INGA JASMIN HOEVER

Diversity and Creativity

In Search of Synergy

Diversity and Creativity:

In search of synergy

Diversity and Creativity:
In search of synergy

Diversiteit en creativiteit:
Op zoek naar synergie

Thesis

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Chapter 1: Introduction

Research Topic

Developing creative ideas concerning products, procedures, or services is seen as an imperative for organizations and organizational actors (Florida & Goodnight, 2005). Creativity is often presented as a necessary (albeit not by itself sufficient) antecedent of innovation (Gilson, 2008) and as such meaningfully contributes to an organization's ability to adapt to changing environments and to maintain a competitive advantage (e.g., Drucker, 1992; Tushman & O'Reilly, 2002). Reflecting this important (and perhaps increasingly important) role of creativity for modern-day organizations, prominent managerial outlets have devoted considerable attention to questions of how to manage for creativity (e.g., Sutton, 2001) and avoid managerial practices that stifle creativity (e.g., Amabile, 1998). Likewise, systematic research on the conditions under which individuals are able to develop or proactively suggest ideas that are simultaneously novel and useful, and thus by general standards considered creative (e.g., Zhou & Shalley, 2010), has grown exponentially over the past two decades (see e.g., George, 2007; Shalley, Zhou, & Oldham, 2004; Zhou & Shalley, 2008, 2010 for overviews).

The acknowledged need for high levels of workplace creativity coincides with a growing practice to organize work using team-based structures (e.g., Guzzo, 1996; Kozlowski & Bell, 2003). Within these teams, three or more individuals act interdependently to fulfill a shared responsibility or reach a common set of objectives (e.g., Ilgen, 1999). The growing complexity of the issues organizations face means that teams of multiple persons with different, specialized knowledge or skills are frequently required to work on a joint task. The prototypical example of Research and Development Teams indicates that creative work forms no exception to this general trend.

Arguments in favor of team-based creative work commonly imply that these teams are not only composed of multiple members but that these members bring different types of information, experience, and perspectives to the table which, if properly integrated, can lead to creative synergy (Kurtzberg & Amabile, 2001) allowing teams to develop more creative solutions than their respective members could have achieved individually. Yet whereas the idea that diversity, especially in the sense of information and

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perspectives, has a beneficial effect on teams' creativity and innovation enjoys a prominent place in past and current theorizing (Jackson, 1992; West, 2002; Williams & O'Reilly, 1998), empirical research has not yielded equally consistent evidence for this proposed main effect (Hülsheger, Anderson, & Salgado, 2009; also see Jackson & Joshi, 2011). Although this inconsistency is not limited to creative outcomes but instead mirrors a more general difficulty to establish consistent (positive or negative) main effects of diversity (van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007), it is particularly striking for the case of team creativity, where diversity benefits are most consistently expected (Joshi & Roh, 2009). To clarify this inconsistency, as well as to develop our to date limited understanding of how teams perform creatively (e.g., George, 2007), this dissertation addresses the underlying question of which factors and processes promote creativity in teams and allow teams to optimally use their informational resources to achieve high levels of collective creativity.

Lessons from Prior Research

Throughout this dissertation, I adopt a product definition of creativity. In line with research on workplace creativity, I define team creativity as the joint novelty and usefulness of ideas for products, services, or procedures (e.g., Amabile, 1988; Oldham & Cummings, 1996; Zhou & Shalley, 2010) developed by a group of people working interdependently. This definition focuses on the quality (rather than the quantity) of a team's work output and entails that ideas which are high on only one of the two defining features (novelty and usefulness) but very low on the other are not considered creative (Zhou & Shalley, 2010; Zhou & Oldham, 2001). Aside from this widely accepted general definition of workplace creativity, recent theoretical work questions the unitary nature of the creativity concept and notes important differences between creativity resulting from different problem types and different drivers to engage in creative work (Unsworth, 2001). In the terminology of this model, the studies reported in this dissertation mainly pertain to what Unsworth (2001) refers to as 'responsive' or 'expected' creativity in the sense that the creative solution is developed in response to an externally defined task instead of resulting from purely discretionary or proactive behavior.

Although research is slowly starting to develop a more fine-grained understanding of how teams deliver on the requirement to develop creative ideas and solutions, a number of recent review articles lament the significant limitations to our understanding of how creative outcomes are achieved by teams (e.g., George, 2007; Shalley et al., 2004) and how different theoretical lenses used to study creativity (i.e., motivational, affective, and cognitive approaches) translate to the team level (Zhou & Shalley, 2010). Given this somewhat fragmentary nature of our knowledge about team creativity and the lack of a unifying theoretical framework, researchers often turn to related research domains and other levels of analysis where creativity has received more extensive and sustained attention in the past.

Research on Group Brainstorming and Idea Generation

One of these related bodies of literatures is the extensive psychological research on creativity in general and work on group brainstorming in particular. Within psychological research, the research topic of creativity was put firmly on the map by Guilford in his 1950 presidential address to the American Psychological Association (Guilford, 1950) and following the development of the brainstorming procedure by Osborn (1957), research into idea generation in groups burgeoned (see Paulus & Nijstad, 2003 for a comprehensive overview). Interestingly, with regard to the creative performance of groups, one of the more robust findings of this research is that when idea generation is at stake, nominal groups of independent actors working individually might be more suited for the task than groups of interacting, interdependent actors (Paulus, 2000). Teams, in this line of research, represent a rich source of production losses in the form of social inhibition (Diehl & Stroebe, 1987), production blocking, and cognitive interference (Nijstad, Diehl, & Stroebe, 2003) which is rarely outweighed by the cognitive stimulation that the ideas of others may provide.

Representatives of this stream of research (e.g., Paulus, 2000) propose that due to its focus on the factors which enhance or inhibit creativity in groups and its systematic use of non-interactive control groups, brainstorming research has important implications and provides useful insights for organizational research into team creativity. In contrast to this more optimistic perspective, I argue that the extent to which insights gained within the

paradigm of group brainstorming inform the question of how teams achieve creative outcomes is limited due to the systematic differences in how the two streams of literature define and measure creativity. Within brainstorming research, group creativity is defined as "divergent thinking in groups as reflected in ideational fluency" (Paulus, 2000, p. 238). Yet whereas divergent thinking as introduced by Guilford traditionally encompasses the four elements of *fluency* (number of ideas), *flexibility* (number of categories), *originality* (unusualness), and *elaboration* (building on other ideas), brainstorming research frequently focuses on the specific element of fluency or ideational productivity as the most objective and quantifiable indicator of a group's creativity. I argue that this equation of group creativity with divergent thinking in groups and the particular focus on ideational fluency renders the findings obtained from this line of research (at least partially) incommensurate with the efforts to build our understanding of how teams jointly develop a final creative solution.

Research on Individual-Level Workplace Creativity

A second body of related literature that might serve as a valuable basis to obtain initial direction for the study of team creativity from is existing organizational research into creativity which has largely focused on the creativity of individual actors (see George, 2007; Shalley et al., 2004; or Zhou & Shalley, 2008, 2010 for overviews). The study of creativity as an organizational outcome and of its antecedents in terms of employee personality (e.g., Kirton, 1980), facilitative environments (e.g., Amabile, 1989, Amabile & Gryskiewicz, 1987), or an interaction of personal and contextual factors (e.g., Woodman, Sawyer, & Griffin, 1993) started to develop significant traction towards the 1980s and early 1990s and has grown exponentially since.

This individual-level research on organizational creativity has largely developed along two complementary theoretical frameworks. The first is Amabile's componential theory of creativity which predicts that highly creative outcomes arise from a confluence of substantial domain-relevant skills, high levels of creativity-relevant processes, and strong (intrinsic) task motivation (Amabile, 1988, 1996). The second theoretical framework complements this approach by taking an interactionist perspective to consider how individuals are embedded in a larger social system and how contextual characteristic

across different levels of this system interact with the individual employees' dispositions and characteristics in their effect on organizational creativity (Woodman et al., 1993; Woodman & Schoenfeldt, 1990). Both the componential model of creativity and the interactionist model of creative behavior offer important insights for the study of team creativity. Whereas the former points to important classes of variables to consider in their impact on collective creativity, the latter highlights how the effect of many of these antecedents are contingent on the characteristics of the situation they are embedded in and thus need to be viewed in a larger context.

Despite the sparse research on workplace creativity in teams, some scholars posit that creativity represents one of the few truly isomorphic concepts in organizational research and suggest that the relationships between creativity and its antecedents are largely homologous across different levels of analysis (Gilson, 2008). In contrast, I suggest that whereas these models may serve as a useful heuristic, a number of considerations highlight the need to reconsider and potentially modify these accounts when moving to the team level. For instance, concerning the componential model of creativity (Amabile, 1996) one may clearly argue that the three components and their combination play a decisive role for team creativity. Yet at the team level, qualitatively different concepts emerge for each component and antecedents that are isomorphic across different levels of analysis may exert different effects on team- and individual-level creativity respectively. More specifically, at the team level, 'domain-relevant skills' not only encompass the sum and range of knowledge, experience, and perspectives available to the team as a whole but also their distribution between members. As a consequence, at the team level, potential discrepancies between the informational resources in principle available to the team and those actually used by the team may arise. This suggests that the relationship of this domain-relevant knowledge to creativity is less immediate and subject to a broader range of contingency factors at the team level. Likewise, whereas 'creativity-relevant processes' at the individual level largely comprise appropriate cognitive strategies and styles to produce ideas that are not only viable but also original (Amabile, 1988, 1996), creativity-relevant processes at the team-level are not fully captured by the average or dispersion of the team-members' individual cognitive styles, but instead extend to include processes pertaining to team information processing through which the results of individual

cognition need to be shared, like coordination and goal-setting, to name a few (see Taggar, 2001, 2002 for a more detailed discussion of the notion of team creativity-relevant processes). In fact, some studies even suggest that teams composed of a large proportion of individuals high in creative thinking styles (and thus exhibit a high propensity to engage in creativity-relevant processes) are, under certain conditions collectively less creative (Taggar, 2001) or innovative (Miron-Spektor, Erez, & Naveh, 2011) than teams composed of a mix of members with a creative thinking style and those with a more conforming and attentive-to-detail orientated thinking style or teams composed of members with more moderate levels of dispositional creativity. Finally, with regard to task motivation, recent research indicates that motivational processes at the individual- and team level of analysis are interrelated through a complex set of bottom-up and top-down influences (Chen & Kanfer, 2006; Chen, Kanfer, DeShon, Mathieu, & Kozlowski, 2009).

Conversely, concerning the important role of contextual factors and their interplay with individual actors' characteristics (Woodman et al., 1993) it is worth noting that some of the intrapersonal processes covering an individuals' reaction to contextual influences attain qualitatively different properties when translated to the team level where they involve communication, coordination, and cooperation (for similar arguments see DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). As such, teams may act as a powerful filter in the perception, processing, and potential effect of external influences on a team and its individual members (Hinsz, Tindale, & Vollrath, 1997).

Taken together this suggests that prior research on individual-level creativity may serve as a starting point for theorizing on which types of variables may be particularly important to consider when trying to explain team creativity and caution against neglecting the role of contextual influences. Yet based on the outlined qualitative differences between these concepts across different levels of analysis, I argue that this research is in and of itself not able to fully capture and account for the factors and processes that foster and hinder team creativity, rendering a more systematic study of when and how teams transform their cognitive resources into higher creativity an important step in further building our currently fragmented understanding of team creativity.

In line with this core research question, I focus explicitly on the team level throughout the three empirical chapters that make up this dissertation. Nevertheless, the

central themes and concepts that feature prominently in the three empirical chapters resonate strongly with some of the core ideas that have guided research on the creativity of individual actors. First and foremost, the concept of diversity, or the existence of differences between members of a team on a given attribute (Harrison & Klein, 2007) as a potential source of different task-relevant knowledge and perspectives represents a core construct throughout all three empirical chapters. In one way or another, each of these chapters contributes to our understanding of when and how teams harness their informational resources for higher creativity. Likewise, the strong theoretical focus on and in-depth behavioral analysis of the team processes that are particularly conducive to higher team creativity evident in the following empirical chapters can be seen as the manifestation of a more general aim to identify particularly "creativity-relevant" team processes. And finally, by studying the joint impact of external factors and team composition characteristics on team processes and creativity, this work acknowledges the core notion the interactionists' approach to creativity to consider the interaction between situational factors and characteristics of the actor, in this case the team.

Yet despite these surface-level similarities between the central themes and ideas in the reported team-level research and the existing knowledge on individual-level creativity, the theoretical analysis and empirical findings of each chapter reveal important insights on how to foster team-level creativity which are not completely reducible or parallel to their individual-level counterparts.

Dissertation Overview

In addition to this introductory chapter, this dissertation comprises three empirical chapters and concludes with a general discussion in which I review the joint findings as well as the insights and broader implications these findings have for future theorizing and empirical research on team creativity, diversity, and team processes. Even though the empirical chapters share an underlying focus on the factors that foster and hinder team creativity, they were devised as separate research papers which may be read independently of each other. Accordingly, there is a certain amount of overlap between the chapters. Additionally, the empirical chapters represent research efforts that I undertook together

with my supervisors and other members of my committee. To reflect their valuable contributions, I will, from here on, refer to the authors with "we" instead of "I".

In chapter 2 "Fostering team creativity: Perspective taking as key to unlocking diversity's potential" we focus on perspective taking between team members as an effective tool to promote collective creativity in cognitively diverse teams by stimulating higher levels of team information elaboration (van Knippenberg et al., 2004). Diversity in the sense of differences in perspectives and knowledge is considered a potent antecedent of higher performance and especially higher creativity in teams (Harrison & Klein, 2007; Jackson, 1992; West, 2002; Williams & O'Reilly, 1998). Yet current quantitative and qualitative reviews regarding this relationship (Hülsheger et al., 2009; Jackson & Joshi, 2011) cast doubts onto the existence of such a consistent diversity main effect. Given that these inconsistent findings are not unique to team creativity but also extend to other team outcomes (see van Knippenberg & Schippers, 2007 for a discussion), recent theoretical models on the effects of workgroup diversity such as the categorization-elaboration model (CEM; van Knippenberg et al., 2004) stress the need to consider the contingency factors that shape the effect of diversity on team outcomes and the processes underlying these conditional effects.

In line with the CEM and based on the purported importance of integrating diverse cognitive resources to achieve creative synergy (Kurtzberg & Amabile, 2001) and of a constructive dialogue between members to successfully integrate knowledge and perspectives (Gardner, Gino, & Staats, 2012), we propose that information elaboration is the central mechanism underlying the potential positive effects of diversity on creativity. Information elaboration entails that team members not only share, but also individually process, constructively discuss, and integrate their diverse perspectives and viewpoints (van Knipppenberg et al., 2004) which conceptually differentiates it from task conflict (Jehn, 1997) and information sharing (Milliken, Bartel, & Kurtzberg, 2003) which have been argued to underlie the benefits of diversity instead. In light of the inconsistent findings concerning diversity's impact on team-level creativity and the frequent accounts of barriers to cross-functional cooperation (e.g., Carlile, 2002, Dougherty, 1992), we do not propose that diversity invariably entails higher levels of information elaboration.

Instead, in this chapter, we hypothesize that perspective taking moderates the effect of diversity on information elaboration and team creativity. We argue that perspective taking, defined as the attempt to understand another person's thoughts and actions by deliberately adopting their viewpoint (Parker, Atkins, & Axtell, 2008), has the potential to elicit higher levels of sharing, individual-level processing, constructive discussion, as well as integration of information and perspectives (or in short elaboration) in diverse teams. We tested the hypothesized relationships in a large group experiment in which we manipulated both diversity of perspectives and perspective taking as between-group factors and observed their single and joint impact on the creativity of a joint team outcome. Videotaping all teams during the team task allowed us to behaviorally code for the proposed mediating mechanism of team information elaboration as well as the theoretical alternatives of task conflict and information sharing. With this study, we contribute to the literatures on diversity, perspective taking, and team creativity in a number of important ways. By combining the literatures on diversity and perspective taking we are able to outline a set of conditions that is particularly suited to promote creativity in teams and through an in-depth analysis of the involved team processes empirically answer existing theoretical debates on the relative merit of different team processes for this important organizational outcome. From a diversity perspective, we add to the growing understanding of the contingency factors surrounding the effect of diversity and direct attention to other- and team-focused processes such as perspective taking as an important, but heretofore largely neglected class of moderators of this effect. Finally, we contribute to research on perspective taking. Whereas its benefits for intra- and interpersonal outcomes are widely acknowledged, our analysis suggests its additional value within the context of collaborative teamwork.

In chapter 3, "Nationality diversity and team creativity: The importance of mutual feedback in teams" we extend this focus on the role of team- and other- focused processes as moderators of the effects of diversity by considering the impact of feedback provided to fellow team members on the creativity of teams with varying degrees of diversity in terms of nationality. The impact of mutual team member feedback, defined as evaluative information individuals receive on their performance (London, 2003) throughout a team's creative process from their fellow teammates, on the team's creative performance is

particularly contested. Whereas research on group brainstorming explicitly cautions against evaluative reactions to the ideas of others so as to avoid evaluation apprehension and the ensuing disruptions to a group's open exchange of ideas (Camacho & Paulus, 1995; Diehl & Stroebe, 1987), others contend that evaluative reactions form an inevitable response to creative ideas which often challenge the status quo (Sternberg, 1999; cf. Sutton & Hargadon, 1996) or even suggest that feedback is part of a broader set of so called team creativity-relevant processes (Taggar, 2001, 2002). Actual research examining the independent effect of mutual feedback between group members on group creativity remains sparse and the existing findings fail to converge into a conclusive picture (see Litchfield, 2008 for a review of research on the isolated effect of different brainstorming rules).

In contrast to the negative repercussions brainstorming research predicts to result from team members' mutual feedback, we argue that this feedback may represent a useful mechanism to convey and elicit the different standards, underlying assumptions, and information which members of diverse teams possess and may therefore help bring out the potential of diversity for team creativity. We test this hypothesis using data from a large sample of intact student teams working on a joint course project. The underlying theoretical analysis and the obtained findings challenge the widespread assumption that feedback and evaluative reactions by team members should be avoided during the creative process but instead point to their value in helping teams realize the positive potential of diversity for team creativity. Furthermore, our study of diversity in terms of nationality as a form of task-related diversity supports an emerging understanding among diversity researchers that the notion of task-relevance cannot be meaningfully assessed by looking at the diversity attribute in isolation but instead requires a consideration of the context and task a team faces (van Knippenberg et al., 2004).

Whereas chapters 2 and 3 focus exclusively on factors and processes within the team as determinants of the potential for diversity to promote team creativity, in the final empirical chapter, we expand our approach to investigate the interaction between performance feedback as an external intervention and the compositional characteristics of the team on team processes and creativity. In chapter 4 entitled "The good bearing of bad news: The differential impact of feedback valence on the creativity of informationally

diverse and homogeneous teams" we analyze the interplay of feedback valence and informational diversity as antecedents of higher creativity in teams. Although prior research on the impact of external feedback on team creativity remains sparse to date (see Ziller, Behringer, & Goodchilds, 1962 for an exception), previous studies and theorizing indicate that positive and negative feedback have distinct consequences for the extent to which teams reflect on their procedure and strategize for the task ahead (Mesch, Farh, & Podsakoff, 1994) as well as on the individual members' cognitive processing styles (Wofford & Goodwin, 1990; for related arguments on the effect of affective valence on information processing styles see, e.g., Bless & Fiedler, 2006). We posit that at the team level, these differential repercussions of positive and negative feedback interact with a team's informational diversity to entail differences in a team's information processing and use which in turn affect a team's creative performance.

In particular, we propose that the combination of higher levels of strategizing and reflection (Mesch et al., 1994) and a more externally focused, systematic individual information processing style which results from negative feedback (Wofford & Goodwin, 1990; cf. Bless & Fielder, 2006) jointly leads teams to more systematically explore their informational resources through higher levels of information elaboration in teams diverse with regard to their members' information and perspectives. These higher levels of information elaboration compared to diverse teams receiving positive feedback, should lead diverse teams provided with negative performance feedback to produce more creative ideas. Conversely, for teams in which team members possess mostly shared perspectives and information, we posit that the benefits of positive feedback outweigh those of negative feedback. Positive feedback can induce enhanced positive affect and in turn more cognitive flexibility for individual team members (Estrada, Isen, & Young, 1994) which may manifest itself at the team level through instances of cognitive stimulation enabling teams to make more creative use of the informational resources they have. Given the novelty of the proposed relationships, we conducted an experimental test of our hypotheses. As part of this test, we manipulated both feedback valence and informational diversity as between-group factors and studied their joint impact on the creativity of a joint plan developed by a team. Parallel to chapter 2, we assessed the proposed mediating mechanisms of

information elaboration and cognitive stimulation by means of behavioral coding based on the video-recordings made during the team task (Weingart, 1997).

With this study, we aim to extend research on the effect of feedback on creativity by showing that in contrast to individual-level findings which stress the motivational benefits of positive feedback for the creative performance of individual actors (e.g., Zhou, 1998; also see Zhou, 2008 for an overview), the effect of feedback valence on team-level creativity is contingent on the distribution of the team's informational resources. Furthermore, our theoretical reasoning as well as our empirical analysis underscores the need to broaden the range of mechanisms theorized to underlie the effects of feedback on creativity to include team information processing mechanisms in addition to the popular motivational accounts at the individual level. Finally, from a diversity perspective, this study also provides first insights into the interplay of feedback and diversity which, although research exists on how to lead and manage diverse teams (e.g., Kearney & Gebert, 2009; Shin & Zhou, 2007; Somech, 2006), has so far received scant systematic research attention.

To conclude, in chapter 5, I provide a brief synopsis of the findings of the combined empirical work and highlight how the arguments and findings of these three interrelated papers provide important implications for organizational research on team creativity, diversity, team processes, and the effects of evaluative feedback.

Chapter 2: Fostering Team Creativity: Perspective Taking as Key to Unlocking Diversity's Potential

Abstract

Despite the clear importance of team creativity for organizations, the conditions that foster it are not very well understood. Even though diversity, especially diversity of perspectives and knowledge, is frequently argued to stimulate higher creativity in teams, empirical findings on this relationship remain inconsistent. We develop a theoretical model in which the effect of a team's diversity on its creativity is moderated by the degree to which team members engage in perspective taking. We propose that perspective taking helps realize the creative benefits of diversity of perspectives by fostering information elaboration. Results of a laboratory experiment support the hypothesized interaction between diversity and perspective taking on team creativity. Diverse teams performed more creatively than homogeneous teams when they engaged in perspective taking, but not when they were not instructed to take their team members' perspectives. Team information elaboration was found to mediate this moderated effect and was associated with a stronger indirect effect than mere information sharing or task conflict. Our results point to perspective taking as an important mechanism to unlock diversity's potential for team creativity.

Introduction

The importance of creativity for organizations' ability to adapt to changing environments and innovate is widely recognized (George, 2007; Zhou & Shalley, 2010). Due to the complexity of issues organizations face and more specialized work roles, creative work is frequently carried out in teams. Whenever the members of these teams differ in their task-relevant perspectives and knowledge, existing theories predict higher creativity (Jackson, 1992; West, 2002). Yet this notion of a consistent main effect of diversity on team creativity is not backed by reliable and generalizable evidence (Hülsheger, Anderson, & Salgado, 2009; Jackson & Joshi, 2011), raising the question of how to realize diversity's benefits for team creativity. In this study, we present perspective taking directed at teammates as a tool that enables diverse teams to bring out their creative potential. Perspective taking entails the attempt to understand the thoughts, motives, and feelings of another person (Parker, Atkins, & Axtell, 2008). We propose that taking the perspectives of teammates helps to realize the promise of diverse perspectives for team creativity by facilitating information elaboration, a team process that we argue is especially conducive to it.

