Journal*, 42: 662–673.
- Stangor, C., Lynch, L., Duan, C., & Glass, B. 1992. Categorization of individuals on the basis of multiple social features. *Journal of Personality and Social Psychology*, 62: 207–218.
- Steiner, I. D. 1972. *Group processes and productivity*. New York: Academic Press.
- Strauss, J. P., Connerley, M. L., & Ammermann, P. A. 2003. The “threat hypothesis,” personality, and attitudes toward diversity. *Journal of Applied Behavioral Science*, 39: 32–52.
- Thatcher, S. M. B., Jehn, K. A., & Zanutto, E. 2003. Cracks in diversity research: The effects of diversity fault-lines on conflict and performance. *Group Decision and Negotiation*, 12: 217–241.
- Tjosvold, D., & Poon, M. 1998. Dealing with scarce resources: Open-minded interaction for resolving budget conflicts. *Group and Organization Management*, 23: 237–255.
- Triandis, H. C., Kurowski, L. L., & Gelfand, M. J. 1994. Workplace diversity. In H. C. Triandis, M. P. Dunnette, & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed.), vol. 4: 769–827. Palo Alto, CA: Consulting Psychologists Press.
- Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. 1987. *Rediscovering the social group. A self-categorization theory*. Oxford, U.K.: Blackwell.
- Van der Vegt, G. S., & Van de Vliert, E. 2005. Effects of perceived skill dissimilarity and task interdependence on helping in work teams. *Journal of Management*, 31: 73–89.
- van Knippenberg, D., De Dreu, C. K. W., & Homan, A. C. 2004. Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, 89: 1008–1022.
- van Knippenberg, D., & Haslam, S. A. 2003. Realizing the diversity dividend: Exploring the subtle interplay between identity, ideology, and reality. In S. A. Haslam, D. van Knippenberg, M. Platow, & N. Ellemers (Eds.), *Social identity at work: Developing theory for organizational practice*: 61–77. New York and Hove, U.K.: Psychology Press.
- van Knippenberg, D., Haslam, S. A., & Platow, M. J. 2007. Unity through diversity: Value-in-diversity beliefs as moderator of the relationship between work group diversity and group identification. *Group Dynamics: Theory, Research, and Practice*, 11: 207–222.
- van Knippenberg, D., & Schippers, M. C. 2007. Work group diversity. In M. I. Posner & M. K. Rothbart (Eds.), *Annual review of psychology*, vol. 58: 515–541. Palo Alto, CA: Annual Reviews.
- Wageman, R. 1995. Interdependence and group effectiveness. *Administrative Science Quarterly*, 40: 145–180.
- Williams, K. Y., & O'Reilly, C. A. 1998. Demography and diversity in organizations. In R. I. Sutton & B. M. Staw (Eds.), *Research in organizational behavior*, vol. 20: 77–140. Greenwich, CT: JAI Press.



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