Although research has yet to establish the positive effect of elaboration on team creativity, we propose that it constitutes a more proximal and compelling precursor to team creativity than other concepts suggested to mediate the positive effects of diversity in its stead (van Knippenberg, De Dreu, & Homan, 2004). In contrast to task conflict and information sharing, elaboration captures the crucial elements of team members constructively discussing each others' suggestions and integrating the input different team members provide. Yet diverse perspectives do not automatically entail higher elaboration and team creativity (cf. Dahlin, Weingart, & Hinds, 2005). Instead, this requires that the members of diverse teams invest cognitive energy in understanding their teammates' approaches to the task. Due to its other-focused nature, the cognitive process of perspective taking has considerable potential to increase the creativity of diverse teams as it may not only facilitate information exchange (cf. Krauss & Fussell, 1991) but also engender a more comprehensive evaluation of the suggested ideas and an integration of different perspectives.

Based on this reasoning, we propose that perspective taking moderates the effect

of diversity on team creativity and that this effect is mediated by information elaboration (see Figure 2.1 for an overview of the model). Although it seems particularly suited to foster the integration of different perspectives that is central to the notion of creative synergy (Kurtzberg & Amabile, 2001) and to realizing the benefits of diversity (van Knippenberg & Schippers, 2007), perspective taking and related other- or team-focused processes play no role in current diversity models. Instead, these models focus on task- and team member characteristics as moderators of diversity's effect on team processes and outcomes (van Knippenberg et al., 2004). Moreover, our study adds an important facet to the understanding of how perspective taking affects team outcomes. Its relevance for intra- and interpersonal outcomes is well established (Parker et al., 2008) and individual-level findings suggests that taking beneficiaries' perspective may inspire more creative ways of helping them (Grant & Berry, 2011). Complementing this research and extending it to the context of collaborative teamwork, we show that perspective taking among teammates may increase team creativity. Our study thus yields valuable insights into how team composition and processes interact to foster the important outcome of team creativity.

Literature Review and Hypotheses

Team Creativity

Creativity, the joint novelty and usefulness of ideas regarding products, processes, and services (Amabile, 1988; Zhou & Shalley, 2010), is vital for organizations and creative work is frequently done in teams. Hence, the question about our knowledge about team creativity has been raised repeatedly. Often, it is met with concern about how little is known about how teams perform creatively (George, 2007; Paulus & Nijstad, 2003). This dearth of knowledge is partly attributable to a strong research focus on individual creativity (Shalley, Zhou, & Oldham, 2004). Moreover, research on team creativity has so far been mainly conducted within the brainstorming paradigm where creativity is defined as divergent thinking and measured as fluency, flexibility, originality, and elaboration (Paulus, 2000), limiting the extent to which these results inform questions regarding creativity defined as above (Zhou & Shalley, 2010). We rely on the accepted definition of workplace creativity to conceptualize team creativity as the joint novelty and usefulness of a final idea developed by a group of people. Our focus on the creativity of a final outcome

Figure 2.1: Research model (Study 1)
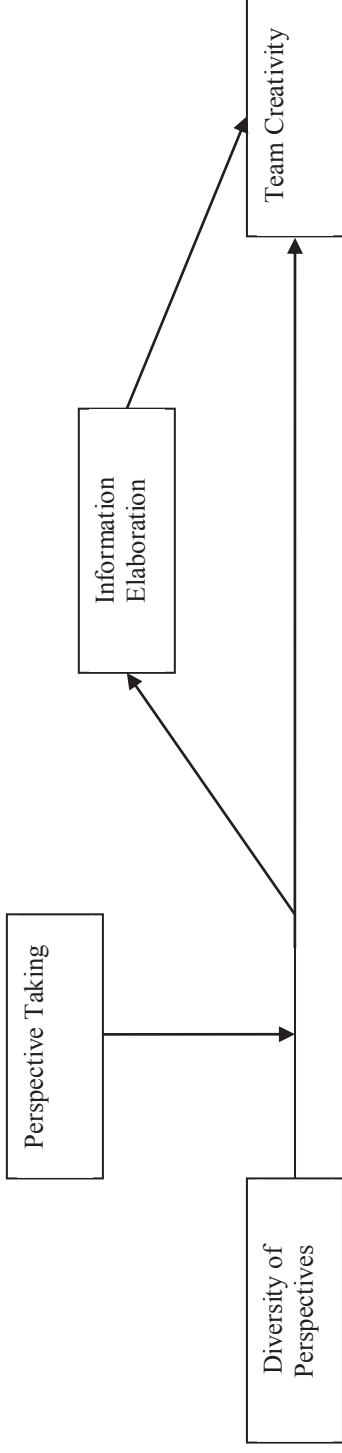
Note. Research model with the interaction between diversity and perspective taking, the mediating process information elaboration, and the outcome variable team creativity.

highlights the importance of studying the factors that contribute to both the generation of initial ideas and their refinement.

The Potential Benefits of Diverse Perspectives

The wide use of teams for creative tasks is based on the notion that they bring a wider pool of perspectives and knowledge to the table. This diversity of perspectives forms a resource from which teams are expected to benefit on creative tasks (Jackson, 1992; Williams & O'Reilly, 1998). Following prior work, we refer to diversity as a team characteristic denoting the extent to which members differ with regard to a given attribute (Joshi & Roh, 2009; van Knippenberg & Schippers, 2007) but not whether these differences are recognized within a team (which reflects the concept of perceived dissimilarity; Harrison & Klein, 2007). Yet we do not single out a specific diversity attribute (e.g., age) or class of attributes (e.g., deep-level diversity). Instead, we focus on the underlying differences in perspectives on a task as the more proximal indicator of a team's increased cognitive resources (van Knippenberg et al., 2004). In line with the word's basic meaning (the Latin 'perspicere' meaning 'to look through'), we use the term perspective to denote "a particular way of considering something" (Cambridge Online Dictionary). A perspective thus shapes *how* a situation is viewed including the perceived relevance and evaluation of certain aspects of the problem and its proposed solutions.

Differences in perspectives are a common part of many diversity attributes usually classified as job-related (e.g., functional diversity; Bunderson & Sutcliffe, 2002), but recent theorizing stresses that underlying differences in task-relevant perspectives are not a function of the diversity attribute alone but arise from the combination of this attribute with a given task (van Knippenberg et al., 2004). In line with this argument, some studies indicate the task-relevance of surface-level attributes (see e.g., McLeod, Lobel, & Cox, 1996; Thomas, 2004) and a recent meta-analysis finds a positive effect of relations-oriented diversity (e.g., gender, ethnicity) on the performance of teams in the service industries (Joshi & Roh, 2009). Regardless of their specific source in a given situation, diverse perspectives reflect qualitative differences that equip teams with a broader range of approaches to the task. Thus, they are best conceptualized as diversity in the sense of variety which reaches its maximum when every member has a different perspective and is

minimal when all members share a perspective (Harrison & Klein, 2007).

The conceptual link between these cognitive resources of diverse teams and higher team creativity is frequently made (e.g., Jackson, 1992; West, 2002). Different perspectives and knowledge form the core of the "value-in-diversity" hypothesis (McLeod et al., 1996) - a value that is deemed especially beneficial for conceptual tasks (McGrath, 1984) including creative tasks. Despite seeming conceptually straightforward, however, this link between team diversity and creativity is not supported by conclusive empirical evidence. Although a recent meta-analysis of team-level predictors of creativity and innovation finds a small but significant effect of job-related diversity (Hülsheger et al., 2009), the wide credibility interval for this effect points to the need to consider contingency factors. Similarly, a recent review concludes that for creative tasks, the effects of job-related diversity are mixed (Jackson & Joshi, 2011).

Moderators of the Effect of Diversity

This inconsistency is not limited to research on team creativity but echoes a more general problem to empirically support the theoretical assumptions of a diversity main effect (van Knippenberg & Schippers, 2007). Hence, recent research stresses the need to study the boundary conditions surrounding the effects of diversity and the processes underlying them. The most comprehensive framework in this regard to date is the categorization-elaboration model (CEM; van Knippenberg et al., 2004). It integrates the social categorization and information-decision making perspective on diversity and outlines a set of moderators of diversity's effect on team outcomes. According to the CEM, teams benefit from their diversity when members differ in task-relevant perspectives and knowledge and engage in information elaboration. Elaboration is argued to be the core team process underlying diversity's benefits and is defined as the exchange, discussion, and integration of ideas, knowledge, and insights relevant to the team's task (van Knippenberg et al., 2004). Social categorization and intergroup bias may harm diverse teams by disrupting elaboration. Yet the absence of these disruptions alone does not guarantee high levels of elaboration. Instead, team member attributes (ability, motivation) and task demands (complexity, required creativity) additionally affect whether diverse knowledge and perspectives are elaborated on.

Research has provided initial support for task characteristics as moderators of the effect of different viewpoints on team creativity (cf. Kratzer, Leenders, & van Engelen, 2006) and identified leadership styles as an additional set of external factors that shape this effect (Shin & Zhou, 2007). Moreover, openness to experience (Homan et al., 2008) and need for cognition (Kearney, Gebert, & Voelpel, 2009) have been found to enhance the performance of diverse teams on conceptual tasks. The facilitative effect of these individual-level dispositions which affect team members' motivation and arguably experience in processing a wide variety of information for related team outcomes are indicative of the role that these factors may play for creative tasks. Yet, although these types of moderators are clearly relevant, this research leaves the question of which processes team members themselves can engage in to improve their teams' information processing patterns and reap the rewards of diversity unanswered.

The Moderating Role of Perspective Taking

The widely acknowledged importance of integrating diverse viewpoints for high (creative) performance (Taggar, 2001; cf. Gardner, Gino, & Staats, 2012) highlights the need to consider processes focused on the team and its members as facilitators of elaboration and creativity. This points to perspective taking between teammates as a potent but so far neglected moderator of diversity's effect on team creativity. As a multi-faceted concept which is used across disciplines, the definitions of perspective taking vary in the experiential aspect targeted by perspective taking (i.e., perception, cognition, affect; Kurdek & Rogdon, 1975) and whether it is seen as a stable disposition (Davis, 1980) or a situationally malleable process (e.g., Parker et al., 2008). Yet these definitions converge on perspective taking as a cognitive process that entails trying to understand or considering another's viewpoint (Caruso, Epley, & Bazerman, 2006; Parker et al., 2008; Sessa, 1996) by "deliberately adopting their perspective" (Caruso et al., 2006, p. 203; Galinksy & Ku, 2004; Parker et al., 2008). Given our interest in the processes that help teams benefit from their diversity, we define perspective taking following Parker et al. as a cognitive process through which "an observer tries to understand, in a nonjudgmental way, the thoughts, motives, and/or feelings of a target, as well as why they think and/or feel the way they do" (2008, p. 151).

As a cognitive process that is directed at an external target, perspective taking can facilitate social interaction. Taking another's perspective reduces stereotyping and in-group favoritism (Galinsky & Moskowitz, 2000), fosters cooperative behaviors (Parker & Axtell, 2001), elicits creative ideas to help others by attuning to their needs (Grant & Berry, 2011), and improves emotional regulation (Parker et al., 2008). In teams, perspective taking has been argued to aid team situation model construction and tacit coordination (Rico, Sánchez-Manzanares, Gil, & Gibson, 2008), and team members' trait perspective taking has been linked to less person-oriented conflict perceptions (Sessa, 1996). Perspective taking has mostly been considered as an individual-level cognitive process. Yet there are arguments to suggest that in teams, perspective taking can acquire the qualities of an emergent group process (Morgeson & Hofmann, 1999) for which members show high levels of convergence (Chen, Mathieu, & Bliese, 2004). In a team, perspective taking not only occurs in a social setting but also affects the likelihood that other members reciprocate in kind. In this vein, other-rated perspective taking has been linked to higher communication satisfaction (Park & Raile, 2009) which in turn may improve a person's mood, motivation, and liking of the other, all of which are argued to promote perspective taking (Parker et al., 2008). In line with these arguments, initial evidence supports this proposed reciprocity in dyads (Axtell, Parker, Holman, & Totterdell, 2007) and teams (Calvard, 2010).

We argue that perspective taking, as an emergent team process, helps teams to capitalize on their diversity on creative tasks by fostering the sharing, discussion, and integration of diverse viewpoints and information. Perspective taking is in part an inferential process (Parker et al., 2008), but it can affect how much persons seek (cf. Tjosvold & Johnson, 1978) and share information and perspectives. This is particularly important for diverse teams which have been found to not consider the full range of information available to them (Dahlin et al., 2005). Trying to comprehend a teammate's perspective creates informational needs that may be satisfied through active inquiry or by monitoring what team members say. Yet even when team members share information and perspectives, knowledge barriers may hinder cross-functional understanding (Carlile, 2002; Dougherty, 1992). By affecting how messages are framed (Boland & Tenkasi, 1996; Krauss & Fussell, 1991) perspective taking may alleviate these difficulties.

Furthermore, diverse perspectives come with differences in evaluative standards that may impair communication (Cronin & Weingart, 2007). Failing to see the value of others' ideas can lead to destructive criticism that disrupts communication (cf. Baron, 1988). Taking another's perspective entails considering their evaluative standards and may facilitate a more constructive appraisal of their ideas. This may foster the process of elaborating on each other's ideas, which is required to develop truly creative ideas (Titus, 2000). Finally, increased diversity heightens the demands for teams to integrate their ideas and viewpoints (Taggar, 2001). Analyzing another person's viewpoint may lead to a cognitive reframing that helps this integration of perspectives and ideas which has been linked to collective creativity (Hargadon & Bechky, 2006).

Arguably, perspective taking will not be equally beneficial for homogeneous teams. In the absence of different approaches to the task, perspective taking is unlikely to reveal novel insights or opportunities to integrate different viewpoints. It might even reinforce the existing perspective on a problem and constrain the exploration of new approaches (cf. Smith, 2003). Also, perspective taking is cognitively taxing (Roßnagel, 2000), and in the absence of the benefits it is associated with in diverse teams, might detract valuable cognitive resources. In sum, we propose:

> *Hypothesis 1:* Perspective taking moderates the effect of diversity of perspectives on team creativity, such that diversity has a more positive effect on creativity when team members engage in perspective taking than when they do not engage in perspective taking.

Our arguments for perspective taking as a moderator of diversity's effect on team creativity strongly build on the benefits of perspective taking for the sharing and integration of diverse viewpoints. Based on prior research suggesting its effects on information sharing (cf. Tjosvold & Johnson, 1978), more careful message framing (Krauss & Fussell, 1992), a more constructive evaluation and debate of ideas, and the potential discovery of ways to integrate different ideas and perspectives (Boland & Tenkasi, 1996), we argue that, in diverse teams, perspective taking may elicit the full range of sub-processes that jointly define elaboration (van Knippenberg et al., 2004). It is worth noting that perspective taking is unlikely to elicit equal levels of elaboration in homogeneous teams. Instead, it might lead team members to quickly recognize their shared

information and viewpoints and in turn limit the extent to which they are elaborated on. In this vein, research on distributed information suggests that when information is fully shared, group discussion mainly serves to establish that all members have the relevant information (Stasser & Titus, 1985). Perspective taking may accelerate this realization. Based on our reasoning for why perspective taking moderates the effect of diversity on team creativity and on the assumed differential effect of perspective taking on elaboration in diverse teams, we propose:

> *Hypothesis 2:* Perspective taking moderates the effect of diversity of perspectives on information elaboration, such that diversity has a more positive effect on elaboration when team members engage in perspective taking than when they do not engage in it.

The precise nature of the team processes that effectuate diversity's benefits is contested. Based on the CEM (van Knippenberg et al., 2004) we posit that elaboration is the key mediator of the interaction of diversity and perspective taking on team creativity. Direct empirical evidence for a relationship between elaboration and team creativity remains missing, yet prior findings on elaboration as a mediator of diversity's effect on decision making (van Ginkel & van Knippenberg, 2008, 2009) and performance in teams (Homan et al., 2008; Homan, van Knippenberg, van Kleef, & De Dreu, 2007; Kearney et al., 2009) including R&D teams (Kearney & Gebert, 2009), suggest its potential value for team creativity. Conceptually, elaboration focuses on the constructive exchange and integration of ideas which are especially beneficial from team creativity and distinguish it from other potential precursors to creativity.

The most prominent alternative team process is task conflict, defined as "disagreements among group members about the content of the task being performed, including differences in viewpoints, ideas, and opinions" (Jehn, 1995, p. 258). Diverse perspectives are thought to elicit these disagreements which are posited to increase creativity by preventing premature consensus (Kurtzberg & Amabile, 2001) and stimulating a reevaluation of the status quo and more thorough debate (Jehn, 1997). Yet the case for task conflict as precursor to creativity is less clear upon closer inspection. Its effects on team creativity and innovation are inconsistent (Hülsheger et al., 2009) and some have argued that it is not its occurrence but the way teams solve it which determines

whether conflict is beneficial (Lovelace, Shapiro, & Weingart, 2001). Moreover, its creative benefits are limited to situations in which conflict does not exceed moderate levels and does not persist into the later stages of a project (Farh, Lee, & Farh, 2010). Additionally, task conflict may elicit strong negative emotionality (Jehn, 1997) and relationship conflict (De Dreu & Weingart, 2003) that can harm team creativity (Pearsall, Ellis, & Evans, 2008). A constructive debate and integration of mutual input thus neither define nor inevitably follow from task conflict. In contrast, elaboration, for which task conflict is neither a necessary nor sufficient condition (van Knippenberg et al., 2004), comprises the processes that task conflict is argued to engender when it leads to creativity but is less prone to the undesirable side-effects of conflict.

A second process that has been posited to promote team creativity is information sharing (Milliken, Bartel, & Kurtzberg, 2003). Exposure to the ideas of others is thought to stimulate cognitive flexibility and idea generation (Brown & Paulus, 2002) and broaden a team's knowledge base (Stasser & Birchmeier, 2003). As such, it may add to a team's creativity-relevant processes and domain-relevant knowledge (Amabile, 1988) and form an important precondition for creativity. Yet information sharing does not suffice to ensure that these benefits are realized. Whereas sharing information is a necessary condition for its integration, research shows that it does not reliably predict knowledge integration in teams (Okhuysen & Eisenhardt, 2002). In some cases, teams have even been shown to discount or disregard information (Cruz, Boster, & Rodríguez, 1997) and react negatively to the ideas of others (cf. Mueller, Melwani, & Goncalo, 2012). In sum, information sharing, neither conceptually covers nor invariably elicits the necessary careful processing and integration of viewpoints. Thus, we posit that elaboration best captures the processes that perspective taking fosters in diverse teams to promote creativity:

Hypothesis 3a: Information elaboration mediates in the interactive effect of diversity and perspective taking on team creativity such that perspective taking moderates the effect of diversity on information elaboration which in turn has a positive effect on team creativity.

Our analysis implies that task conflict is unlikely to mediate in the joint effect of diversity and perspective taking on team creativity. Perspective taking has been shown to shape the perceptions of the nature of a team's conflict (Sessa, 1996) but may reduce

conflict levels due to more careful message framing. Also, the effect of task conflict on team creativity is not unequivocally positive. Information sharing, in turn, is a likely effect of perspective taking in diverse teams but may not transmit the full benefit of perspective taking. In line with calls to test proposed effects against viable theoretical alternatives (instead of the absence of an effect; van de Ven, 2007), we tested the following:

> *Hypothesis 3b:* The conditional indirect effect of diversity as moderated by perspective taking on creativity through information elaboration is stronger than the indirect effect observed for the alternative mediators of task conflict and information sharing.

Method

Design and Participants

We tested our hypotheses in a laboratory experiment using a 2 (diversity of perspectives: diverse vs. homogeneous) x 2 (perspective taking: yes vs. no) between-groups design. 231 students (55.8% male; mean age = 21.3, SD = 2.20) from a Dutch university were assigned to 77 three-person teams which were randomly assigned to conditions.[1] The majority of participants were students of business administration (75.8%) or economics (17.3%). In return for their participation, they received partial course credit or 10 Euro (about 15 USD).[2] We video-taped all teams to allow for a behavioral coding of the mediating processes. Due to technical problems, the video-data for one team and the survey data for another were missing. As there is no indication that these teams behaved differently than the others, we relied on all teams to test the effects of the manipulated factors on their creativity.[3] We ran the analysis of the perspective taking manipulation

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[1] Students registered for the study online, so their assignment to teams was not strictly random. Yet, they reported low familiarity with their teammates in the post-experimental survey (M = 1.47; SD = 0.85) on a scale from 1 = *not familiar at all* to 5 = *very familiar*. Repeating our analyses with familiarity as a control did not alter the pattern of findings.
[2] Including the number of members who received money as a control in the analyses did not alter the pattern of our results. Accordingly, all analyses are reported without this control.
[3] Analyzing the effect of diversity and perspective taking on the teams' creativity without the teams with partially missing data did not change the nature or significance of the effects.

check without the team with missing survey data and all analyses involving the mediators were conducted without the team with the missing video-recording.

Experimental Task

The task was designed to observe teams while they develop a creative plan. Task materials were inspired by a group exercise unrelated to creativity (Windy City Theatre Exercise, Thompson & Bloniarz, 1996). We adapted the role instructions, task, and information to form a creativity task. In this task, participants take the roles of management team members of a theater. Together, they have to develop a creative action plan to improve the theater's position. Participants received role instructions (their managerial function) and information about the theater (location plan, schedule of plays, etc.). Teams were instructed to develop the most creative plan possible and provided with a standard definition of creativity as joint novelty and usefulness. Moreover, we asked them to hand in one integrated plan and not a list of unconnected ideas. These instructions matched the adopted definition of team creativity. As further motivation, we promised monetary rewards to teams with the most creative plans.

Experimental Manipulations

Diversity of perspectives. We used functional role instructions to manipulate diversity of perspectives in line with our definition of it as a team characteristic denoting the existence of differences between members in the way they view the task, information, and solutions. In the diverse condition, members were assigned the roles of the Artistic, Event, and Finance Manager respectively. The descriptions of each managerial role in the diverse condition highlighted different aspects of the solution that were important for the respective role and stressed that team members should ensure that these aspects were realized in the final plan. Whereas the Artistic Director had to ensure high creative reputation, the Event Manager was concerned with high service levels and community involvement, and the Finance Manager had to pay special attention to financial performance. Apart from the role instruction, all information about the theater was fully shared across conditions. As such, our manipulation closely resembles the notion of functional assignment diversity in the sense that different viewpoints are derived from

different functional accountabilities and not experience per se (Bunderson & Sutcliffe, 2002).

Importantly, this manipulation focused on the distribution of different perspectives (roles) between team members. In practice, these distributional differences accrue to a broader range of perspectives at the team level. With an experimental manipulation we have the chance to avoid a potential confound of the distribution of differences with differences in the amount or range of perspectives available to a team. Realizing this opportunity, comparable previous studies on informational diversity and distributed information (e.g., Homan et al., 2007; Stasser & Titus, 1985) provided teams with equal amounts of information across conditions but manipulated its distribution within the teams causing members of homogeneous teams to have more information at their individual disposal. Parallel to this, we decided to keep the amount of role information containing the goal criteria constant on the team level. Hence, in order to avoid a potential confound of the diverse teams having a clearer picture of the desired solution, the role in the homogeneous condition contained the goal information from all three diverse roles. To keep the instructions comparable in length, the role descriptions in the diverse condition stressed certain parts of the information that were redundant with the information given to everyone. This manipulation covers the two main definitional criteria of diversity as a team-level characteristic that indicates to which degree team members differ on a particular attribute.[4]

Perspective taking. Perspective taking was manipulated at the team level at the onset of the team task. Teams in the perspective taking condition were verbally instructed to try to take each others' perspectives as much as possible and asked to jointly review a page of written instructions on what perspective taking entailed. These instructions told participants to try to view the situation from the positions of the other team members and

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[4] Teams may also differ on specific diversity attributes or combinations other than our manipulated diversity. Although randomly assigning teams to conditions should prevent that these differences systematically co-vary with our manipulation, we re-ran the analyses while controlling for diversity in terms of nationality, sex, field of study (Blau's index), and age (SD) and the two-and three-dimensional faultlines based on these attributes (using van Knippenberg, Dawson, West, & Homan, 2011's measure). As including these controls did not alter the pattern of our results, all analyses are reported without them.

specified examples of perspective taking such as trying to understand how others view the situation and trying to ask themselves what is important to the other person. As a further incentive to engage in perspective taking, participants were informed that this would help to increase their creative performance. Teams in the non-perspective taking condition received only the instructions for the team task.

Measures

       Creativity. In line with prior work we defined creativity as the joint novelty and usefulness of a plan or idea (Zhou & Shalley, 2010). This means that ideas which are high on only one of the two defining features (novelty and usefulness) but very low on the other are not considered creative. Hence, we coded each team's plan for both novelty and usefulness ($r = .59$, $p < .001$) and multiplied them to obtain an overall creativity measure (see Zhou & Oldham, 2001 for a similar procedure). To assess *Novelty*, we divided each plan into its constituent ideas (whenever it contained multiple) and two independent coders rated each idea included in the plan on a five-point scale ($0 = $ *not novel at all* to $4 = $ *very novel*). As teams were instructed to develop one final plan which could consist of one or multiple, interrelated ideas, we averaged the scores of the ideas within one plan to obtain the overall novelty score. The same set of coders coded the plans' *Usefulness* in different random order than novelty. As different ideas could jointly impact the usefulness of a plan with regard to a goal, they coded usefulness on the basis of the entire plan on a seven-point scale ($0 = $ *harmful* to $6 = $ *very useful*).[5] Coders were instructed to assess usefulness with regard to the three main goals included in the instructions across conditions (creative reputation, financial performance, community involvement and service levels). Plans that were useful with regard to all three goals received the maximum score of 6, plans that were harmful with regard to all goals received a score of 0 and plans that were useful for some, but less so for other goals received intermediate scores. We trained coders using the data from 19 pilot teams (not included in the analysis). To adjust for scaling differences, we divided novelty and usefulness by their standard deviations before calculating their product as the overall creativity score. The high intraclass correlation coefficients (*ICCs*) and r_{wg}-

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[5] The different coding formats for novelty and usefulness are attributable to different degrees of variation that can be meaningfully distinguished with regard to the plans. Sensitivity analyses using a seven-point scale for novelty instead did not alter our findings.

values indicate high inter-rater reliability and agreement (usefulness: $ICC(1) = .79$, $ICC(2) = .88$, mean $r_{wg} = .93$; novelty: $ICC(1) = .82$, $ICC(2) = .90$; mean $r_{wg} = .89$; Bliese, 2000; James, Demaree, & Wolf, 1984).[6]

Manipulation check diversity of perspectives. Our diversity manipulation aimed to provide members of diverse teams with diverging views on what is important and what is relevant information. In order to ascertain the effectiveness of this manipulation we analyzed participants' answers to what they (a) considered particularly important to achieve in the team task and (b) which initial ideas they had for it. Participants answered these questions during their individual preparation for the team task. The answers to what participants considered important were coded for whether they contained aspects reflecting the Artistic, Event, or Finance Manager's perspective. We used this information to calculate Blau's coefficient of heterogeneity as an indicator of the diversity with which team members pursued each aspect and averaged this indicator across the three perspectives to yield a single index of the diversity of viewpoints within a team. In order to test whether our manipulation also led members of diverse teams to assign differential relevance to certain information sources out of the overall set of information, we coded the initial ideas for which information sources they were based on. Although all members received all information sources, certain sources were thematically related to certain perspectives (e.g., the calendar of plays to the artistic director, sales overview to the financial manager, etc.). For each member, we calculated the proportion of ideas that were based on information related to the artistic, event, and financial perspective and used the standard deviation of these proportions as an index of an individual preferential reliance on certain types of information. We averaged this index across a team's members to obtain a team-level indicator.

Manipulation check perspective taking. To ensure the effectiveness of the perspective taking manipulation, participants indicated the degree to which they engaged in it on a five-item scale (Cronbach's $\alpha = .72$). We relied on their self-assessment because perspective taking is a cognitive process and as such not directly observable. Example

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[6] As moderate scores of usefulness/novelty were given more often than extreme values, we based our r_{wg}s on the expected variance of a triangular null distribution (James et al., 1984).

items included: "During the group discussion, I tried to take the perspective of the other members of my team". Answers were given on a five-point scale ranging from "1 = *not at all*" to "5 = *very much*". To avoid priming participants in the non-perspective taking conditions with the concept of perspective taking, they completed this scale after the team task. High levels of agreement between team members' reported degree of perspective taking (mean r_{wgj} = .92), and acceptable aggregate reliability (Cronbach's α = .68) and reliability ($ICC(1)$ = .23, $ICC(2)$ = .47) justify averaging the individual responses to the team level in line with the proposed consensus model (Chen et al., 2004).

Information elaboration. A different set of two independent coders coded elaboration (and the other mediators) from the videos in different random order. As a team process that has no individual-level equivalent, elaboration was coded at the team level on a seven-point scale with specific anchors for each scale point. The scale was based on a scale by van Ginkel and van Knippenberg (2008) who studied team decision making with a hidden profile task. For our creativity task lacking a single, demonstrably correct answer and with mostly shared information, coding for the sharing, discussion, and integration of unshared, critical information was not possible. We thus adapted the coding scheme (see the Appendix for a detailed description).

In line with the definition of elaboration, the different scale levels detailed to which degree members mentioned different perspectives and information, whether other teammates acknowledged this, whether different perspectives and information were discussed and used to build on each other's suggestions, and whether teams tried to integrate different perspectives and information. Examples of integration attempts included statements linking multiple perspectives and constructive remarks about potential improvements of suggested ideas. A value of 1 was given to teams that immediately began to develop ideas with little or no systematic discussion of the different perspectives and information. A score of 7 was assigned to teams in which all perspectives and information were mentioned and fully discussed by its members, different information and perspectives were used to build on each other's suggestions, and team members attempted to integrate different information and perspectives. The measure thus assessed to which extent teams engaged in all the consecutive processes detailed in the elaboration concept and assigned the highest score to teams showing the full range of these interrelated sub-processes. The

coders trained using the coding scheme with the pilot team videos and exhibited high agreement (mean r_{wg} = .93) and inter-rater-reliability ($ICC(1)$ = .85, $ICC(2)$ = .92).

Information sharing. Prior research indicates differences between the likelihood and the effect of sharing initially unshared information compared to initially shared information (Stasser & Titus, 1985; cf. Homan et al., 2007). Thus we coded information sharing separately for the information on the theater which was fully shared across conditions and for the members' perspectives which were unshared in the diverse condition. Two independent coders coded each video separately for the extent to which all three members mentioned each information source ($ICC(1)$ = .76, $ICC(2)$ = .86, mean r_{wg} = .93) or perspective ($ICC(1)$ = .60, $ICC(2)$ = .75, mean r_{wg} = .87). The measures for sharing information and perspectives reflect the number of members that on average discussed a certain piece of information or perspective with a maximum of 3 for teams in which all members discussed all information sources or all perspectives.

Task conflict. In line with the definition of task conflict as the existence of disagreements about viewpoints, ideas, and opinions pertaining to the task (Jehn, 1995), task conflict was coded from the videos as the number of disagreements about task-related ideas, opinions, and information by two independent coders ($ICC(1)$ = .65, $ICC(2)$ = .78, mean r_{wg} = .75).

Procedure

Upon arrival at the laboratory, participants were told that they were going to take part in a study on how teams come up with creative ideas and informed about their task. They first read written instructions which provided a brief description of the setting, the management team member role, and an array of information about the theater including a calendar of plays, a location plan, a floor plan, an overview of costs, ticket sales, and target groups. As part of their individual preparation, they had to answer two open questions asking (a) what was particularly important for them to consider during the team task and (b) their initial ideas for the plan. After 20 minutes, they were asked to work on the team task which required them to develop a final, integrative creative action plan for the theater. Teams in the perspective taking condition also received the perspective taking instructions. Teams had 20 minutes to complete the team task which we videotaped. After ten minutes,

the experimenter entered with the final answer sheet and reminded them to come up with one integrative, creative plan. Afterwards, participants individually filled out a brief survey before they were debriefed, paid or awarded their credit, and dismissed. Altogether, the experimental sessions lasted one hour.

<div align="center">

Results

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Table 2.1 displays the descriptive statistics and intercorrelations for the variables in our study. We tested our hypotheses using regression analyses with dummy-coded variables to reflect the teams' assignment to the experimental conditions (0 = homogeneous; 0 = non-perspective taking) and mean-centered the mediating variables. To forego the problems of the causal steps approach to testing mediation (Baron & Kenny, 1986) and of parametric tests of the product of the paths' coefficients, we used a non-parametric bootstrapping method to test indirect effects. For the mediated moderation proposed in Hypothesis 3a, we relied on a procedure by Edwards & Lambert (2007) and we tested the differences in conditional indirect effects through different mediators proposed in Hypothesis 3b with a procedure by Preacher and Hayes (2008).

Manipulation Checks

Diversity of perspectives. We conducted two analyses of variance to test for the effect of diversity and perspective taking on the teams' heterogeneity in what their members saw as important and the index for the members' preferential use of perspective-related information respectively. Each analysis yielded a main effect of diversity as the only significant effect. Teams in the diverse condition showed significantly higher degrees of heterogeneity in what their members saw as important ($M = 0.42$, $SD = 0.07$) than homogeneous teams ($M = 0.18$, $SD = 0.12$; $F(1, 73) = 101.61$, $p < .001$; $\eta^2_{partial} = .58$). Likewise, members of diverse teams exhibited a significantly higher preference for basing their ideas on certain information sources ($M = 0.43$, $SD = 0.12$) than members of homogeneous teams ($M = 0.26$, $SD = 0.10$; $F(1, 68) = 40.52$, $p < .001$; $\eta^2_{partial} = .37$). These results suggest a successful manipulation of diversity of perspectives.

Perspective taking. An analysis of variance testing for the effect of perspective taking and diversity on the teams' perspective taking scores yielded only the expected

significant main effect of perspective taking. In the perspective taking condition, teams reported significantly higher values ($M = 4.24$, $SD = 0.38$) than in the non-perspective taking condition ($M = 3.58$, $SD = 0.33$; $F (1, 72) = 80.38$, $p < .001$, $\eta^2_{partial} = .54$). These differences in situational perspective taking are not due to differences in dispositional perspective taking. In fact, individuals did not differ between conditions in their dispositional perspective taking (all $Fs < 1$) which was assessed at the end of the post-experimental survey with the scale by Davis (1980; seven items, Cronbach's $\alpha = .68$). These findings point to a successful perspective taking manipulation.

Test of Hypotheses

The effect of diversity and perspective taking on team creativity. In order to test Hypothesis 1, we first regressed team creativity on the dummy-coded variables for diversity and perspective taking and then added their product to test the proposed moderation (see Table 2.2). The model containing only the dummy variables for the direct effects of our manipulations did not account for significant variation in the criterion team creativity ($R^2 = .04$, $p = .26$) and neither diversity ($b = 1.57$, $SE = 1.39$, $p = .26$) nor perspective taking ($b = 1.65$, $SE = 1.39$, $p = .24$) were significant predictors. Adding the interaction between diversity and perspective taking to the model significantly increased the amount of explained variance ($R^2 = .17$, $p < .01$; $\Delta R^2 = .13$, $p < .01$) and the interaction significantly predicted creativity ($b = 8.88$, $SE = 2.60$, $p < .01$). Simple slopes analyses (Preacher, Curran, & Bauer, 2006) yielded a significant positive simple slope of diversity (i.e., the difference between diverse and homogeneous teams) in the perspective taking ($b = 5.79$, $SE = 1.79$, $p < .01$) but not in the non-perspective taking condition ($b = -3.09$, $SE = 1.88$, $p = .11$). In sum, the significant moderation effect and the specific pattern of effects (see Figure 2.2) support Hypothesis 1 and the theoretical reasoning behind it.

Table 2.1: Descriptive statistics and correlations (Study 1)

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Diversity	0.50	0.50									
2. Perspective taking	0.52	0.50	.04								
3. Perspective taking manipulation check	3.92	0.46	-.10	.72**							
4. Diversity manipulation check information preference	0.34	0.13	.61**	-.01	-.05						
5. Diversity manipulation check goals	0.30	0.16	.76**	.08	-.12	.43**					
6. Sharing information	2.11	0.42	.01	.09	.02	-.16	-.03				
7. Sharing perspectives	1.08	0.52	.23*	.19	.15	-.01	.17	.12			
8. Task Conflict	4.17	2.95	.14	-.26*	-.27*	-.01	.09	.20	-.07		
9. Information Elaboration	3.53	1.40	.08	.27*	.22	-.04	.02	.31**	.56**	-.36**	
10. Team creativity	10.01	6.04	.13	.14	.15	.08	.06	-.02	.24*	-.24*	.53**

Note. Diversity and perspective taking are dummy-coded variables (0 = homogeneous; 0 = no perspective taking). All correlations are reported at the team level.
* *p* < .05 ** *p* < .01.

Table 2.2: Regression results for the mediated moderation model (Study 1)

Predictor	b	SE	β	t	R^2
Model 1: Creativity					.17**
Diversity	-3.09	1.89	-.26	-1.64	
Perspective taking	-2.89	1.86	-.24	-1.55	
Diversity x perspective taking	8.88	2.60	.66	3.41***	
Model 2a: Information elaboration					.19*
Diversity	-0.80	0.43	-.29	-1.87	
Perspective taking	-0.22	0.42	-.08	-0.51	
Diversity x perspective taking	1.89	0.59	.61	3.20**	
Model 2b: Sharing information					.01
Diversity	0.17	0.84	.03	0.20	
Perspective taking	0.56	0.83	.11	0.68	
Diversity x perspective taking	-0.20	1.16	-.04	-0.18	
Model 2c: Sharing perspectives					.09*
Diversity	-0.02	0.17	-.02	-0.11	
Perspective taking	-0.05	0.16	-.05	-0.32	
Diversity x perspective taking	0.49	0.23	.42	2.13*	
Model 2d: Task conflict					.09*
Diversity	1.83	0.95	.31	1.94	
Perspective taking	-0.58	0.93	-.10	-0.62	
Diversity x perspective taking	-1.88	1.30	-.29	-1.44	
Model 3a: Creativity					.40***
Diversity	-1.23	1.65	-.10	-0.74	
Perspective taking	-2.39	1.59	-.20	-1.50	
Diversity x perspective taking	4.49	2.38	.33	1.88	
Information elaboration	2.32	0.44	.54	5.23***	
Model 3b: Creativity					.44***
Diversity	-0.82	1.67	-.07	-0.49	
Perspective taking	-1.99	1.61	-.17	-1.24	
Diversity x perspective taking	3.95	2.38	.29	1.66	
Information elaboration	2.94	0.63	.68	4.64***	
Sharing information	-0.49	0.25	-.20	-1.95	
Sharing perspectives	-1.18	1.41	-.10	-0.84	
Task conflict	0.08	0.23	.04	0.35	

Note. Diversity and perspective taking are dummy coded variables (0 = homogeneous; no perspective taking). * $p < .05$ ** $p < .01$ *** $p < .001$.

Figure 2.2: Interaction between diversity of perspectives and perspective taking on team creativity (Study 1)
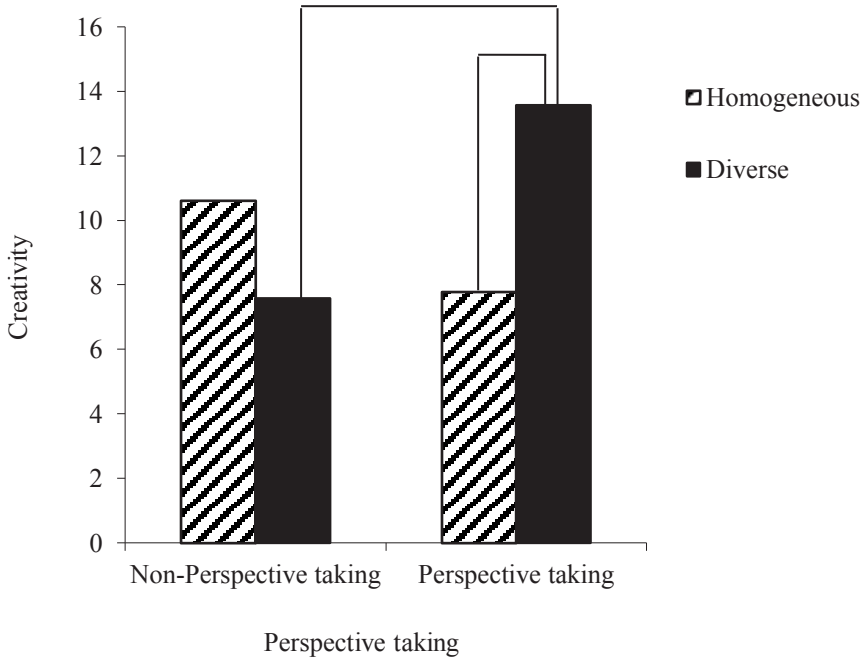
Note: Interaction of diversity and perspective taking on team creativity. As indicated by the bars, the simple main effects of diversity in the perspective taking condition and the simple main effect of perspective taking in the diverse condition are significant.

The effect of diversity and perspective taking on information elaboration. Hypothesis 2 predicted that perspective taking moderates the effect of diversity on elaboration. To test it, we regressed elaboration on diversity and perspective taking and then added their interaction to the model. The model containing only the predictors for our manipulated factors did not explain significant variance in elaboration (R^2 = .08, p = .05), although perspective taking (b = 0.75, SE = 0.31, p = .02) but not diversity (b = 0.19, SE = 0.31, p = .55) were significant predictors. Adding the interaction between diversity and perspective taking to the model significantly increased the amount of explained

variance in elaboration ($\Delta R^2 = .12$, $p < .01$). In this model ($R^2 = .19$, $p < .01$), the coefficient for the interaction was significant ($b = 1.89$, $SE = 0.59$, $p < .01$). Simple slopes analyses showed that in support of Hypothesis 2, the simple slope for diversity was significant and positive in the perspective taking condition ($b = 1.09$, $SE = 0.41$, $p < .01$) but not in the non-perspective taking condition ($b = -0.80$, $SE = 0.43$, $p = .07$). Simple slopes analyses also qualified the observed direct effect of perspective taking which only had a significant and positive simple slope for diverse ($b = 1.67$, $SE = 0.41$, $p < .001$) but not for homogeneous teams ($b = -0.22$, $SE = 0.42$, $p = .61$). This suggests that the direct effect of perspective taking is solely attributable to its effect on elaboration in the diverse condition.

The mediating role of information elaboration. Support for Hypothesis 3a requires a conditional indirect effect of diversity on creativity through elaboration in the perspective taking condition and the absence of such an effect in the non-perspective taking condition. In line with our theoretical arguments, the model allowed for a moderation of the first stage of the indirect effect (from diversity to elaboration) but not of the second stage (from elaboration to creativity; model F, Edwards & Lambert, 2007). [7] Coefficient estimates for the model's paths were obtained by extending the regression analyses which established the moderating role of perspective taking on diversity's effect on team creativity and on the mediator elaboration in support of Hypothesis 1 and 2. To test the effect of elaboration on creativity and the strength of the direct effect of the interaction of diversity and perspective taking on creativity after accounting for elaboration, we regressed creativity on diversity, perspective taking, their interaction, and elaboration. In this model ($R^2 = .40$, $p < .001$), elaboration significantly and positively predicted creativity ($b = 2.32$, $SE = 0.44$, $p < .001$) rendering the effect of diversity's interaction with perspective taking non-significant ($b = 4.49$, $SE = 2.38$, $p = .06$). To assess the magnitude of the indirect effect, we relied on bias-corrected confidence intervals based on 1000 bootstrap samples. Conditional indirect effects were computed for both levels of perspective taking and considered significant if their 95% confidence interval excluded zero. Supporting Hypothesis 3a, there was a significant indirect effect of diversity on creativity through elaboration in the perspective taking ($b = 2.52$, CI [0.95, 4.63]) but not

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[7] Testing an alternative model that allowed for a moderation of both stages of the indirect effect did not alter the results and showed no moderation of the indirect effect's second stage.

in the non-perspective taking condition (b = -1.86, CI [-4.97, 0.12]) and these conditional indirect effects differed significantly (b = 4.39, CI [1.67; 8.70]).

Comparing the alternative mediators. To test the relative strength of different mediators posited in Hypothesis 3b, we first repeated the analyses used to test Hypothesis 3a for each alternative mediator. Sharing the (fully shared) information about the theater did not mediate the effect of diversity on creativity in either the perspective taking condition (b = 0.00, CI [-0.32, 0.34]) or the non-perspective taking condition (b = -0.01, CI [-0.49, 0.41]). Sharing the (in diverse teams unshared) perspectives partially mediated the interaction of diversity and perspective taking. There was a significant positive indirect effect of diversity on creativity through sharing perspectives in the perspective taking condition (b = 1.29, CI [0.03, 3.05]) but not in the non-perspective taking condition (b = -0.05, CI [-1.58, 0.84]). Yet diversity's interaction with perspective taking remained a significant predictor after adding the mediator sharing perspectives to the model (b = 7.54, SE = 2.62, p < .01). Lastly, there was no indirect effect of diversity on creativity through task conflict in either the perspective taking (b = 0.02, CI [-0.67, 0.77]) or the non-perspective taking condition (b = -0.87, CI [-2.62, 0.03]). To fully test Hypothesis 3b, we specified a multiple mediated moderation model (Preacher & Hayes, 2008) with simultaneous indirect effects through all four mediators.[8] This model yielded a significant indirect effect of the interaction between diversity and perspective taking through elaboration (b = 5.55, CI [1.87, 11.09]) but not through task conflict (b = -0.15, CI [-1.44, 0.59]), sharing information (b = 0.10, CI [-1.18, 1.84]) or sharing perspectives (b = -0.57, CI [-2.94, 0.64]). The confidence intervals for the contrasts between the specific indirect effect through elaboration and those through task conflict (C = 5.71, CI [1.82, 11.26]), sharing information (C = 5.45, CI [1.47, 11.26]), and sharing perspectives (C = 6.13, CI [1.87, 12.31]) excluded zero.

Discussion

We examined what team members can do to help their team to benefit from its diversity on creative tasks as is frequently predicted (Jackson, 1992; West, 2002) but not

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[8] Three multiple mediated moderation models comparing each alternative mediator individually to elaboration also showed only a reliable indirect effect through elaborations. Further details are available upon request.

consistently shown (Hülsheger et al., 2009). The need to integrate different perspectives to achieve creative synergy points to the other-referential process of perspective taking as a potent factor in explaining when and how diverse teams perform more creatively. Our findings support the hypothesized moderating role of perspective taking on the effect of diversity on creativity and the proposed mediation of this moderated effect through information elaboration.

Theoretical Implications

By combining the literatures on diversity and perspective taking, we outline a set of conditions that help teams integrate their diverse viewpoints. Our findings thus add to the CEM as they help to clarify the contingencies that shape the inconsistent effects of diversity (van Knippenberg & Schippers, 2007) and point to an additional class of moderators of diversity's effect on elaboration and team outcomes beyond the individual (e.g., Kearney et al., 2009) and task characteristics (Kratzer et al., 2006) proposed by the CEM. Our results point to the value of also considering team- and other-focused processes as moderators which may be especially relevant when outcomes require integrating diverse cognitive resources. Moreover, as these team-focused processes are arguably more proximal to team information processing, they may also underlie the effect of other factors that have been found to moderate diversity's effect on team creativity. For example, transformational leadership (Shin & Zhou, 2007) may affect perspective taking as individualized consideration entails that leaders try to understand their followers' viewpoint (Moates & Gregory, 2008) and thus function as role models. Likewise, seeing value in diversity may promote diverse teams' performance (Homan et al., 2007) by raising the motivation to invest cognitive effort in considering their teammates' perspectives.

In addition, we were able to show that information elaboration mediates the positive effects of diversity on team creativity in the perspective taking condition, thus extending prior findings suggesting its benefit for other team outcomes (Homan et al., 2007, 2008; van Ginkel & van Knippenberg, 2008, 2009). Whereas idea generation is widely studied (Paulus & Nijstad, 2003), research is only starting to develop an in-depth picture of the potentially distinct processes which teams use to transform ideas into a final

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solution (Lingo & O'Mahoney, 2010). Our study thus adds to a more complete account of how teams perform creatively. We also ruled out that task conflict or information sharing can account for our effects. This helps to resolve an ongoing theoretical debate (van Knippenberg et al., 2004) in which different mediators are theoretically contrasted but not empirically compared. Our empirical comparison of the alternative mediators also provides a more stringent test for the posited role of elaboration as we can show its benefits compared to viable alternatives rather than against the absence of an effect (van de Ven, 2007).

By studying the effect of perspective taking on teams, we add to a growing understanding of its effects beyond the well-established individual-level and dyadic outcomes (Parker et al., 2008). Earlier team research shows that perspective taking facilitates implicit coordination (Rico et al., 2008) and shapes conflict perceptions (Sessa, 1996). Yet the only study we know of that links perspective taking to creativity operates at the individual level (Grant & Berry, 2011) and does not speak to its effect on team processes and outcomes in collaborative settings. Studying perspective taking as a team-level construct for which members of homogeneous and diverse teams exhibited high consensus also yields promising avenues for future research.

As a cognitive process, perspective taking may not always acquire the properties of an emergent team process. Instead, individuals might under certain conditions continue to vary in their perspective taking efforts. Studying these conditions and the effects of perspective taking diversity may help to delineate the boundary conditions of our findings. Future studies could for instance examine whether all members need to engage in this cognitively taxing process (Roßnagel, 2000) to ensure its benefits. This would also echo calls to treat team member (dis)agreement as a theoretically meaningful variable rather than a mere methodological issue (DeRue, Hollenbeck, Ilgen, & Feltz, 2010). Likewise, the temporal dynamics of perspective taking and its effects warrant further investigation. Perspective taking is unlikely to occur on an ongoing basis raising the question of whether it is especially beneficial at specific incidents in a discussion such as in case of disagreements or when reacting to others' ideas. Furthermore, if perspective taking helps uncover diverse perspectives and build a shared mental model (Rico et al., 2008), its benefits may vary across project phases and diminish with growing team tenure.

Given our focus on diversity's effect on team creativity, we specified our model at the team level. Yet studying perspective taking in a multi-level context could expand our knowledge on its multifaceted effects. Recent findings show that whether members benefit from their teams' cognitive diversity for their individual creativity depends on their creative self-efficacy and transformational leaders (Shin, Kim, Lee, & Bian, 2012). In this vein, perspective taking may be a tool for individuals to harness their team's cognitive resources for their own creativity. Conversely, organization-level variables, such as reward structures, may affect team members' motivation to engage in perspective taking and use the gained insights for the collective benefit.

Lastly, our findings raise the question under which conditions perspective taking occurs in diverse teams. As we manipulated perspective taking and diversity orthogonally, we cannot speak to this question and prior findings informing it are mixed. On the one hand, anticipating differences in opinion has been linked to a more accurate understanding of another's thoughts (Tjosvold & Johnson, 1977). On the other hand, when team members are increasingly dissimilar, the cognitive effort of perspective taking may rise and be less willingly extended. In this vein, a recent study links perceived coworker dissimilarity to less positive attributions and emphatic concern (as direct effects of perspective taking; Williams, Parker, & Turner, 2007). In sum, it seems that diversity may at times hinder perspective taking. Clarifying the specific nature of this relationship is important as perspective taking may improve the social dynamics in teams (Parker et al., 2008) and limit intergroup bias (Galinsky & Moskowitz, 2000). Combined with our results, this suggests that perspective taking may also mitigate the potential negative effects of diversity. Further research, directly measuring team viability, cohesion, and emotional conflict, is needed to establish whether perspective taking is indeed doubly useful for diverse teams.

Practical Implications

When faced with the question of how to boost the creativity of teams in which members have divergent approaches to the task, our results suggest that trying to foster perspective taking is one viable answer. Prior research indicates that perspective taking may be influenced by situational factors and can be trained (Parker et al., 2008; Sessa,

1996). Through its focus on perspective taking, the current study hence directs attention to a factor that is at least partially under managerial control. In order to maximize the creativity of diverse teams, managers and team leaders can consider both a direct training of perspective taking as well as a change in task and job characteristics (Parker & Axtell, 2001) to indirectly increase perspective taking. Yet our findings indicate that perspective taking is not equally effective across all teams. Rather, the lack of a positive effect on homogeneous teams suggests that its benefits may be limited to situations in which team members have different viewpoints. Interventions in highly homogeneous teams should thus focus on increasing the variety of a team's cognitive input. Here, perspective taking may still play a role if it is directed at persons with different viewpoints outside one's team.

Moreover, our results not only present elaboration as an antecedent of team creativity but also highlight the importance of going beyond information sharing and of creating a constructive debate of the knowledge and perspectives instead of disagreements about them per se. Besides raising awareness of the importance of elaboration, managers may also support it by creating conditions that prior research shows facilitate elaboration in diverse teams. Those include pro-diversity beliefs (Homan et al., 2007), a reward structure inducing a superordinate identity (Homan et al., 2008), and a shared task-understanding (van Ginkel & van Knippenberg, 2008).

Limitations and Directions for Future Research

This study was designed to test the causal effects of a set of antecedents on team creativity. The experimental procedure bolsters our confidence in the internal validity of our findings and allowed us to test the effect of two manipulated factors on the rated creativity of one comparable team product to show the mediating role of a video-coded team process. Although establishing the external validity of our findings was not our main aim (Mook, 1983), the important question of whether our results generalize to other settings can ultimately only be addressed by a series of systematic replications. Yet there are prior findings and theoretical arguments to suggest that our findings may hold across a broader range of contexts and operationalizations. In general, meta-analyses on a variety of psychological effects show that effect sizes obtained in the laboratory and field correspond

substantially (Anderson, Lindsay, & Bushman, 1999). In particular, a recent meta-analysis on the diversity-performance link (including creativity) across 132 studies found no reliable effect of study setting (laboratory vs. field; van Dijk, van Engen, & van Knippenberg, 2009). Likewise, there has been consistent support for elaboration as a mediator of the benefits of diversity across laboratory (Homan et al., 2007; van Ginkel & van Knippenberg, 2008; 2009) and field studies (Kearney & Gebert, 2009; Kearney et al., 2009) and various operationalizations of diversity. And regarding the role of perspective taking, recent results indicate its benefits for team reflexivity (Calvard, 2010) which has been linked to elaboration (van Ginkel & van Knippenberg, 2009).

Another potential limitation arises from our choice to manipulate diversity of perspectives as an underlying element of different diversity attributes across situations. Although we can rule out that our effects are instead caused by other, specific diversity attributes or faultlines formed by them (see footnote 4), it is important to explore whether our model holds for other diversity types and combinations. Based on our rationale that the task-relevance of diversity depends on the situation, we would propose that the moderating role of perspective taking extends to specific diversity attributes insofar as they entail different approaches to the task. Likewise, recent work links the effects of deep-level diversity to the existence of surface-level diversity (Phillips & Loyd, 2006). In line with this finding, one might propose that surface-level diversity may signal deep-level diversity and thus stimulate the exploration of alternative viewpoints whereas a lack thereof may lead to the erroneous assumption that perspectives align and stifle perspective taking. Moreover, our manipulation of diversity resembled the concept of functional assignment diversity as it focused on the diverse, role-based accountabilities but not the experience members had with their role. Exploring the impact of experience would be interesting as contradictory arguments can be raised regarding its effect on perspective taking. Whereas research on cognitive entrenchment (Dane, 2010) suggests that growing expertise may come at the expense of reduced flexibility, others argue that effective perspective taking requires clear, identifiable perspectives (a conceivable correlate of more role experience; Boland & Tenkasi, 1995).

Moreover, unlike many types of job-related diversity which also entail differences in knowledge, our diversity manipulation focused on team members' perspectives but kept

the information they received constant so as to avoid confounding differences in perspectives with those in knowledge. Additional differences in knowledge can be argued to strengthen the effect of perspective taking. Research shows that teams often fail to uncover unshared information (Stasser & Titus, 1985) and studies on the mediating role of elaboration stress that this process is especially effective with regard to unshared information (e.g., Homan et al., 2007). Thus, to the extent that perspective taking not only mobilizes diverse perspectives but also helps uncover unshared information, it should put diverse teams at an even bigger advantage compared to diverse teams that do not engage in it. As such, our manipulation seems to provide a conservative test of perspective taking as a moderator of the effect of diversity on creativity. Whether perspective taking indeed is of higher value for teams in which members also have diverse knowledge needs to be tested through future research.

Finally, our diversity manipulation might have induced different levels of cognitive load for members of homogeneous and diverse teams. We tried to minimize this possibility by matching the length of instructions and keeping the amount of information about the theater constant across participants. Yet as small differences in cognitive load are theoretically possible, we tested whether or not these differences affected individuals' ability to perform the task. We coded all initial individual ideas for their creativity. Sensitivity analyses revealed no systematic differences in the average or maximum creativity of these ideas (all $F < 1$) indicating that if our manipulation caused differences in cognitive load, they did not seem to interfere with the task.

Conclusion

The importance of team creativity is widely recognized, yet our knowledge of how teams optimally use their resources for higher creativity is limited (George, 2007). Our results provide an important step toward building our understanding of this phenomenon. We outline the role of perspective taking in helping diverse teams to elaborate on their perspectives and information to develop more creative solutions. In sum, our findings suggest interesting avenues for future research and useful implications for practitioners who seek to enhance their teams' creativity.

Chapter 3: Nationality Diversity and Team Creativity: The Importance of Mutual Feedback in Teams

Abstract

Despite its clear importance for organizations, the factors and processes underlying successful creative teamwork are not well understood. We develop a theoretical model in which the effect of a team's nationality diversity on its creativity is moderated by the degree of mutual feedback among teammates. Although the overall effect of within-team feedback on team creativity is theoretically contested, we outline how feedback received from fellow team members may instill higher creativity in diverse teams by helping them to uncover and more thoroughly explore the informational resources available to them. Results of a study with intact student teams support the hypothesized moderation effect of mutual feedback on the relationship between nationality diversity and team creativity such that diversity in terms of team member nationality was positively related to team creativity under conditions of high mutual feedback, but had a negative effect on creativity under conditions of low levels of feedback between team members.

Introduction

Workplace creativity is widely recognized as a key factor for organizations and their ability to innovate, create value, and adapt to changing environments (e.g., George, 2007). Due to the complexity of issues organizations face, in conjunction with increasing work role specialization, teams are frequently set to work on creative tasks. In an increasingly globalized world, these teams are not only more diverse in terms of their functional background or education, but also in terms of their nationality (Dahlin, Weingart, & Hinds, 2005). Depending on the problem or task a team is faced with, these differences in nationality may provide team members with differences in task-relevant perspectives and information (Curşeu, 2010; Kearney & Gebert, 2009). Managerial wisdom (Egan, 2005) as well as more formal theorizing hold that teams that are diverse in knowledge and perspectives are a particularly suitable means to the end of increased creativity (e.g., Jackson, 1992; West, 2002).

Unfortunately, this notion of a consistent main effect of diversity on team creativity seems similarly tenuous as the more general assumption of a direct diversity effect on team performance (van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007). In fact, the results of different studies fail to converge on a reliable and generalizable effect of job-related diversity dimensions on team creativity and innovation (see Hülsheger, Anderson, & Salgado, 2009; Jackson & Joshi, 2011, for recent overviews). This raises the question of how to realize the benefits of diversity for team creativity.

In the present study, we argue that feedback that is provided by fellow teammates constitutes a viable tool for members of diverse teams to make positive use of the informational resources diversity affords them with. Feedback is defined as evaluative information individuals receive on their performance or contributions (London, 2003, p. 11), in our case from their team members. Creative ideas tend to elicit evaluative reactions from others since they challenge the status quo in desirable or undesirable ways (Sternberg, 1999). And at least anecdotal evidence suggests that creative teamwork forms no exception to this rule, even in settings in which these evaluative reactions are officially declared undesirable (Sutton & Hargadon, 1996).

Despite these accounts suggesting that evaluative reactions are frequently encountered throughout the creative process of teams, the role of feedback and evaluation on teams' creative performance is theoretically contested. Whereas brainstorming research operates on the understanding that evaluative reactions from team members should be avoided in order to minimize evaluation apprehension and process losses (e.g., Camacho & Paulus, 1995; Diehl & Stroebe, 1987), other studies identify feedback as one of multiple team creativity-relevant processes (Taggar, 2001, 2002). Empirical research to resolve this contradiction is largely missing. Yet related research on individual-level feedback and creativity (see Zhou, 2008 for an overview) suggests that externally provided feedback from supervisors or experts may be beneficial to the degree that it fosters (instead of undermines) intrinsic motivation and is of informational value.

Building on this research, we suggest that mutually receiving feedback from team members moderates the effect of diversity on team creativity. More specifically, receiving feedback from their teammates may act as a trigger for team members to engage in task-oriented information exchange that mobilizes and integrates their broader informational resources. Additionally, to the extent that it leads to new insights or helps teams discover differences in the tacit understanding of the task or the solutions, mutually providing feedback to team members may increase value-in-diversity beliefs (van Knippenberg & Haslam, 2003). In line with both contemporary models on the effect of diversity on team outcomes (van Knippenberg et al., 2004) and research on the effect of individual feedback on creativity (Zhou, 2008) providing feedback to team members thus represents a promising but heretofore unacknowledged way to capitalize on the benefits a team's diversity promises.

We tested this proposition using data obtained from a sample of intact business administration student teams working on a team assignment. Results from this study indicate support for our prediction such that feedback received from team members was found to moderate the effect of nationality diversity on the team's creative performance. These findings have important theoretical and practical implications. First, the study theoretically links the literature on team-level feedback with the literature on team diversity. Despite the potential of feedback to affect team member motivation as well as team processes and information use which are considered crucial factors shaping the effect

of diversity in teams (e.g., van Knippenberg et al., 2004), the influence of within-team feedback on the effect of diversity on team creativity has so far remained unexplored. Second, testing the impact of within-team feedback on team creativity is especially intriguing since the psychological literature on brainstorming (e.g., Diehl & Stroebe, 1987; see Paulus & Nijstad, 2003 for an overview) and the literature on team creativity conducted within the field of Organizational Behavior (e.g., Taggar, 2001; 2002) arrive at contradictory predictions about its effect. By combining the effects of team diversity and mutual feedback, our study not only helps to clarify the conditions under which the seemingly straightforward conceptual link between a team's diversity and a team's creativity empirically materializes but also identifies ways in which feedback can promote team creativity. Moreover, our study extends the scope of the research linking feedback and creativity to the team level. Although feedback is likely to be present in the context of creative teamwork, actual research on its effect and effectiveness is largely missing (Litchfield, 2008). Given the importance of creative teamwork in organizations, the finding that within-team feedback constitutes a mechanism to realize the promise of diversity for team creativity is also of high practical relevance.

Literature Review and Hypotheses

Team Creativity

To be creative, that is to produce ideas that are both novel and useful (e.g., Amabile, 1988; Oldham & Cummings, 1996), is an imperative for modern organizations. Moreover, given the ubiquity of teams as organizational building blocks (Guzzo, 1996), creative work is frequently carried out in teams. The prototypical examples of Research and Development teams or New Product Development teams cover functions that are crucial to firm survival. Accordingly, the question about the state of our knowledge about team creativity has been raised more than once. Frequently, it is met with concern about how little is known about how teams work together to produce creative outcomes (George, 2007; Paulus & Nijstad, 2003). This dearth of scientific knowledge is partly attributable to a strong research focus on individual creativity in organizations (Shalley, Zhou, & Oldham, 2004). Turning to a related body of psychological research on group brainstorming leads to the conclusion that the anticipated benefits of having teams work on

creative tasks are not self-evident. Indeed, when idea generation is at stake, this literature suggests using individuals instead of interactive teams (Diehl & Stroebe, 1987; Paulus, 2000). Yet the complexity of most organizational issues requires input from multiple persons creating a situation in which creative work is frequently carried out in teams.

In line with existing research on organizational creativity, we define team creativity as the joint novelty and usefulness of an idea or ideas generated and developed by a group of people working interdependently. This conceptualization adheres to the core definitional features of novelty and usefulness (e.g., Amabile, 1988; Zhou & Shalley, 2010) while explicitly stressing the collective nature of this process which is required to deliver on the anticipated performance advantage of creative teamwork. In fact, the wide use of teams for creative tasks in organizations is based on the common wisdom that they bringing a number of people together to work on a problem activates a wider pool of perspectives and knowledge which, if properly combined and integrated, can lead to creative synergy (Kurtzberg & Amabile, 2001).

The Potential and Pitfalls of Diversity

Implicit in the presumed benefit of creative teamwork is thus the assumption that team members have a variety of perspectives to offer on a given problem or task, or the notion of diversity. Diversity is defined as the degree to which differences exist between the members of a social unit such as a team on any given attribute (van Knippenberg & Schippers, 2007). In the present study we focus on diversity in terms of team member nationality. Diversity in terms of nationality is interesting because it represents a very real phenomenon in an increasingly globalized world in which teams become more demographically diverse (Paletz, Peng, Erez, & Maslach, 2004) and frequently operate in a multinational context (Milliken & Martins, 1996). Moreover, the case of nationality diversity represents a prime example of an insight that resonates within more recent theorizing on diversity: The idea that the positive and negative effects of diversity are not tied to specific diversity attributes or types. Rather, depending on the situation and task, every type of diversity may potentially elicit both social categorization and intergroup bias as well as better information use (van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007; also see Webber & Donahue, 2001). As a case in point, across different

studies, nationality diversity has been conceptualized both as a detriment to and a resource for teams and empirical findings on its effect on team processes and outcomes vary considerably.

The differences in the conceptual treatment of nationality diversity in previous research illustrate this point. On the one hand, national diversity is classically seen as an example of less job-related, more visible, and more relationship-oriented diversity (e.g., Jackson, 1992; Jackson & Joshi, 2011; Joshi & Jackson, 2003; Milliken & Martins, 1996). This kind of diversity is often assumed to elicit the negative consequences of social categorization and intergroup bias and disrupt team communication and performance (Jehn, Northcraft, & Neale, 1999; Pelled, Eisenhardt, & Xin, 1999). Similarly, some researchers argue that national diversity instigates destructive conflict within teams (Ayub & Jehn, 2006) and the ways in which communication and interaction may be hindered in multicultural teams have received both research and managerial attention (e.g., Brett, Behfar, & Kern, 2006; Dahlin et al., 2005). Problems with communication (cf. Baer, Leenders, Oldham, & Vadera, 2010) and higher levels of relationship conflict (Pearsall, Ellis, & Evans, 2008) in turn have been linked to reduced team creativity.

In contrast, other research stresses the benefits that may arise from diversity in terms of ethnicity or nationality within a team. Earlier research on the so called "value-in-diversity" hypothesis is based on the underlying assumption that the insights and viewpoints of people from different ethnic or cultural backgrounds may be of informational and creative value to teams and companies (Cox & Blake, 1991; McLeod, Lobel, & Cox, 1996). In line with this reasoning, Curşeu (2010) conceptualizes nationality diversity as diversity in the sense of variety (Harrison & Klein, 2007) because differences in nationality serve as a proxy for different life experiences. In a similar vein, Kearney and Gebert (2009) describe nationality diversity as an instance of diversity as variety that is likely to come with different perspectives on work tasks which may not only add informational value, but also help to avoid the pitfalls of group think (Janis, 1982).

Empirically, these divergent conceptualizations of nationality diversity as a benefit or detriment are reflected in the inconsistent findings regarding its effect on team creativity and related outcomes. In line with their theoretical arguments, McLeod and her colleagues (McLeod et al., 1996) find that ethnically heterogeneous groups develop more

effective and feasible ideas. Similarly, Curşeu (2010) finds a direct positive effect of a combined measure of nationality, age, and gender diversity (as a composite indicator of variety diversity) on the rated creativity of webpages developed by students. Additionally, and contrary to their initial predictions based on social categorization theory, Dahlin and her colleagues (2005) reported both positive and negative effects of national diversity on different aspects of a team's information use and that, in their case, the positive effects unexpectedly outweighed the negatives.

Other studies, in turn, fail to find a direct effect of ethnic diversity on group creativity (Paletz et al., 2004) or nationality diversity on team performance (e.g., Kearney & Gebert, 2009; Kearney, Gebert, & Voelpel, 2009; Pelled et al., 1999). Some studies even suggest that culturally or nationally diverse teams have a disadvantage in terms of both team processes and performance compared to culturally homogeneous teams, especially during the earlier phases of their collaboration (Watson, Kumar, & Michaelsen, 1993). In a similar vein, Kooij-de Bode and colleagues (Kooij-de Bode, van Knippenberg, & van Ginkel, 2008) report that ethnically diverse teams were less able to make effective use of distributed information and reached lower quality decisions than their diverse counterparts unless they were specifically instructed to elaborate on the information available to the different members of the team.

These differences in the conceptualization of nationality diversity and the effects it is assumed or reported to produce indicate that whether a diversity dimension provides teams with a broader range of task-relevant knowledge and perspectives is not solely a property of a particular diversity dimensions but also depends on the task and situation at hand (van Knippenberg et al., 2004; cf. McLeod et al., 1996). Accordingly, it is important to outline whether a certain diversity dimension has the potential to entail broader informational resources for a team working on a specific task. In our case, where the teams' task involves the development of solutions to increase the effectiveness of an observed team, the members of teams diverse in nationality are likely to possess differences in experiences that could afford them with different perspectives and knowledge relevant to the task.

Without discounting the potential negative effects nationality diversity can incur through social categorization processes, to the extent that a given diversity dimension like

nationality diversity represents an informational resource and provides teams with differences in perspectives, experiences, or knowledge, current theorizing suggests benefits for team performance and creativity (e.g., Jackson, 1992; West, 2002). From a diversity perspective, the availability of different perspectives and knowledge constitutes the core of the value-in-diversity hypothesis (Cox, Lobel, & McLeod, 1991) and this value is considered especially vital for knowledge-intensive tasks. Creative tasks, in turn, represent a prime example of a task for which team members' diverse perspectives should pose an advantage (van Knippenberg et al., 2004). Taken together, both the diversity and creativity literatures imply that diversity in a team should lead to more creative and multi-faceted solutions.

Despite the intuitive appeal of arguments stressing the beneficial consequences of diversity, current diversity research has seriously challenged the idea of such a consistent positive (or negative) main effect on team outcomes more generally. In their review of the recent diversity literature, van Knippenberg and Schippers (2007) call for a contingency approach that incorporates relevant moderators and mediators of diversity's effects on different outcomes to replace the bankrupt main-effects logic (cf. Joshi & Roh, 2009). In line with this call, the categorization elaboration model (CEM; van Knippenberg et al., 2004) provides a comprehensive framework outlining when and how diversity effects occur. According to this model, the positive effects of diversity are contingent not only on the existence of differences in team members' task-relevant knowledge but also on the team's joint elaboration of this information. The level of elaboration in turn, is argued to be contingent on the type of the task and the team members' motivation and ability. At the same time, the negative effects of diversity resulting from intergroup bias on the basis of diversity-elicited social categorization need to be prevented in order to avoid disruptions of the team's information elaboration process.

Whereas prior research and theorizing indicate that the existence of task-relevant differences is a more important precondition for positive effects of diversity on tasks that are complex or require creative or innovative solutions (Bowers, Pharmer, & Salas, 2000; Jehn et al., 1999; van Knippenberg et al., 2004), the lack of consistent main effects extends to the effects of diversity on team creativity. Although the inconsistent findings of nationality diversity may, in part, be attributable to the fact that this type of diversity is not

always task-relevant, the effects of more strictly job-related forms of diversity on team creativity do not converge into a significantly more consistent overall picture. As a case in point, a recent meta-analysis of team-level predictors of innovation finds a small but significant effect of so called job-related diversity on team creativity and innovation (Hülsheger et al., 2009) but concludes that the wide credibility interval for this effect points to the need to consider contingency factors. Similarly, a recent review concludes that for creative tasks, the effects of job-related diversity are mixed, especially when research is conducted on teams other than top management teams (Jackson & Joshi, 2011).

Altogether, these findings suggest "a tension between the promise and the reality of diversity in team processes and performance" (Mannix & Neale, 2005, p. 31). The mere existence of diversity that provides team members with varied perspectives and information on a task is insufficient to foster team creativity. In line with this realization and the theoretical developments urging for a better understanding of the moderating and mediating factors surrounding the effect of diversity (van Knippenberg et al., 2004), more recent studies have started to consider the contingency factors that determine the shape and existence of diversity effects. In addition to the task- and team member characteristics suggested as moderators of diversity's effect on team processes and outcomes suggested by the CEM, researchers have additionally considered the impact of leadership styles and found benefits of diversity for team performance (Kearney & Gebert, 2009) and creativity (Shin & Zhou, 2007) when team leaders displayed high levels of transformational leadership. To complement this existing research by investigating how team members may affect their team's ability to effectively use their diverse resources for creative performance is thus a matter of strong theoretical and practical interest.

The Moderating Role of Team Member Feedback

In the current study, we suggest that providing feedback to and receiving feedback from fellow teammates is an important behavior that team members can engage in to help their team benefit from their diversity. More generally, feedback is defined as the evaluative information people receive about their performance (London, 2003, p. 11) and is classically seen as an potent management tool to influences employee motivation and behaviors (Ilgen, Fisher, & Taylor, 1979; London, 2003). Yet feedback does not only

constitute a formal tool supervisors employ to improve the performance of their subordinates but is also provided by (London, 1995) or actively sought out from other sources, including coworkers, teammates, and other intra- and extra-organizational sources (De Stobbeleir, Ashford, & Buyens, 2008).

In the present case, we are particularly interested in the effect of feedback that is provided by fellow team members. Traditionally, the role of feedback in affecting the creative process and product developed by teams is contested. Brainstorming research suggests that evaluative reactions to the ideas of others should be avoided in order to prevent evaluation apprehension and the ensuing process losses (Camacho & Paulus, 1995; Diehl & Stroebe, 1987; Paulus, Larey, & Dzindolet, 2001). In his recent review of the brainstorming literature, Litchfield (2008) argues that the brainstorming rule to avoid criticism has led to the perception that within-team feedback (especially negative feedback) is designed to stifle creativity and idea generation and lead to self-censorship preventing people to voice less conventional ideas (Williams, 2002).

Surprisingly, however, there is little systematic research on the isolated effects of the brainstorming rule to avoid criticism to back the proposition that evaluative feedback has a universally negative effect (Litchfield, 2008). In one of the few studies addressing this matter, Nemeth and colleagues compared a no-criticism-condition with a debate condition on laboratory idea generation but this manipulation did not yield systematic differences (Nemeth, Personnaz, Personnaz, & Goncalo, 2004) suggesting that the effect of evaluative reactions on team creativity is not as consistent or consistently negative as the brainstorming rules suggest. Outside of the brainstorming literature, Taggar (2001, 2002) even identifies feedback as one component within a set of eight team creativity-relevant processes. These are jointly found to moderate the effect of different levels of individual creative input for the creative outcome at the group level. Yet as the differential effect of team member feedback on team creativity is not reported, its impact remains unclear.

In sum, the direct effect of feedback on team creativity is subject to some debate. Yet we argue that obtaining feedback from team members has considerable potential to help diverse teams deliver on their proposed creative advantage through feedback's influence on a team's information processing and group dynamics. First, obtaining feedback from fellow team members constitutes a trigger for team members to engage in a

discussion about their different perspectives on a problem and its solutions. On a related note, recent research suggests that proactively seeking feedback from multiple sources (including team members) functions as an individual's self-regulatory strategy that positively affects their creative performance (De Stobbeleir, Ashford, & Buyens, 2011). Within diverse teams, obtaining feedback from fellow teammates represents a way for members to mobilize the sometimes tacit informational resources available within their team. This mobilization constitutes an important first step en route to delivering on the promise of diversity (van Knippenberg et al., 2004). The feedback that other team members provide on a fellow member's contribution, ideas, or performance is likely to contain explicit or implicit information on the evaluative standards this person uses to judge the novelty and usefulness of ideas. Given the open and ill-defined nature of creative tasks (Lubart, 2001), these standards attain an important function in navigating the team's discussion towards the development of ideas. In fact, although empirical research has so far not systematically examined this proposition, feedback has been theorized to exert its effect not only through its motivational repercussions but also by clarifying creativity-relevant standards (Zhou, 2008).

Furthermore, feedback provided by team members may aid the integration of the variety of information and perspectives team members possess. More specifically, providing feedback on someone else's idea or contribution requires the feedback giver to apply his or her perspective, knowledge, and experience to it. Conversely, receiving feedback is likely to increase the recipients' attention to it and make individuals explore the underlying reasons for the given feedback (cf. Staw, 1975). This more careful consideration of another person's arguments may help team members identify ways to integrate their ideas, information, and viewpoints. Taken together, mutual feedback between team members is likely to ensure that the more varied information members of diverse teams possess is not only activated and shared but also attended to and integrated which is crucial for creative synergy (e.g., Kurtzberg & Amabile, 2001; van Knippenberg et al., 2004).

In addition to these informational benefits, mutual team member feedback may also help prevent the negative social effects of diversity from materializing. Receiving feedback on one's ideas or contributions from dissimilar team members may increase

awareness of the informational value of the team's diversity, thus fostering value-in-diversity beliefs (van Knippenberg & Haslam, 2003). Believing in the value of diversity, in turn, has been found to moderate the effect of diversity on different aspects of team performance and to overcome the disruptive effect of faultlines within groups (Homan, van Knippenberg, van Kleef, & De Dreu, 2007; van Dick, van Knippenberg, Hägele, Guillaume, & Brodbeck, 2008). Furthermore, receiving feedback may signal to the recipient that his or her contributions are carefully considered and taken into account by fellow team members. This should prove especially important for diverse teams, in which team orientation is often reported to be lower (at least initially; e.g., Watson et al., 1993).

Individual-level research on the effect of feedback on creativity stresses the creative benefits of informational feedback that does not undermine a person's sense of self-determination (Zhou, 1998, 2008). Combining these findings with recent theorizing on the conditions that need to be met in order for the positive effects of diversity to materialize (van Knippenberg et al., 2004), the previously outlined effects of mutual feedback between team members suggest that it represents a mechanism to bring out the benefits of diversity for creativity. More specifically, receiving feedback from team members may not only mobilize the broader range of available cognitive resources but also foster its integration. Without engaging in mutual feedback, diverse teams have a lower likelihood of garnering the informational benefits diversity provides them with and also run the danger of having less favorable group processes impair their creative performance. Based on the outlined expected positive effects of members of diverse teams providing to each other we predict the following:

> *Hypothesis 1:* Mutual feedback between team members moderates the effect of nationality diversity on team creativity such that the effect of diversity is more positive when the level of mutual feedback between team members is high.

Method

Participants

388 students enrolled in a course in an introductory Organizational Behavior course as part of an International Business Administration Bachelor program at a Dutch university participated in this study. At the beginning of the course, students were assigned

to 97 teams of four students each. Of this initial sample, two teams were removed from the dataset because they did not perform the team task according to the basic rules and requirements. Within the remaining 95 teams, dropouts from the course lead to a reduction in the size of some teams (22 groups with three members and one group with two members) reducing the sample size to 356 students in 95 teams participating in the team task. Of these 356 students participating in the team task, six individuals (1.7%) failed to fill in the online questionnaire. As non-respondents were distributed across teams in a way that ensured questionnaire data from at least two thirds of the members for each of the 95 teams, no further teams were removed from the sample. However, the estimation of the questionnaire-based constructs is based on a reduced sample size of 350 participants. Information on the nationality of the students was available for all participants. The sample comprised individuals from overall 44 different nationalities. The largest proportion of students was of Dutch 48.3% and German 15.7% nationality. A little less than half (45.2%) of the students were female.

Procedure and Task

At the onset of the course, students were provided with information about the team task which constituted part of the mandatory activities for the course all students were expected to participate in. A list informing students about their assignment to their respective teams and the contact information of their fellow teammates was uploaded on the course website. Students were required to get in touch with their fellow team members and start working on the assignment. Their team reports were due approximately one month after the first lecture. Three days before the submission deadline for their teams' reports, students received an invitation for an online survey which they could fill in over the next three days. The online survey contained the measures about the mutual team feedback. By the time students responded to the survey, multiple students per team indicated that they had met with all of their fellow team members.

For the team task, the students had to jointly analyze a group portrayed in a video case. More specifically, they had to identify the strengths and weaknesses of the team they observed, pinpoint the team's biggest weakness, and generate, develop, and describe a list of solutions to help remedy this biggest weakness. They were instructed to focus on the

team's weaknesses instead of the weaknesses of its individual members and were required to develop creative solutions that left the team intact and were feasible in the context portrayed in the show. Each team handed in one joint report outlining the analysis of the team and the solutions the student teams described as suggestions to remedy the identified problems.

Measures

    Nationality diversity. The information about the participants' nationality was obtained from the student administration records prior to the onset of the study. To capture each group's diversity in terms of nationality, we relied on Blau's index of heterogeneity (Blau, 1977). As argued above, nationality is understood as a set of distinct categories that provide individuals with a set of different experiences, values, and perspectives which, in the given setting, are relevant for the task the team is expected to perform. As such, it falls most closely under the description of diversity as variety (Harrison & Klein, 2007) for which Blau's index constitutes an appropriate and widely used measure (e.g., Bunderson & Sutcliffe, 2002). Thus, our choice of the Blau's index of heterogeneity is in line with Harrison and Klein's (2007) arguments in favor of using diversity measures that adequately reflect the conceptual understanding of diversity and with recent research on nationality diversity (e.g., Dahlin et al., 2005; Kearney & Gebert, 2009). Blau's index of heterogeneity is computed as $1 - \Sigma\, p_i^2$, with p denoting the proportion of team members with a respective nationality and i denoting the number of distinct nationalities present in a team.

    Team member feedback. The amount of feedback received from teammates was assessed with a four-item scale which we adapted from Ashford and Black's (1996) feedback seeking scale. While the original items assess an individual's propensity to seek out supervisory feedback, we adapted the items to assess the degree to which fellow team members provided an individual with feedback. Sample items included or "While working on the group task, to what extent have your fellow team members provided you with their opinion on your work". Answers were recorded on a five-point scale ranging from "1 = to no extent" to "5 = to a great extent". The four items were combined into one scale that exhibited satisfactory reliability ($\alpha = .81$).

Although teams might over time develop a certain amount of sharedness in the amount of feedback different members receive or provide, we do not believe that such sharedness is inevitable or necessary with regards to the proposed moderating effect of mutual team member feedback on the relationship between a team's diversity and creativity. Rather, we contend that also in teams in which not all members receive equal amounts of feedback, the provided feedback still has the potential to activate certain amounts of underlying knowledge and perspectives. In line with this reasoning we aggregated team members' reported degree of feedback in line with a summary-index model (Chen, Mathieu, & Bliese, 2004) by taking the average of the values recorded by the members of each team.

Control variables. There are a number of variables that can be argued to either affect or underlie the proposed relationships and which we will therefore control for in our analyses. First, due to its potential to affect team processes, outcomes, and diversity measures (Jackson, Brett, Sessa, Cooper, Julin, & Peyronnin, 1991) and in line with previous studies on diversity (e.g., Dahlin et al., 2005; Kearney & Gebert, 2009), we assessed *team size* and included it as a control variable in our analyses. To obtain the most accurate information on the number of students that actually contributed to each team's product, team size was determined by the number of students that were listed on the front page of each group report. Second, in line with prior work on the effect of diversity (e.g., Kearney et al., 2009; Shin & Zhou, 2007) we decided to include diversity in terms of gender assessed as Blau's index of heterogeneity based on the information of team members' gender obtained from the study administration in the analyses. As our sample is largely age-homogeneous and participants are enrolled in the same program of study, we refrained from including diversity in terms of age or field of study.

Moreover, certain team member personality traits may shape the extent to which they welcome feedback or attend to new information or viewpoints shared within this feedback. More specifically, openness to experience comprises an individual's dispositional readiness to engage with and accept new ideas and experiences (McCrae & Costa, 1987) and has been linked to individual creativity (Feist, 1998; also see George & Zhou, 2001) as well as to teams' ability to capitalize on their diversity and achieve higher team performance (Homan et al., 2008). Hence, we assessed team members' openness to

experience with a ten-item scale from the International Personality Item Pool (Goldberg et al., 2006) recording team members' responses on a five-point scale. The items formed a scale of satisfactory reliability (α = .65) and were aggregated to the team level by averaging members' openness to experience scores for each team.

Finally, team psychological safety, a variable that captures the extent to which team members perceive the team to be a secure context for risk-taking (Edmondson, 1999), may affect the extent to which feedback is perceived as constructive and helpful. Therefore, we also assessed team members' perceived psychological safety using Edmondson's (1999) seven-item scale. Sample items included "It is safe to take a risk on this team" and answers were recorded on a seven-point scale ranging from "1 = very inaccurate" to "7 = very accurate". The items formed a scale of satisfactory reliability (α = .73). To obtain a team-level indicator, we averaged team members' responses.

Creativity. Creativity was coded from the team reports by two independent coders unaware of the teams' composition and feedback scores. More specifically, the coders independently rated each idea a team produced for creativity on a five-point scale ranging from "1 = not creative at all" to "5 = very creative". The coding was based on a standard definition of creativity (Amabile, 1988) that emphasized that creative ideas or solutions are simultaneously novel and useful. The two raters exhibited substantial inter-rater reliability ($ICC(1)$ = .60, $ICC(2)$ = .74) and agreement (mean r_{wg} = .92) in their assessment of the ideas. Our main interest in this paper is not so much in accounting for the teams' ability to develop a large number of mediocre ideas but in explaining their ability to develop the most creative ideas possible. In keeping with this focus and in line with related prior research (e.g., Baer et al., 2010) we relied on the creativity of each team's most creative idea as the indicator of each team's creativity. More creative teams where thus teams whose best idea was maximally creative.[9]

Analyses and Results

Table 3.1 reports the descriptive statistics and pairwise correlations for all variables in the study. All variables are reported at the team level. As may be expected given the nature of our sample, nationality diversity covered a moderate to high range

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[9] Sensitivity analyses conducted using the sum of the creativity scores assigned to a team's ideas or the mean creativity of those ideas yielded converging results.

Table 3.1: Descriptive statistics and correlations (Study 2)

Variable	Mean	SD	Min.	Max.	1	2	3	4	5	6
1. Nationality diversity	0.59	0.10	0.38	0.75						
2. Feedback	2.88	0.48	1.75	4.25	.04					
3. Team size	3.75	0.46	2.00	4.00	.21*	-.02				
4. Gender diversity	0.37	0.17	0.00	0.69	-.06	-.13	.17			
5. Openness to experience	3.72	0.27	2.85	4.65	.08	-.06	-.20	-.02		
6. Team psychological safety	4.86	0.51	3.79	5.96	-.12	.16	-.08	-.08	.06	
7. Team creativity	2.82	0.96	1.00	5.00	-.07	.08	-.08	.07	.07	.12

Note. N = 95 teams for all variables.
* *p* < .05, ** *p* < .01

(with the Blau's index of heterogeneity ranging from 0.38 to 0.75). Team size was positively correlated with team nationality diversity ($r = .21$, $p < .05$) indicating that larger teams tended to be slightly more diverse. The remaining bivariate correlations were very small and not statistically significant. We tested our hypothesis using moderated regression analysis. We used the product of the diversity and the feedback variables as the interaction coefficient in the analyses and centered these variables before calculating their product. Furthermore, we mean-centered the control variables team size, gender diversity, mean openness to experience, and team psychological safety to make the coefficient interpretation more meaningful and prevent a distortion in the levels of the values on the dependent variable in the graphic display.

In a first step, we entered the control variables team size, gender diversity, team members mean openness to experience, and team psychological safety as predictors of team creativity. As can be seen in Table 3.2, the model including only the control variables did not explain a significant amount of variance in the criterion team creativity ($R^2 = .03$, $F < 1$, $p = .61$) and neither the coefficient for team size ($b = -0.16$, $SE = 0.22$, $t = -0.71$, $p = .48$), nor the ones for gender diversity ($b = 0.51$, $SE = 0.60$, $t = 0.87$, $p = .39$), openness to experience ($b = 0.16$, $SE = 0.38$, $t = 0.42$, $p = .67$), or team psychological safety ($b = 0.22$, $SE = 0.20$, $t = 1.12$, $p = .27$) reached statistical significance.

Adding the predictors for the direct effects of team nationality diversity and mutual team member feedback in the second step did not significantly improve the amount of explained variance in team creativity ($\Delta R^2 = .01$, $F < 1$, $p = .72$). Neither the coefficient for nationality diversity ($b = -0.40$, $SE = 1.06$, $t = -0.38$, $p = .70$) nor the one for team member feedback ($b = 0.15$, $SE = 0.21$, $t = 0.72$, $p = .47$) was statistically significant and the overall model did not explain a significant portion of variance ($R^2 = .04$, $F < 1$, $p = .77$).

Finally, in the third step, we added the interaction between team nationality diversity and team member feedback to the model. In line with our hypothesis, the coefficient for the interaction was positive and statistically significant ($b = 6.81$, $SE = 1.97$, $t = 3.45$, $p = .001$). Adding the interaction term was also associated with a significant increase in the amount of variance explained by our model ($\Delta R^2 = .11$, $F (1, 87) = 11.91$, $p = .001$). The overall model including the control variables, team nationality diversity,

team member feedback, and the interaction between nationality diversity and team member feedback explained 15% of variance in our criterion team creativity ($R^2 = .15$, $F(7, 87) = 2.23$, $p = .04$).

Table 3.2: Results of the regression analyses (Study 2)

Predictor	B	SE	β	t	Δ R²	R²
Step 1: Control variables						
Team size	-0.16	0.22	-.08	-0.71		
Gender diversity	0.52	0.60	.09	0.87		
Openness to experience	0.16	0.38	.04	0.42		
Team psychological safety	0.22	0.20	.12	1.12		
					.03	.03
Step 2: Direct effects						
Team size	-0.14	0.23	-.07	-0.60		
Gender diversity	0.55	0.61	.10	0.90		
Openness to experience	0.20	0.38	.06	0.51		
Team psychological safety	0.19	0.20	.10	0.93		
Nationality diversity	-0.40	1.06	-.04	-0.38		
Feedback	0.15	0.21	.08	0.72		
					.01	.04
Step 3: Interaction effect						
Team size	-0.16	0.22	-.08	-0.74		
Gender diversity	0.80	0.58	.14	1.38		
Openness to experience	0.25	0.36	.07	0.69		
Team psychological safety	0.17	0.19	.09	0.92		
Nationality diversity	-0.45	1.00	-.05	-0.45		
Feedback	0.12	0.20	.06	0.59		
Nationality diversity x feedback	6.81	1.97	.35	3.45**		
					.11***	.15*

$N = 95$ teams for all analyses.
* $p < .05$, ** $p < .01$, *** $p < .001$

In order to explore the nature of the interaction effect, we plotted the interaction in line with recommendations by Aiken and West (1991) and Dawson and Richter (2006). More specifically, we used the unstandardized coefficients and intercept from the final regression model to plot the relationship between team nationality diversity and team creativity at low (-1 standard deviation) and high (+1 standard deviation) levels of feedback received from teammates (see Figure 3.1 for the pattern of the simple slopes).

Figure 3.1: The moderating effect of feedback on the relationship between nationality diversity and team creativity (Study 2)
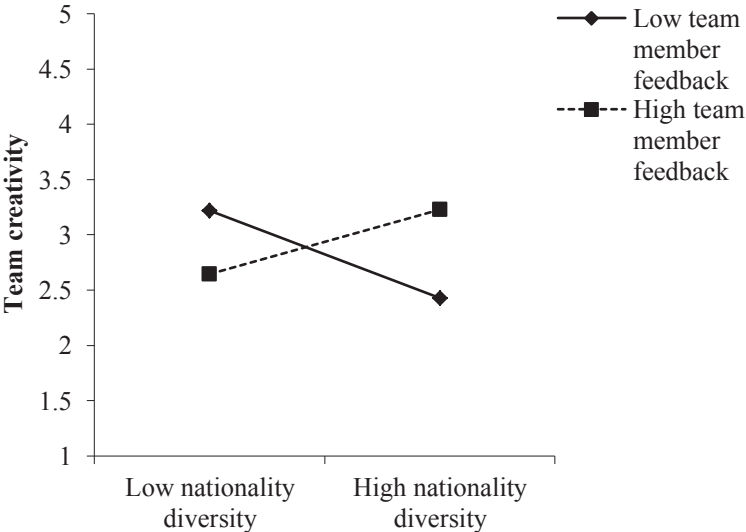
To further test the statistical significance of the simple slopes, we relied on a procedure suggested by Hayes (2012). We calculated the simple slopes of nationality diversity at the conditional values of high (+1 standard deviation), medium (mean), and low (-1 standard deviation) levels of team member feedback. The simple slope of nationality diversity was negative and significant at the low conditional value of team member feedback (b = -3.72, SE = 1.39, t = -2.68, p = .01). Conversely, nationality diversity was positively related to team creativity at the high conditional value of team member feedback (b = 2.81, SE = 1.37, t = 2.06, p = .04). At the medium conditional value

of team member feedback, nationality diversity was not significantly related to team creativity (b = -0.45, SE = 1.00, t = -0.45, p = .65). Region of significance analyses using the Johnson-Neyman technique further indicated that simple slopes of nationality diversity were significant ($p < .05$) and negative for feedback values lower than -0.55 standard deviations and positive at feedback values higher than +0.95 standard deviations. Finally, although not strictly part of our model, we further explored the nature of the interaction effect by testing the significance of the simple slopes of mutual team feedback at different levels of team diversity. The results of region of significance analyses indicate that mutual feedback had a significant and positive effect on team creativity for nationality diversity values higher than +0.46 standard deviations and was significantly and negatively related to team creativity for nationality diversity values below -1.05 standard deviations. Taken together, the significant coefficient for the interaction between feedback and nationality diversity on team creativity and the specific pattern of the simple slopes supports Hypothesis 1.

Discussion

In today's increasingly globalized economy, teams in organizations are often staffed with members who vary in their nationality. Recent research argues that diversity in team members' nationality may not only function as social category diversity that instigates intergroup bias and conflict (Ayub & Jehn, 2006; Jehn et al., 1999) but may also, depending on the task, supply teams with a broader range of task-relevant knowledge and perspectives (e.g., Curşeu, 2010; Kearney & Gebert, 2009). Yet whereas the benefits of these broader cognitive resources are predicted to arise especially for creative tasks, research does not always confirm this creative advantage (e.g., Hülsheger et al., 2009; Jackson & Joshi, 2011). In the present study we identify mutual feedback among team members as a contingency factor that helps to explain when and why teams capitalize upon their diversity. The results of our study support this hypothesized role of within-team feedback. Our finding that the effect of diversity is more positive when team members receive high levels of feedback from their teammates has important theoretical and practical implications.

Theoretical Implications and Contributions

First, our findings point to the important but heretofore unacknowledged role of feedback processes in influencing the creativity of more diverse teams by mobilizing their informational resources. Feedback has long been recognized as a way to influence a person's motivation and modify behavior towards the display of more desirable and less undesirable behaviors (Ilgen et al., 1979; London, 2003). More recent research indicates that some of the individual-level effects of feedback on goal setting and regulatory actions to achieve these goals for higher performance extend to the team level (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Additionally, feedback forms an accepted part of information processing in groups (Hinsz, Tindale, & Vollrath, 1997). Yet, even though both motivation and information processing constitute integral parts of current diversity models (e.g., van Knippenberg et al., 2004), we know of no prior research that examines the interplay of within-team feedback and workgroup diversity on team creativity or other team-level outcomes. Our findings thus provide first evidence that within-team feedback can indeed bring out the informational benefits of diversity and prevent negative social categorization processes from disrupting team functioning.

Furthermore, by integrating findings from the literature on team feedback into current research and theorizing on team diversity, we are able to add to our incomplete understanding of when diversity is an asset for teams charged with creative tasks. The finding of the moderating role of team member feedback is further designed to integrate existing research on the moderators of diversity on team creativity and related outcomes. For instance, previous research indicates that situationally induced or dispositionally high need for closure (Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004) impairs the display of creative interaction behaviors and the ideational fluency of groups. When individuals feel that a quick response is needed, this might conceivably limit team members' attempts to provide feedback to their fellow team members or the degree to which members carefully attend to feedback when they receive it. Conversely, Kearney and colleagues found that team member need for cognition moderated the effect of age and educational specialization diversity on the performance of teams engaged in knowledge intensive tasks (Kearney et al., 2009). The degree to which team members engage in

mutual feedback giving might in part underlie these reported effects of personality characteristics and situational factors.

Moreover, our findings extend research on the effect of feedback on creativity to the team level. While research on the individual-level relationship between externally provided feedback and creativity has yielded a consistent body of empirical evidence specifying the effects of different characteristics of the feedback message (e.g., Zhou, 1998), as well as their interaction with situational factors (e.g., Zhou, 2003; Zhou & George, 2001) and individual states and traits (e.g., George & Zhou, 2007; Zhou, 2003), comparable research on the team level is still sparse. At the individual level, the effects of feedback are attributed to its influence on a person's intrinsic motivation, their understanding of creativity standards, and by providing individuals with opportunities to increase their creativity-relevant skills (Zhou, 2008). Although we contend that these factors are likely to play a role in the effect of within-team feedback on team creativity, there are also systematic differences between the settings traditionally examined in the aforementioned line of research and the setting examined here. More specifically, we analyze a situation in which feedback is provided in an ongoing team process by fellow team members who are part of the creative effort. In contrast, the majority of the mentioned studies at the individual level focus on feedback provided by supervisors or external experts. Since feedback-source characteristics such as status and perceived expertise are at least theoretically assumed to influence feedback's effect on creativity (Zhou, 2008), the effect of within-team feedback may not be completely analogous for team-level creativity. Furthermore, at the team level, feedback may additionally have an influence on creativity by affecting a team's communication and information processing which are generally seen as important determinants of team outcomes (Ilgen, Hollenbeck, Johnson, & Jundt, 2005).

Although this is not the main focus of our study, our findings also suggest that feedback has a different effect on creativity in diverse as opposed to more homogeneous teams. Post-hoc analyses of the simple slopes of mutual team member feedback under conditions of high and low team nationality diversity indicate that feedback had differential effects in more diverse (with a more positive effect of feedback) as compared to more homogeneous (with a trend towards more negative effects of feedback) teams. Due

to the paucity of systematic research on the matter, the exact reason for this effect is unclear. Based on our theoretical discussion of how feedback helps to mobilize and integrate the broader range of informational resources nationality diversity provides a team with, we would argue that the effect of feedback is less positive in more homogeneous teams in which there are conceivably less resources to mobilize. On the basis of the brainstorming literature, one might even argue for a negative effect of team member feedback on team creativity (e.g., Camacho & Paulus, 1995; Diehl & Stroebe, 1987) which in the case of more homogeneous teams is not offset by the same informational benefits outlined for diverse teams.

Systematic differences between either the type of feedback provided by members of more diverse compared to more homogeneous teams or differences in the assessment of the feedback source as a function of team member diversity might also account for the negative effect of mutual feedback between team members on team creativity in more homogeneous teams. Finally, the negative effect of mutual feedback in more homogeneous teams may be indicative of the fact that the mutual provision of feedback increases the focus on their shared knowledge and opinion, thus reducing the chance that existing informational variety gets used optimally (not unlike the observed overreliance of teams on shared information in decision making settings; e.g., Stasser & Titus, 1985; Wittenbaum & Park, 2001). The degree to which these or other explanations can indeed account for the negative effect of mutual feedback among members of homogeneous teams constitutes an interesting question for future research.

Practical Implications

Given the importance of creativity for organizations together with the trends towards increasing use of teamwork and demographic changes in the workforce (e.g., Jackson & Joshi, 2011; Paletz et al., 2004), gaining a better understanding of the ways in which team members can bring out the benefits of their diversity is of key practical relevance. The findings of the current study point to the positive effects mutual feedback between team members can have on the creativity of diverse teams. By focusing on feedback among team members, the current study looks at a behavior that team members can engage in without much training or managerial attention. At least anecdotal evidence

suggests that team members have a hard time refraining from evaluative reactions altogether (Sutton & Hargadon, 1996). Since our findings suggest that receiving feedback from team members comes with a creative benefit for more diverse teams, instructing the members of these teams to mutually seek out and provide feedback on each other's ideas might prove more beneficial under certain conditions than the instructions to refrain from evaluative reactions altogether.

At the same time, the unexpected negative effect of mutual feedback among the members of more homogeneous teams indicates that mutual team member feedback is not equally effective across all teams and may even be detrimental under certain conditions. Even though this effect clearly requires further explanation through future research, our findings suggest that, all other things being equal, team members should not be encouraged to engage in high levels of mutual feedback unless this feedback is likely to mobilize informational resources.

Limitations and Directions for Future Research

Despite these contributions, our study suffers from a number of limitations that raise questions for future research. In this regard, it is important to note that we looked at a single diversity dimension. With our focus on nationality diversity we target a diversity dimension that is practically relevant, of informational relevance to the task, and exemplifies the polyvalent nature of diversity for team outcomes (van Knippenberg & Schippers, 2007). Nonetheless, it would be interesting to explore how the reported effect plays out in settings where multiple diversity dimensions interact. For instance, recent research indicates that differences in viewpoints and opinions are more readily accepted and expected when teams are diverse on an easily detectable characteristic as well (Phillips & Loyd, 2006). In this regard, it might be interesting to explore how the effect of feedback plays out in situations where underlying informational differences do not align with readily detectable differences such as different team member nationalities.

Furthermore, our study did not differentiate between different types of feedback but only assessed the amount of feedback team members received from each other. Individual-level research on feedback and creativity indicates that the characteristics of the feedback message (e.g., feedback valence, style, and developmental orientation) can have

an important influence in determining its effect on an individual's creativity (e.g., Zhou, 1998, 2008). Based on this research and complementing studies assessing the effect of feedback on performance more generally, the effectiveness of feedback at the team level may also depend on the degree to which feedback is perceived as constructive (Baron, 1988; London, 1995) or useful (Zhou & George, 2001) by the recipient. To which degrees these and other characteristics influence the effect of feedback on the creativity of different kinds of teams remains an interesting question for future research.

Furthermore, the nature of our sample as one of students enrolled in an international study program and thus presumably individuals who are relatively open to new cultural experiences raises the question to which extent our findings generalize to samples in which a more international work environment is not chosen by the individual team members to the same extent. Although we try to account for this possibility by controlling for team members' openness to experience and team psychological safety, systematic replications using other contexts are needed to assess whether the moderating role of feedback holds for situations in which team members enter a multicultural work environment less proactively.

Finally, within our study, we assessed team member feedback via an online questionnaire. Even though the use of self-report measures is ubiquitous in research on group processes, these measures have been criticized for their retrospective nature and the accompanying danger of distorted recall as well as their subjectivity and the ensuing biases (e.g., Weingart, 1997). To gain a deeper insight into the nature and temporal unfolding of the effects of feedback on team creativity, studies in a more controlled setting allowing for the use of behavioral, observation-based measures would clearly be desirable. In a similar vein, although we use time-lagged data that allows us to speak to the directionality of our effects and rely on multiple data sources to reduce common-source and common-method biases, we are unable to make claims concerning the causal nature of the observed effects. Although we are able to rule out the effect of a number of conceivable third variables that might account for or influence our effects by controlling for them in our analyses, future experimental evidence would be required to justify such claims.

Conclusion

The importance of team creativity is widely acknowledged, yet our actual understanding of the behaviors team members may engage in to optimally use their resources to creative ends is limited (George, 2007). Our findings present an important step in increasing existing knowledge about this important phenomenon. We demonstrate how members of diverse teams can help their team to benefit from its diversity by providing each other with feedback on their ideas and input. Taken together, our findings both indicate interesting avenues for future research and provide useful implications for practitioners who seek to improve the creativity of diverse workgroups.

Chapter 4: The Good Bearing of Bad News: The Differential Impact of Feedback Valence on the Creativity of Informationally Diverse and Homogeneous Teams

Abstract

Teams carrying out creative work are likely to encounter feedback on their efforts. Although research has developed a nuanced understanding of the effects of feedback on the creative performance of individuals, its effects on teams remain largely unexplored. In the present study, we investigate the effect of feedback valence on the creativity of a solution developed by a team. In contrast to individual-level findings, which stress the motivational benefits of positive feedback, we argue that the effect of feedback valence on team creativity and team-level information processing is contingent on the diversity of informational resources within a team. More specifically, based on prior research suggesting the differential effects of feedback valence on individuals' information processing and changes in team processes and strategizing, we propose that when team members differ in their information and viewpoints, negative feedback entails more creative subsequent solutions as it prompts teams to engage in higher levels of information elaboration. Conversely, teams in which team members possess largely shared information and perspectives are hypothesized to benefit more from positive feedback as this enables them to use the available information more flexibly. Results from a large group experiment support the proposed differential effects of feedback valence on the creativity of homogeneous and diverse teams and the posited differential processes underlying them. In addition, they point to the interplay of affective, motivational, and cognitive processes which – although prominent approaches to studying creativity at the individual level – are usually considered in isolation.

Introduction

Developing creative ideas is considered an imperative for organizations (Florida & Goodnight, 2005). Within these organizations, teams, especially those composed of members holding diverse knowledge and perspectives, are seen as a viable means to develop these ideas (Jackson, 1992; West, 2002). Although managerial practice seems to advocate minimizing the degree of external control these teams are subjected to (Egan, 2005, cf. Amabile, Conti, Coon, Lazenby, & Herron, 1996), there are a number of reasons why external feedback needs to be provided to teams periodically. First, their efforts need to be coordinated with the overarching goals of the organization. In addition, the limited supply of resources mandates that time, money, and support are invested strategically and devoted to the most promising ideas. Finally, research has stressed that managerial attention given through monitoring and feedback signals that a team's project is considered to be relevant (Sethi, Smith, & Park, 2001, 2002). Evaluative feedback is thus likely to represent a regular element of a team's creative process raising the question of when and how teams may use this evaluative information to their creative advantage.

One of the most basic dimensions of external feedback is its valence, or the extent to which an evaluated performance is signaled to meet or fail to meet a given standard. Research on the effect of external feedback on team-level creativity in general, and on the impact of feedback valence in particular, remains largely missing to date (see Ziller, Beringer, & Goodchilds, 1962 for an exception). This is problematic not only because many teams are likely to encounter feedback at some point throughout their creative work but also because there is reason to suggest that the observed effects of feedback on individuals' creativity (see Zhou, 2008 for an overview) may not fully generalize to the team level. Individual-level research points to the creative benefits of positive feedback and the advantageous motivational consequences it entails (e.g., Zhou, 1998, cf. Fodor & Greenier, 1995). In contrast, we contend that at the team level, the effect of feedback valence is less straightforward but instead contingent on the distribution of informational resources within a team and that different processes underlie these differential effects of positive and negative feedback.

More specifically, we argue that negative feedback will have a more positive effect on the subsequent creativity of informationally diverse teams due to its potential to

stimulate higher levels of reflection and strategizing (Mesch, Farh, & Podsakoff, 1994) and induce a more accommodative information processing style among team members (Bless & Fiedler, 2006). In conjunction, these effects may lead teams to engage in higher levels of information elaboration (van Knippenberg, De Dreu, & Homan, 2004; cf. Kooij-de Bode, van Knippenberg, & van Ginkel, 2010) – a team process that has recently been linked to increased team creativity (Hoever, van Knippenberg, van Ginkel, & Barkema, in press). In contrast, in informationally homogeneous teams, positive feedback is likely to be more beneficial as it may stimulate team members to use the information and perspectives they share more flexibly (Bless & Fiedler, 2006) and use this individual cognitive flexibility to stimulate the team's discussion.

Results from a large group experiment show that informational diversity moderates the effect of feedback valence on team creativity and that team information elaboration (as an indicator of a team's thorough exploration and use of the available information, van Knippenberg et al., 2004) and cognitive stimulation (as team-level manifestation of cognitive flexibility and divergent thinking) jointly mediate this moderated relationship (see Figure 4.1 for an overview of the model). These findings have a number of important theoretical implications. First, they suggest that when moving to the team level, there is value in broadening the range of mechanisms through which feedback is thought to exert its effects on creativity by amending the motivational accounts featuring prominently at the individual level with processes capturing the extent to which teams systematically explore their informational resources and use them flexibly. By showing the interplay of the motivational and affective consequences of feedback with team-level communication, we further add to research on creativity from a cognitive lens which current theorizing on creativity identifies as relatively understudied compared to motivational and affective accounts (Zhou & Shalley, 2010). Second, our results highlight the need to reconsider the assumption of largely homologous effects of feedback on the individual and the team level respectively (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004) for creative outcomes. Finally, by combining the literatures on feedback and team diversity and showing that the effect of this external intervention is contingent on the team's composition, our research provides a first indication that the effect of common formal interventions might differ for homogeneous and diverse teams.

Literature Review and Hypotheses

Team Creativity

In line with prior work on creativity, we define team creativity as the joint novelty and usefulness of an idea or plan concerning a product, service, or procedure (Amabile, 1996; Zhou & Shalley, 2010) developed by a group of people. This conceptualization is commonly used in research on workplace creativity but differs from the way creativity is conceptualized and measured within research on group brainstorming. The increasing complexity of the problems organizations face in conjunction with a trend towards more team-based ways of organizing work (Guzzo, 1996; Ilgen, 1999) means that creative work is frequently carried out in teams. In contrast to this acknowledged importance of team-based creative work, systematic knowledge on how teams perform creatively beyond the generation of initial ideas (see Paulus & Nijstad, 2003 for an overview) is only starting to develop (George, 2007).

Following earlier calls to expand our understanding of the factors affecting team creativity (George, 2007; Shalley, Zhou, & Oldham, 2004), research has started to systematically explore the impact of team characteristics and team processes on the teams' creative and innovative performance. This research has yielded important insights concerning the somewhat inconsistent role of team characteristics (e.g., composition, size, task interdependence) and pointed to the vital importance of team processes (see Hülsheger, Anderson, & Salgado, 2009 for a recent meta-analytic overview). However, creativity constitutes an inherently social phenomenon (Csikszentmihalyi, 1999) and in organizations, the creative efforts of teams are embedded in a larger context and need to be coordinated with regard to a broader set of objectives. This implies that teams may be faced with evaluative feedback concerning their creative performance as well as the less formal, more immediate evaluative reactions that creative ideas are frequently reported to evoke (Mainemelis, 2010; Mueller, Melwani, & Goncalo, 2012; Sutton & Hargadon, 1996). In sum, this raises the questions of how teams react to external feedback and how it affects their potential to perform creatively.

Figure 4.1: Research model (Study 3)
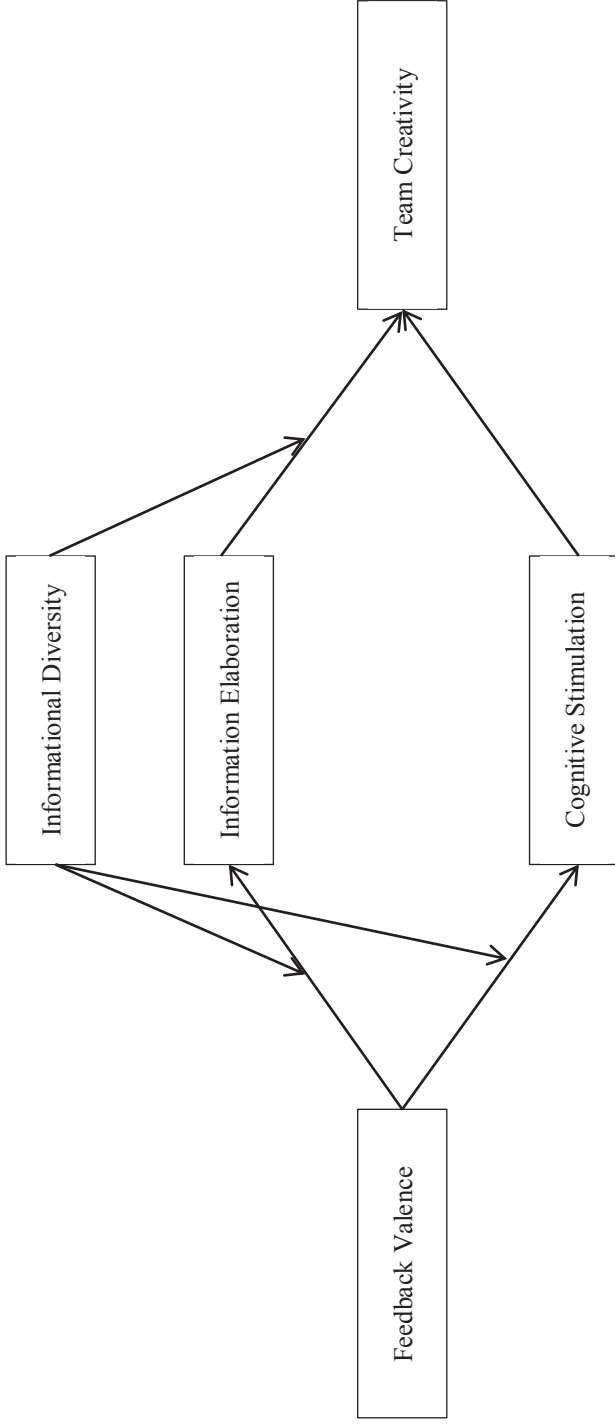
Note. Research model with the interaction between feedback valence and diversity, the mediating processes information elaboration and cognitive stimulation, and the outcome variable team creativity.

Team Creativity and Team Feedback

Broadly speaking, feedback is defined as information about an individual's or team's performance (Herold & Greller, 1977; Nadler, 1979), often in comparison or relation to a goal or performance standard (Frese & Zapf, 1994). Despite the ubiquity of feedback as a strategy to motivate and direct the behavior of organizational actors (Ilgen, Fisher, & Taylor, 1979), its impact on team creativity remains ill-understood. As a case in point, feedback receives no systematic attention in recent reviews of team creativity research (e.g., Kurtzberg & Amabile, 2001; Paulus, 2008; Paulus & Nijstad, 2003) or in the sections devoted to team creativity within general reviews on workplace creativity (e.g., George, 2007). This relative dearth of systematic research into the effects of feedback at the team level stands in contrast to a growing number of studies examining its effect on the creativity of individual actors (Zhou, 2008).

Even though feedback messages may differ on various dimensions, feedback valence or the positivity or negativity of the discrepancy between an assessed work product and the standards applied to judge it (Zhou, 1998; p. 262) represents one of the most basic characteristics of the feedback message. Research on feedback valence has yielded converging evidence for the benefits of positive feedback on creativity (Zhou, 1998); an effect which is accentuated when feedback is delivered in an informational style (Zhou, 1998), when situations enable creative behaviors (George & Zhou, 2001), and when an individual's personality or motivational predisposition heighten his or her propensity to react to this feedback (Fodor & Greenier, 1995; George & Zhou, 2001; Zhou, 1998). The benefits of positive feedback are argued to arise as a function of its motivational repercussions. Positive feedback is linked to increased perceptions of mastery and, if delivered in an informational style, foster a sense of self-determination (Zhou, 1998) which jointly feed into intrinsic motivation (Deci & Ryan, 1985). Intrinsic motivation, in turn, is considered an important antecedent of creativity (Amabile, 1996).

Despite the relatively consistent effects of feedback valence at the individual level of analysis, there are initial empirical accounts and theoretical considerations to suggest that these relationships are not fully homologous at the team level. Empirically, in one of the very few team-level studies speaking to this relationship, Ziller and colleagues (1962)

experimentally induced success or failure on a prior task and studied its single and joint effect with membership change on the teams' ability to generate original ideas during a subsequent task. Interestingly, although participants in the condition of prior task success reported greater task enjoyment (a frequent operationalization of intrinsic motivation), their findings showed neither a direct nor a moderated effect of prior success or failure on the groups' ideational fluency and originality (Ziller et al., 1962). These findings imply that the effects of feedback valence may be less direct at the team level and that the mechanisms underlying them may extend beyond the motivational underpinnings of positive and negative feedback.

Theoretically, work comparing the effects of individual- and team-level goal setting, feedback, and regulatory actions on team performance more generally contends that while there is a certain amount of homology of the observed relationships, differences between levels of analysis may arise as a result of team-level processes manifesting themselves in a qualitatively different manner through communication and coordination (DeShon et al., 2004, p. 1051). Interestingly, research on team creativity identifies these team-level processes of communication and coordination as antecedents of prime importance. For example information elaboration, capturing the extent to which team members fully share, individually process, discuss the implications of, and integrate their task-relevant knowledge and perspectives is deemed particularly vital for tasks requiring creative and innovative solutions (van Knippenberg et al., 2004). Likewise, task conflict (Jehn, 1995) is argued to represent a viable precursor of team-level creative synergy due to its potential to foster a more thorough debate of the alternative options (Kurtzberg & Amabile, 2001). In a similar vein, information sharing (Milliken, Bartel, & Kurtzberg, 2003), participative decision making (West, 2002), or knowledge-integration capability (Gardner, Gino, & Staats, 2012) have been presented as vital antecedents for high creativity and performance. Conversely, studies focusing on the mediating role of motivational mechanisms such as collective efficacy beliefs theoretically explain their effect in part through the impact these have on team information processing mechanisms (e.g., Shin & Zhou, 2007).

The Effects of Feedback Valence on Teams and their Members

This widely acknowledge key role of team information processing mechanisms for team creativity implies that an important step in narrowing the gap in our understanding of the effect of feedback valence on team creativity is to analyze its impact on how team's use and process information. Although not studied with regard to team creativity, prior research suggests that positive and negative feedback respectively have distinct impacts on team processes and the propensity of teams to revise them as well as the way team members process their information with distinct consequences for team information processing.

Strategizing and changes in group processes. Receiving information about the team's prior performance has been found to affect how favorably members interpret their group processes retrospectively (Staw, 1975; cf. Peterson & Behfar, 2003). In contrast to groups receiving (bogus) positive performance feedback, members of teams receiving negative feedback report not only lower task enjoyment and motivation but also lower levels of group cohesiveness, communication quality, and open idea exchange (Staw, 1975). The perceived discrepancy between team performance and goals or performance standards has further been argued (Weldon & Weingart, 1993) and found (Mesch et al., 1994) to lead to increased strategizing, effort, and more ambitious goals for teams receiving negative performance feedback compared to those receiving positive feedback. This research, together with other work stressing the cueing function of feedback more generally (Earley, Northcraft, Lee, & Lituchy, 1990) thus suggests that negative feedback has a higher likelihood to stimulate teams to reflect upon their group processes and adapt their strategy whereas positive feedback is more likely to reinforce existing group processes and entail stable levels of effort (Mesch et al., 1994).

Information processing. Although the occurrence rather than the nature of the changes in a team's strategy following negative feedback are targeted by the aforementioned literature, a different stream of research suggests that these changes may in part pertain to the way in which teams and their members process their available information and perspectives. With regard to the effects of performance feedback specifically, individual-level research analyzing the verbal protocols of decision makers on subsequent tasks show that participants receiving negative (as opposed to positive)

feedback not only change their decision style but also more carefully evaluate their task and resources, and rely less on pre-existing scripts and more on strategies incorporating the specifics of the objects and events at hand (Wofford & Goodwin, 1990).

Related insights may be gained from the broad body of literature focusing on the interplay of affect and cognition as positive and negative mood is likely to arise as a function of positive and negative feedback (see Westermann, Spies, Stahl, & Hesse, 1996 for a review on feedback as a tool for experimental mood induction). This literature highlights the distinct consequences of positive and negative affect on individuals' information processing styles (see Bless & Fiedler, 2006, or Forgas, 2008 for overviews). Negative mood, according to this research, evokes what Bless and Fiedler (2006) label an accommodative information processing style which is characterized by a higher attention to external information and more inductive, bottom-up processing. This data-driven processing style manifests itself in a more systematic analysis of the presented information (e.g., Bohner, Bless, Schwarz, & Strack, 1988; Bohner, Moskowitz, & Chaiken, 1995), a higher vigilance towards external information, and a more specific and contextualized focus (Bless, Mackie, & Schwarz, 1992). Conversely, positive affective states are linked to an assimilative information processing style marked by a tendency to impose internal knowledge structures onto the environment (Bless & Fiedler, 2006). In line with this outlined general tendency, individuals in a positive mood have been found to engage in more heuristic information processing (Ruder & Bless, 2003), rely on broader, more abstract categories (Bless et al., 1992), and show less regard for external constraints and norms (e.g., Forgas, 1999). Importantly, with regard to creativity, positive moods have also been linked to increased cognitive flexibility (Estrada, Isen, & Young, 1994) and creativity on ideation but not on creative problem solving tasks (for a meta-analytic overview see Davis, 2009).

The outlined differential effects of feedback valence on team processes and individual-level information processing styles suggests two important additional routes through which feedback may affect creativity in teams in addition to and conjunction with its motivational effects. Moreover, the discussed effects seem to speak against a consistent direct effect of feedback valence such that one type of feedback is inherently more suited to stimulate higher team creativity. Instead, we argue that the benefits of the outlined

effects are contingent on the characteristics of the team as the feedback recipient.

The Moderating Role of Informational Diversity

The aforementioned importance of team information processing mechanisms for team creativity and the outlined potential of positive and negative feedback to affect team processes and individual information processing respectively, points to the distribution of informational resources between team members as a crucial factor which shapes whether the benefits of one type of feedback outweigh its potential costs. The extent to which team members differ in the viewpoints and knowledge they hold is captured by the concept of diversity. Although some authors designate certain diversity types (e.g., variety, Harrison & Klein, 2007) or groups of diversity attributes (e.g., task-related diversity covering attributes such as functional or educational background diversity; Jackson, 1992) as reliable indicators of these cognitive differences, we follow an alternative approach which argues that the extent to which diversity equips team members with differences in task-relevant knowledge and perspectives is a function of both the diversity attribute(s) and the task at hand (van Knippenberg et al., 2004; also see Calvard & Hoever, 2012). Echoing more recent work (Hoever et al., in press), we thus focus on the existence of differences between team members' task-relevant knowledge and perspectives as the more proximal indicator of the distribution of a team's informational resources rather than on a specific diversity attribute (such as ethnicity or educational background). In the present study, we argue that this distribution of task-relevant knowledge and perspectives is an important contingency factor shaping the effect of feedback valence on subsequent team creativity.

More specifically, we propose that when team members differ in their task-relevant knowledge and perspectives, negative feedback may lead to higher creativity compared to positive feedback. Team creativity requires members to combine and integrate different viewpoints and information (Kurtzberg & Amabile, 2001) yet research on distributed information (Wittenbaum, Hollingshead, & Botero, 2004) and information elaboration (e.g., van Ginkel & van Knippenberg, 2008, 2009) indicates that teams do not always use their information optimally. Negative feedback may help teams to more fully use their informational resources by promoting strategizing and reflection (Mesch et al., 1994) which in turn might lead members to develop a better understanding of the

informational requirements of their task (van Ginkel, Tindale, & van Knippenberg, 2009).

Additionally, as the team is the most immediate context in which team member cognition unfolds, the more accommodative, externally focused information processing style that may result from negative feedback (Wofford & Goodwin, 1990; cf. Bless & Fiedler, 2006) should increase the likelihood that members both mention and carefully process the information and viewpoints their teammates contribute. This careful processing of each other's input is an integral component of information elaboration, an important precursor of team creativity (Hoever et al., in press). Interestingly, parallel to our argument for why negative feedback should exert this effect, higher levels of elaboration have recently been observed in teams with high trait negative affect (Kooij-de Bode et al., 2010; van Knippenberg, Kooij-de Bode, & van Ginkel, 2010).

In contrast, when receiving positive feedback, teams in which members hold diverse knowledge and perspectives are less likely to systematically explore the informational resources available to them. The more assimilative information processing style likely to be induced by positive feedback results in a more inward-directed cognitive focus (Bless & Fiedler, 2006). Although this information processing style is associated with greater individual ideational creativity and cognitive flexibility (Davis, 2009), these benefits are likely to be limited when applied to a more restricted range of individual information and perspectives and harder to integrate into a collective solution within a team with members holding diverse information and perspectives (cf. Taggar, 2001). Furthermore, this information processing style reduces the likelihood that information and perspectives provided by other team members are fully elaborated. In sum, this implies that negative feedback may have a more positive effect on the creativity of informationally diverse teams than positive feedback.

Conversely, in homogeneous teams, positive feedback is likely to lead to higher creativity compared to negative feedback. In contrast to the situation outlined for diverse teams, negative feedback is less likely to be associated with the aforementioned benefits in terms of a more systematic exploration and use of a team's informational resources. Although negative feedback may well stimulate teams to consider alternative strategies, the initial sharedness of information and perspectives renders a more systematic use of these resources an unviable strategy for the team to resort to. Likewise a more externally

focused, accommodative information processing style is less likely to yield new insights when occurring in a team in which members largely overlap in their information and viewpoints. Positive feedback, in contrast, is not only likely to increase the members' enjoyment of the task (Ziller et al., 1962) but also induce a more assimilative information processing style marked by higher cognitive flexibility. Compared to homogeneous teams receiving negative feedback, this may allow members of homogeneous teams to use their available information more flexibly and contribute more unconventional ideas to a team's discussion. Moreover, in homogeneous teams, these ideas are formed on the basis of a pool of shared information and viewpoints, making it easier for teams to relate to and integrate them into a final plan (cf. Taggar, 2001) and reacting to them favorably. A positive reaction, in turn, is likely to foster the future sharing of divergent ideas or new directions for the team's discussion. Taken together, we propose that the relative merit of positive and negative performance feedback for subsequent creative performance is contingent on the distribution of informational resources within a team.

> *Hypothesis 1:* Diversity moderates the effect of feedback valence on team creativity such that negative feedback has a more positive effect on team creativity in diverse teams and positive feedback has a more positive effect on team creativity in homogeneous teams.

Differential Team Processes Underlying the Differential Effects of Feedback Valence

Our reasoning for the more positive effect of negative feedback on the creativity of diverse teams focuses on the consequences of negative feedback for team information processing. More specifically, we propose that negative feedback elicits higher levels of information elaboration in diverse teams than positive feedback. Elaboration is defined as the sharing, individual level processing, joint discussion, and integration of task-relevant knowledge and perspectives within a team (van Knippenberg et al., 2004). Negative feedback is likely to stimulate a search for alternative strategies and means to improve a team's (creative) performance (Mesch et al., 1994), which may include a review of the informational resources within a team to facilitate the sharing of unshared information and viewpoints. In line with this argument, team-level reflection has been found to foster a more accurate and shared understanding of the task and its informational requirements and

in turn higher levels of information elaboration (van Ginkel et al., 2009). Moreover, the more outward-orientated cognitive focus resulting from negative feedback entails an increased attention to new information provided by team members and fosters a more thorough processing of their input (cf. Kooij-de Bode et al., 2010). This in turn increases the likelihood that team members discover opportunities to integrate their diverse information and perspectives. In sum, in diverse teams, negative feedback has the potential to elicit the full range of sub-processes that jointly define information elaboration. In contrast, positive feedback is more likely to signal to teams that no change in strategy is needed (Mesch et al., 1994) and reduce the likelihood that teams seek out additional resources. Combined with the likely effects of positive feedback in terms of a more assimilative information processing style, this means that when receiving positive feedback, diverse teams are less likely to fully share, individually process, discuss, and integrate their task-relevant information and viewpoints.

In homogeneous teams, in turn, negative feedback is unlikely to be equally beneficial. Teams with shared information and perspectives are left with fewer resources to draw upon in an attempt to increase their creativity. Negative feedback is unlikely to yield increased effort if the recipient does not perceive to possess the resources to improve the performance (Ilgen & Davis, 2000). Increased strategizing and reflection may thus have the paradoxical effect of reducing the discussion of shared information and making teams realize the limits of their informational resources and thus their perceived ability to improve their creative performance. These lower efficacy beliefs, in turn, are likely to reduce the expended effort and information elaboration. Conversely, the positive affect resulting from positive feedback is likely to lead team members to engage with the available information in a more flexible manner and view it in a broader context (Bless & Fiedler, 2006). Taken together that means that negative feedback is likely to have a more positive effect on team information elaboration in diverse as opposed to homogeneous teams. Accordingly, we propose:

Hypothesis 2a: Diversity moderates the effect of feedback valence on information elaboration such that negative feedback (as compared to positive feedback) has a more positive effect on elaboration in diverse teams than in homogeneous teams.

We further argue that increased information elaboration in diverse teams

following negative feedback is the key mechanism underlying the proposed beneficial effect of negative feedback under these conditions. This proposition is based on prior research indicating the mediating role of elaboration of positive diversity effects on team creativity (Hoever et al., in press) and related team outcomes including team performance (Homan et al., 2008; Homan, van Knippenberg, van Kleef, & De Dreu, 2007; Kearney, Gebert, & Voelpel, 2009; Kearney & Gebert, 2009) and decision making (van Ginkel & van Knippenberg, 2008, 2009).

> *Hypothesis 2b:* Information elaboration mediates in the joint effect of feedback valence and diversity on team creativity.

Although elaboration is clearly unlikely to be detrimental in more homogeneous teams, there are a number of considerations that support the idea that elaboration may be less vital to realizing high creativity in teams in which members' information and viewpoints largely overlap. The main reason to assume a higher benefit of elaboration on team creativity in diverse teams lies in the need for these teams to communicate and jointly discuss their information and perspectives so as to ensure its consideration and integration for the team output. In homogeneous teams, in which information and perspectives are mostly shared, the pool of information available to team members substantially overlaps with the information available to the team as a whole enabling individuals to fully use their team's informational resources by means of individual cognition and without necessarily elaborating on it fully as a team (see Homan et al., 2007 for a similar reasoning and findings). Accordingly, we propose:

> *Hypothesis 2c:* Diversity moderates the indirect effect of feedback valence on creativity through elaboration such that information elaboration has a more positive effect on team creativity in diverse teams than in homogeneous teams.

In contrast to the proposed mediating role of elaboration as a process capturing the degree to which teams fully and systematically explore their task-relevant information and perspectives, we propose that the positive effect of feedback valence for homogeneous teams is mainly attributable to its potential to elicit cognitive stimulation within these teams. We use the term cognitive stimulation to denote team member statements designed to change the direction of the discussion or infuse seemingly task-unrelated information into the team's discussion. Cognitive stimulation can be seen as a team-level manifestation

of divergent thinking (Guilford, 1967), lateral thinking (De Bono, 1969), or cognitive flexibility (Nijstad, De Dreu, Rietzschel, & Baas, 2010). These thinking styles are considered important individual-level antecedents of creativity (e.g., Taggar, 2002; Woodman, Sawyer, & Griffin, 1993). When verbalized at the team level, they have the potential to redirect a team's discussion in more remote and less predictable ways and draw attention to seemingly tangential information. Examples of cognitive stimulation in teams include team members drawing analogies or parallels from unrelated contexts, going off on a tangent instead of following the discussion's linear progression, or thinking aloud about half-baked ideas. Cognitive stimulation thus requires team members to engage in individual divergent thinking and to verbalize this process or its outcome.

We propose that positive feedback, through its impact on positive affect, has the potential to foster higher levels of cognitive flexibility among the individual members of a team. More specifically, a more assimilative information processing style characterized by a use of broader, more flexible categories may help members to see parallels between the context of the task and other contexts (Bless & Fiedler, 2006; Estrada et al., 1994). This application of formerly task-unrelated knowledge has been linked to collective creativity (Hargadon & Bechky, 2006). Likewise, team members may exhibit higher cognitive flexibility in reacting to the input of others and use it as a trigger to lead the discussion off on a tangent. And finally, positive feedback may lead team members to be more willing to share half-baked ideas (Williams, 2002; cf. Grawitch, Munz, Elliot, & Mathis, 2003), the merit of which might not be readily obvious but which can, with further refinement, add value to a team's ideas.

Whereas positive feedback is likely to have comparable effects on positive affect in diverse and homogeneous teams, there are arguments indicating that the effects of positive affect on cognitive stimulation are not as sustained for diverse teams as they are for homogeneous teams. First, team members' readiness to share the results of divergent thinking within the team hinges in part on the way prior attempts at cognitive stimulation are received by their teammates. Whereas more positive and constructive reactions have the potential to encourage the future occurrence, negative reactions to, destructive criticism of, or ignoring team members' input may inhibit future cognitive stimulation and impair communication between team members (cf. Baron, 1988). For teams with less of a

common ground in terms of information and perspectives, making sense of and seeing the value in the suggestions of others is relatively more difficult (cf. Taggar, 2001) and thus comparatively less likely. Second, as diverse teams receiving positive feedback might not fully elaborate on their information and perspectives, they might forego the opportunity to create an optimal knowledge base for divergent thinking and cognitive stimulation. Together, this suggests that although positive feedback has a stronger and more lasting effect on cognitive stimulation in homogeneous as opposed to diverse teams. To the extent that it does occur, however, cognitive stimulation may provide valuable insights and opportunities for diverse and homogenous teams alike. Accordingly, we propose:

> *Hypothesis 3a:* Diversity moderates the effect of feedback valence on cognitive stimulation such that positive feedback has a more positive effect on cognitive stimulation in homogeneous teams than in diverse teams.

> *Hypothesis 3b:* Cognitive stimulation mediates in the joint effect between feedback valence and diversity on team creativity.

Finally, although both elaboration and cognitive stimulation describe a team's communication behavior, they capture different aspects of a team's information processing style and use. In a nutshell, elaboration pertains to a team's use of the information and perspectives that have a bearing on the task and is chiefly concerned with the systematic processing and evaluation of this information (van Knippenberg et al., 2004). In contrast, cognitive stimulation, at its core, involves the activation of information or viewpoints that are per definition not directly relevant for the task or the relevance of which is not immediately obvious. Moreover, cognitive stimulation is characterized as a process that disrupts the systematic and sequential sharing and discussion of information to redirect a team's discussion in a new direction.

This is not to say that the two processes are completely unrelated. Rather, it is conceivable that information elaboration may follow cognitive stimulation in an attempt to integrate or make sense of the unexpected content or direction. Conversely, especially when elaboration involves sharing and attending to unique, previously unshared information it may serve as a trigger for cognitive flexibility (Brown & Paulus, 2002; cf. De Dreu & West, 2001) which may form the basis for cognitive stimulation. Yet despite their potential relation, based on the outlined differences we propose that elaboration and

cognitive stimulation jointly mediate in the interactive effect of diversity and feedback valence such that negative feedback has a more positive effect on the creativity of diverse teams than positive feedback through elaboration whereas positive feedback has a more positive effect on the creativity of homogeneous teams than negative feedback through cognitive stimulation.

Method

Design and Participants

We tested our hypotheses using an experimental procedure so as to be able to draw inferences about the causal nature of the observed relationships. The experiment followed a 2 (diversity: diverse vs. homogeneous) x 2 (feedback valence: positive vs. negative) design with both factors manipulated as between-group factors. 234 students (49.6 % female, mean age: 20.88, $SD = 2.11$) from a Dutch university were assigned to 78 three-person teams which were randomly assigned to one of the four experimental conditions. The majority of participants were students of business administration (80.3%) or economics (6.0%). Students received either 10 euro (about 14 USD) or partial course credit for their participation. We video-taped all teams to allow for a behavioral observation of the proposed mediating mechanisms. The original sample contained 79 teams, but one team was excluded because a review of the video-recording indicated that they failed to follow the instructions. In addition, due to technical problems, the video-data for one team was missing reducing the sample size for all analyses involving video-coded measures to 77 teams. Since there is no reason to suspect that this team behaved differently than the other teams, we included their data in the analyses where possible.

Experimental Task

The task was designed to observe teams while they develop a joint creative plan. Task materials including role descriptions, information about the theater, and task instructions were inspired by a group exercise unrelated to creativity (Windy City Theater Exercise, Thompson & Bloniarz, 1996) and adapted in prior work to form a team creativity task (see Hoever et al., in press). As part of the adapted task, team members are asked to take on the roles of the members of a management team of a large theater. Together, they

are in charge of developing a creative action plan to improve the theater's position. To prepare for this task, participants first individually study role instructions and information regarding the theater (e.g., a schedule of plays, a location plan, a floor plan). At the end of this individual phase, they answer two open questions concerning a) what they consider particularly important to achieve during the team task and b) their initial ideas. For the subsequent team task, they are instructed to develop a maximally creative action plan for the theater and provided with a standard definition of creativity as the joint novelty and usefulness of an idea. Moreover, given our interest in creativity beyond the initial idea generation, we explicitly asked teams to develop one final, integrated plan and not a list of different, unconnected ideas. As further motivation, monetary rewards were given to the teams with the most creative action plans.

Experimental Manipulations

Diversity. We used functional role instructions paired with partially unshared information to manipulate diversity in line with our definition of it as a team characteristic denoting the existence of differences between members in the way they view the task and the task-relevant information they possess. In the diverse condition, members were assigned the roles of the Artistic, Event, and Finance Manager respectively. The descriptions of each managerial role in the diverse condition highlighted different aspects of the solution that were important for the respective manager and stressed that team members should ensure that these aspects were realized in the final plan. Whereas the Artistic Director had to ensure high creative reputation, the Event Manager was concerned with high service levels and community involvement, and the Finance Manager had to pay special attention to financial performance.

In addition to the description of their managerial roles, participants received information about the theater. In part, this information was fully shared across conditions (all members received the location plan and information containing the theater's target customers). Other information was unshared in the diverse condition but available to all members of homogeneous teams. This included a calendar of plays (Artistic Director), information on ticket sales, prices, and revenues (Financial Manager), and a floor plan detailing the facilities of the theater (Event Manager). As such, our manipulation closely

resembles the notion of functional assignment diversity in the sense that different viewpoints and information arise from distinct functional accountabilities rather than from experience (Bunderson & Sutcliffe, 2002).

This manipulation focuses on the distribution of different role-related perspectives and information between team members. In practice, these distributional differences may accrue to a broader range of perspectives at the team level. With an experimental manipulation we have the chance to avoid a potential confound of the distribution of differences with differences in the amount or range of perspectives and information available to a team. Realizing this opportunity, comparable previous studies on informational diversity and distributed information (e.g., Homan et al., 2007; Stasser & Titus, 1985) provided teams with equal amounts of information across conditions but manipulated its distribution within teams. As a consequence of this manipulation, members of homogeneous teams have more information and perspectives at their individual disposal than members of diverse teams. Parallel to this, we decided to keep the amount of information and perspectives constant at the team level. Hence, in order to avoid a potential confound of the diverse teams having a clearer picture of the desired solution, the homogeneous role contained the information and perspectives from all three diverse roles.

Feedback valence. Feedback valence was manipulated by means of a feedback sheet that teams received midway through the task (for a similar procedure see Zhou, 1998). The feedback sheet was a printed form containing information on how novel, useful, and overall creative the team's initial ideas were compared to the ideas other teams had developed in a previous study. For each dimension, the sheet listed a blank space in which the experimenter entered a percentage corresponding to the percentile rank a team ostensibly obtained with their initial ideas. When collecting the initial ideas, the experimenter informed the participants that their ideas would be compared to the ideas from a prior study which had already been rated by experts for their novelty, usefulness, and creativity so as to provide teams with an indication of how creative their ideas were in comparison.

In the negative feedback condition, the experimenter indicated that the ideas of the team were more novel than the ideas of 20%, more useful than 30%, and on average more creative than 25% of the ideas developed by the teams in the previous study.

Conversely, teams receiving positive feedback were given a feedback sheet that indicated that their ideas were more novel than 70%, more useful than 80%, and overall more creative than 75% of the ideas developed by the teams in the previous studies. The slightly different values for novelty, usefulness, and creativity were chosen so as to avoid making the feedback overly unrealistic. In line with prior work, the feedback information was bogus and did not result from an actual comparison of their ideas to the ideas of other teams (e.g., Zhou, 1998; Woodford & Goodwin, 1990).

Measures

Creativity. Based on earlier research, we defined creativity as the joint novelty and usefulness of an idea or plan (Zhou & Shalley, 2010). In line with this definition's focus on joint novelty and usefulness (which indicates that ideas which are highly novel or highly useful but not at all useful or novel are not considered creative), we used the product of novelty and usefulness as an overall indicator of creativity. More specifically, since plans may consist of one or multiple interrelated ideas, we separated each plan into its constituent ideas. One coder coded each idea separately for novelty and usefulness on a seven-point scale ranging from "1 = not novel/useful at all" to "7 = very novel/useful" respectively. Given the somewhat stakeholder-dependent nature of usefulness judgments (George, 2007; see Csikszentmihalyi, 1999, for a discussion of creativity as a social phenomenon rather than the invariant quality of an object), it is important to clarify what usefulness entails in a given context. Within the setting of the chosen task, the coder assessed usefulness as the degree to which a given idea addressed each of the three main goals included in the instructions across conditions (i.e., creative reputation, financial performance, community involvement and service levels). For each idea, we then calculated its overall creativity as the product of its novelty and usefulness. This indicator was then averaged across all ideas that comprised a team's plan.

Information elaboration. Information elaboration was coded from the videos in different random order. Elaboration is conceptualized as a team process without any direct individual-level equivalent and was therefore assessed at the team level. One coder indicated the degree to which teams jointly engaged in the set of interrelated sub-processes that jointly define elaboration on a seven-point scale with specific anchors for each scale

point (see the Appendix for a detailed description of the scale). We used a scale adapted from van Ginkel and van Knippenberg (2008) who used it to code elaboration in teams working on a hidden-profile task. The changes made in the adapted version served to make the scale viable for a task without a demonstrably correct answer and a situation in which different pieces of information are not per se more or less critical in identifying a viable solution.

In line with the definition of elaboration as the extent to which members share, individually process, jointly discuss, and integrate their task relevant information and perspectives (van Knippenberg et al., 2004), the different scale levels detailed to which degree some or all members mentioned different perspectives and information, whether other teammates acknowledged this, whether different perspectives and information were discussed and used to build on each other's suggestions, and whether teams tried to integrate the perspectives and information. A value of 1 was given to teams that directly began to develop ideas with little or no systematic discussion of the different perspectives and information. A score of 7 was assigned to teams in which all perspectives and information fully discussed by its members, different information and perspectives were used to build on each other's suggestions, and team members attempted to integrate different information and perspectives. The measure thus assessed to which extent teams engaged in all the consecutive processes detailed in the elaboration concept and assigned the highest score to teams showing the full range of the interrelated sub-processes. Prior research using this coding scheme indicates that it allows for a reliable assessment of information elaboration (Hoever et al., in press; cf. van Ginkel & van Knippenberg, 2008; 2009).

Cognitive stimulation. Cognitive stimulation was assessed at the team level as the frequency of statements that were indicative or verbalizations of divergent thinking. In particular, the videos were coded for the occurrence of three types of statements. The first involved team members drawing parallels between the task's setting of a theater and other contexts to devise or frame ideas. Examples statements included the suggestion of service buttons like those found in airplanes or the production of a series of interrelated plays like multiple episodes of a TV-series. The second comprised participants verbalizing their idea generation process by thinking aloud and sharing half-baked ideas. Finally, we coded

statements in which members took a previous utterance out of context and moved the discussion off on a tangent. One coder noted the frequency of each of these behaviors which were summed to obtain an aggregated indicator.

Manipulation check diversity. Our manipulation of diversity focused on the distribution of information and perspectives within a team such that in diverse teams, members differed in their perspectives and with regard to the information they possess. Whereas the aspect of the manipulation targeting the differences in information between team members is straightforward in the sense that we could experimentally control which information team members received, it is important to ascertain that members adopted their given perspectives and that these perspectives indeed differed more between members of diverse as opposed to homogeneous teams. To assess the heterogeneity of perspectives in the diverse and homogeneous conditions, we coded the team members' individual answers to the open question of what they considered particularly important for the team task with regard to whether these statements contained aspects of the perspectives of the Artistic, Event, and Finance Manager respectively. For each of these aspects, we calculated Blau's coefficient of heterogeneity as an indicator of the degree to which team members differed in their endorsement of each of the three aspects. To form an overall team-level measure, we averaged the three Blau coefficients for each team. Higher values on this index reflect higher levels of heterogeneity between members' perspectives.

Manipulation check feedback valence. In order to test the effectiveness of the feedback valence manipulation, we asked participants to respond to an eight-item scale assessing the extent to which members perceived their team's initial ideas as novel, useful, and overall creative relative to the ideas developed by other teams. The scale consisted of items used in previous studies employing similar manipulations at the individual level (see Zhou, 1998) but were adapted to the team context and appended to cover the different aspects of creativity teams received feedback on. Example items included "compared to other groups performing this task, our initial solutions were very creative" and answers were recorded on a five-point scale from "1 = not at all" to "5 = very much". The items formed a scale of high internal consistency ($\alpha = .95$) and members showed high levels of aggregate consistency ($\alpha = .97$), agreement (mean $r_{wg} = .96$) and reliability ($ICC(1) = .77$; $ICC(2) = .91$), in their assessment of the perceived quality of their initial ideas. This is in

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line with the intended team-level nature of the manipulation and justifies aggregating individual responses to the team level (Bliese, 2000).

Procedure

Upon arriving at the laboratory, participants were assigned to their teams, told that they were taking part in a study on how teams develop creative ideas, and informed about their task. They were further told that this study looked at the impact of feedback given on individual versus team ideas on the creative performance of the teams. In fact, all teams received feedback on the team's but not on the individual ideas. This cover story was adopted to provide participants with a rationale for the feedback procedure that did not involve revealing the actual nature of the manipulation. During a first initial phase, participants individually reviewed a set of written instructions. These included the general instructions for the team task, their managerial role, and information about the theater. To ensure that participants studied the material carefully and to support the aforementioned cover story, they were asked to individually answer what they (a) considered particularly important to achieve for the team task and to (b) write down their initial ideas for the team task. After 20 minutes, the experimenter asked them to work on the team task during which they needed to develop a team action plan for the theater. They were informed that they would have about 30 minutes to develop their plan but that the experimenter would collect their ideas after a third of the allotted time was over and asked to record their ideas for the plan on an answer sheet so that the experimenter could provide them with feedback. When the experimenter collected these ideas, teams were provided with a piece of scrap-paper and asked to continue working on the task while the experimenter checked these ideas. After 7 minutes the experimenter returned and provided the teams with the feedback sheet, the sheet with the initial ideas, and a form for the team to record their final plan on. Teams were asked to jointly review the feedback and to come up with a final action plan that was as creative as they could make it and constituted one, integrative plan. After receiving the feedback, teams were able to work on their plan for another 15 minutes at the end of which the experimenter collected the final answer sheet. The final part of the study comprised a brief post-experimental survey containing the manipulation check for feedback valence, socio-demographic questions, and some additional measures.

Experimental sessions lasted one hour at the end of which the experimenter debriefed and thanked participants and paid them or awarded their course credit.

Results

Descriptive Statistics and Correlations

Table 4.1 displays the descriptive statistics and correlations for all variables. Both of the proposed mediators elaboration ($r = .56$, $p < .001$) and cognitive stimulation ($r = .57$, $p < .001$) were significantly and positively correlated with team creativity. Moreover, both processes were significantly correlated with each other ($r = .52$, $p < .001$). In order to test the predicted joint effect of our manipulated factors on team creativity (Hypothesis 1), elaboration (Hypothesis 2a), and cognitive stimulation (Hypothesis 3a) we conducted three analyses of variance. For all hypotheses involving indirect and conditional indirect effects, we relied on a procedure outlined by Hayes (2012) and used his macro to estimate the multiple moderated mediation model. Following his suggestions, we mean-centered the mediators and relied on bias-corrected bootstrapped confidence intervals to assess the magnitude of the indirect effects. Both diversity and feedback valence were entered as dummy-coded variables with the homogeneous and the negative feedback condition serving as the zero-coded reference categories.

Manipulation Checks

Feedback valence. We conducted an analysis of variance testing for the single and joint effect of our feedback valence and diversity manipulations on the team-level reported perceived quality of the team's initial solutions. In line with the intended effect of the manipulation, this analysis yielded a significant main effect of our feedback valence manipulation as the only significant effect ($F(1, 74) = 640.39$; $p < .001$, $\eta^2_{partial} = .89$) with teams in the positive feedback condition reporting significantly higher values ($M = 4.06$, $SD = 0.26$) than in the negative feedback condition ($M = 2.26$, $SD = 0.36$). Neither the main effect for diversity ($F(1, 74) = 1.56$; $p = .22$) nor the interaction between diversity and feedback valence ($F < 1$) reached statistical significance. These results point to a successful manipulation of feedback valence.

Table 4.1: Descriptive statistics and correlations (Study 3)

	Mean	SD	1	2	3	4	5	6
1. Diversity	0.47	0.50						
2. Feedback valence	0.51	0.50	-.05					
3. Feedback valence manipulation check	3.18	0.95	-.09	.94**				
4. Diversity manipulation check	0.30	0.16	.78**	.04	.02			
5. Information elaboration	3.37	1.14	.22	-.06	-.12	.17		
6. Cognitive stimulation	2.63	2.07	.01	.02	-.03	.10	.52**	
7. Team creativity	14.98	7.12	.15	.13	.05	.24*	.56**	.57**

Note. Diversity and feedback valence are dummy-coded variables (0 = homogeneous; 0 = negative). All correlations are reported at the team level.
* $p < .05$ ** $p < .01$.

Diversity. We subjected the average Blau's index of the heterogeneity with which the members of each team endorsed the three different perspectives to an analysis of variance testing for the effect of feedback valence, diversity, and their interaction. In line with the manipulation's intended effect, there was a significant main effect of diversity with diverse teams exhibiting significantly higher degrees of heterogeneity ($M = 0.43$, $SD = 0.03$) than homogeneous teams ($M = 0.19$, $SD = 0.13$, $F (1, 74) = 114.15$, $p < .001$, $\eta^2_{partial} = .61$). Neither the main effect of feedback valence nor the interaction effect attained statistical significance (both $F < 1$). This pattern of a main effect of diversity as the only significant effect also held for each of the Blau coefficients corresponding to each of the respective goal aspects. This suggests that our diversity manipulation not only equipped members of diverse teams with diverse information but also succeeded in inducing more diverse viewpoints as compared to homogeneous teams.

Test of Hypotheses

The effect of feedback valence and informational diversity on team creativity. To test the proposed differential effect of feedback valence on the creativity of homogeneous and diverse teams, we conducted an analysis of variance testing for the single and joint effect of feedback valence and diversity on the rated creativity of the team's action plans. The results indicated that on average, diverse teams ($M = 16.09$, $SD = 6.77$) did not produce significantly more or less creative plans than homogeneous teams ($M = 13.98$, $SD = 7.37$; $F (1, 74) = 2.77$, $p = .10$). Likewise, teams did not differ systematically in the creativity of their final plan as a function of the valence of the feedback they received on their initial ideas ($F (1, 74) = 1.31$, $p = .26$). Teams receiving negative feedback ($M = 14.04$, $SD = 6.59$) produced plans of comparable creativity as teams receiving positive feedback ($M = 15.88$, $SD = 7.57$). The analysis further yielded a significant interaction between feedback and diversity ($F (1, 74) = 23.03$; $p < .001$; $\eta^2_{partial} = .24$). Planned contrasts revealed that as predicted, there was a negative simple main effect of feedback valence in the diverse condition with diverse teams receiving negative feedback devising more creative action plans ($M = 18.60$, $SD = 6.26$) than diverse teams receiving positive feedback ($M = 13.44$, $SD = 6.41$; $F (1, 74) = 6.37$, $p = .01$,

$\eta^2_{partial} = .08$). Conversely, in the homogeneous condition, there was a positive simple main effect of feedback valence with homogeneous teams receiving positive feedback developing significantly more creative final plans ($M = 17.87$, $SD = 7.99$) than those receiving negative feedback ($M = 9.48$, $SD = 2.50$; $F (1, 74) = 18.57$, $p < .001$, $\eta^2_{partial} = .20$). Additionally, there was a significant positive simple main effect of diversity in the negative feedback condition ($F (1, 74) = 20.46$, $p < .001$, $\eta^2_{partial} = .22$) and a negative simple main effect of diversity in the positive feedback condition ($F (1, 74) = 5.02$, $p = .03$, $\eta^2_{partial} = .06$). The significant interaction between feedback valence and diversity as well as the specific pattern of simple main effects (see Figure 4.2) support Hypothesis 1.

Figure 4.2: Interaction between feedback valence and informational diversity on team creativity (Study 3)
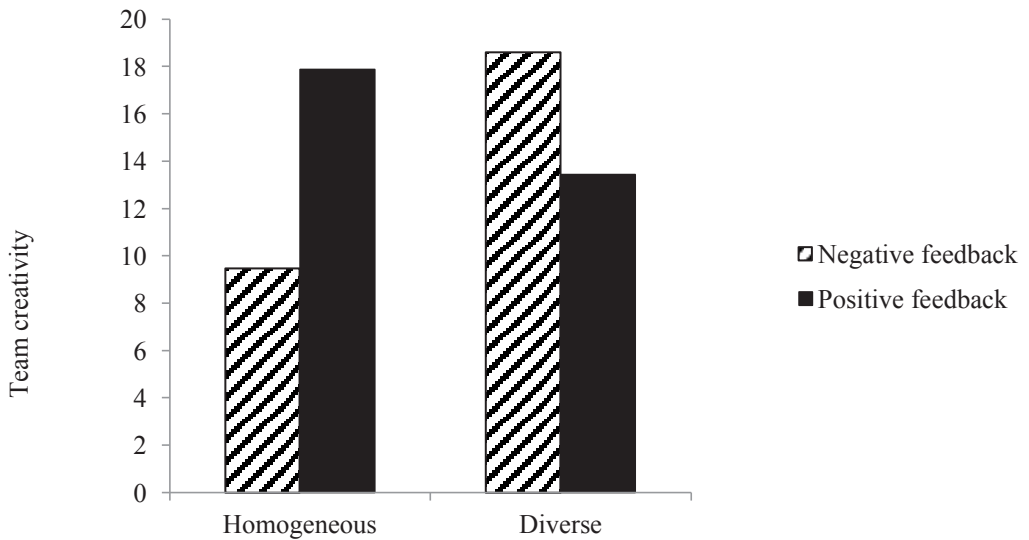
Note. Interaction of feedback valence and informational diversity on the creativity of the team's action plans.

The effect of feedback valence and diversity on information elaboration.
Hypothesis 2a posits that negative feedback has a more positive effect on elaboration in diverse as opposed to homogeneous teams. We conducted an analysis of variance testing for the effect of feedback valence and diversity on the teams' information elaboration. The results showed no significant differences between the average level of elaboration in teams in the negative feedback condition ($M = 3.44$, $SD = 1.29$) and those receiving positive feedback ($M = 3.30$, $SD = 1.00$; $F < 1$). There was, however, a significant main effect of diversity (F (1, 73) = 6.27, $p = .01$, $\eta^2_{partial} = .08$) such that diverse teams elaborated more fully on their information and perspectives ($M = 3.62$, $SD = 1.32$) than homogeneous teams ($M = 3.13$, $SD = 0.90$). Importantly, and in line with our proposition, the analyses also yielded a significant effect of the interaction between feedback valence and diversity (F (1, 73) = 38.95, $p < .001$, $\eta^2_{partial} = .35$). Planned contrast revealed that as predicted, there was a significant negative simple main effect of feedback valence in the diverse condition (F (1, 73) = 23.44, $p < .001$, $\eta^2_{partial} = .24$) with diverse teams receiving negative feedback engaging in higher levels of elaboration ($M = 4.34$, $SD = 1.12$) than diverse teams receiving positive feedback ($M = 2.87$, $SD = 1.11$). Conversely, for homogeneous teams, the results indicated a significant positive simple main effect of feedback valence on elaboration (F (1, 73) = 15.78, $p < .001$, $\eta^2_{partial} = .18$), with homogeneous teams receiving positive feedback engaging in higher levels of elaboration ($M = 3.66$, $SD = 0.76$) than homogeneous teams in the negative feedback condition ($M = 2.49$, $SD = 0.61$).

A more detailed analysis of the pattern of the interaction effect also qualified the observed positive main effect of diversity on elaboration. This analysis yielded a positive simple main effect of diversity in the negative feedback condition (F (1, 73) = 36.98, $p < .001$, $\eta^2_{partial} = .34$) with diverse teams receiving negative feedback engaging in higher levels of elaboration ($M = 4.34$, $SD = 1.12$) than homogeneous teams in the same feedback condition ($M = 2.49$, $SD = 0.61$). In contrast, in the positive feedback condition, homogeneous teams more fully elaborated on their information and perspectives ($M = 3.66$, $SD = 0.76$) than their diverse counterparts ($M = 2.87$, $SD = 1.11$; F (1, 73) = 7.23, $p = .01$, $\eta^2_{partial} = .09$). This indicates that the observed main effect of diversity is solely attributable to the higher levels of elaboration diverse teams engage in following negative feedback. Taken together, the statistically significant interaction effect

and the observed pattern of simple main effects support Hypothesis 2a.

The effect of feedback valence and diversity on cognitive stimulation. In order to test the differential positive effect of positive feedback on cognitive stimulation in homogeneous teams proposed in Hypothesis 3a, we conducted an analysis of variance testing for the effect of feedback valence and diversity on the teams' cognitive stimulation. In this analysis, neither the main effect of feedback valence nor the main effect of diversity attained statistical significance (both $F < 1$). However, the analysis yielded a significant interaction between feedback valence and diversity ($F(1, 73) = 21.80$, $p < .001$, $\eta^2_{partial} = .23$). Planned contrasts revealed the predicted positive simple main effect of feedback valence on cognitive stimulation in homogeneous teams ($F(1, 73) = 11.46$, $p < .01$, $\eta^2_{partial} = .14$) with homogeneous teams in the positive feedback condition ($M = 3.49$, $SD = 2.38$) exhibiting higher levels of cognitive stimulation than homogeneous teams receiving negative feedback ($M = 1.50$, $SD = 0.97$). Conversely, in the diverse condition, teams receiving positive feedback exhibited fewer instances of cognitive stimulation ($M = 1.65$, $SD = 1.77$) than teams receiving negative feedback ($M = 3.60$, $SD = 1.84$; $F(1, 73) = 10.38$, $p < .01$, $\eta^2_{partial} = .12$). Moreover, the effect of diversity on cognitive stimulation was contingent on the valence of the feedback the teams received. In the positive feedback condition, homogeneous teams engaged in significantly higher levels of cognitive stimulation ($M = 3.49$, $SD = 2.38$) than diverse teams ($M = 1.65$, $SD = 1.77$; $F(1, 73) = 11.98$, $p < .01$, $\eta^2_{partial} = .14$). In contrast, in the negative feedback condition, diverse teams displayed higher levels of cognitive stimulation ($M = 3.60$, $SD = 1.84$) than homogeneous teams ($M = 1.50$, $SD = 0.97$; $F(1, 73) = 9.84$, $p < .01$, $\eta^2_{partial} = .12$). Although we did not a priori expect that positive feedback would have a negative effect on cognitive stimulation, the finding that positive feedback has a more positive effect on cognitive stimulation in the homogeneous condition and that cognitive stimulation is higher in homogeneous teams following positive as compared to negative feedback support our initial reasoning and Hypothesis 3a.

The mediating role of elaboration and cognitive stimulation. To test for the conditional indirect effects of feedback valence on team creativity through elaboration and cognitive stimulation within diverse and homogeneous teams, we relied on a procedure suggested by Hayes (2012) which allows for the combined test of moderated mediation

through multiple mediators and involving a moderation of both stages of the indirect effect. In a first step, we aimed to test Hypotheses 2b and 3b which predicted a mediation of the joint effect of feedback valence and diversity on team creativity through elaboration and cognitive stimulation. To do so, we specified a model which allowed for the moderation of the first stage of the indirect effects of feedback valence on team creativity through the simultaneous mediators of elaboration and cognitive stimulation respectively but constrained the effects from each of the mediators to creativity to be equal for diverse and homogeneous teams (see Model 8, Hayes, 2012). Within this procedure, estimates for the different paths of the model are obtained by means of OLS regression analyses (see Table 4.2 for an overview of the different models). Given the problems associated with parametric tests of the product of coefficients that jointly define the indirect effect (Preacher, Rucker, & Hayes, 2007), we assessed the magnitude of the indirect effects using bias-corrected confidence intervals constructed for the estimates of the indirect effects on the basis of 1000 bootstrap samples drawn from the original sample with replacement. Coefficients are considered significant if the respective 95% confidence interval excludes zero (see Table 4.3 for the estimates and confidence intervals for the indirect effects).

Mirroring the results reported for the tests of Hypotheses 2a and 3a, there was a significant effect of the interaction between feedback valence and diversity on elaboration ($b = -1.64$, $SE = 0.26$, $t = -6.24$, $p < .001$) and on cognitive stimulation ($b = -1.32$, $SE = 0.28$, $t = -4.67$ $p < .001$). Regressing team creativity on feedback valence, diversity, their interaction, and the two mediators yielded a model that explained significant variance in the criterion team creativity (adjusted $R^2 = .41$, $p < .001$). In this model, elaboration ($b = 2.74$, $SE = 1.19$, $t = 2.30$, $p = .02$) and cognitive stimulation ($b = 3.66$, $SE = 1.11$, $t = 3.29$ $p < .01$) were the only two significant predictors of team creativity, rendering the direct effect of the interaction between feedback valence and diversity non-significant ($b = -4.16$, $SE = 3.18$, $t = -1.31$ $p = .19$). Hypotheses 2b and 3b predicted that information elaboration and cognitive stimulation would mediate in the interactive effect of feedback valence and diversity on a team's creativity. Supporting these predictions, the model showed a specific indirect effect of the interaction between feedback valence and diversity on creativity through elaboration ($b = -4.50$, $SE = 2.06$, CI [-9.06; -0.87]) and through cognitive stimulation ($b = -4.82$, $SE = 2.55$, CI [-11.54; -1.12]).

Table 4.2: Regression results for the moderated mediation model (Study 3)

Predictor	b	SE	β	t	Adj.R²
Model 1: Creativity					.24***
Feedback valence	8.39	1.42	.59	4.31***	
Diversity	9.12	2.02	.64	4.52***	
Feedback valence x diversity	-13.55	2.82	-.81	-4.79***	
Model 2a: Information elaboration					.35***
Feedback valence	0.73	0.18	.51	3.97***	
Diversity	1.15	0.19	.80	6.08***	
Feedback valence x diversity	-1.64	0.26	-.97	6.24***	
Model 2b: Cognitive stimulation					.19***
Feedback valence	0.66	0.19	.48	3.39**	
Diversity	0.70	0.20	.51	3.46**	
Feedback valence x diversity	-1.32	0.28	-.81	-4.67***	
Model 3a: Creativity					.41***
Feedback valence	3.91	1.96	.27	1.99	
Diversity	3.34	2.22	.24	1.50	
Feedback valence x diversity	-4.16	3.18	-.25	-1.31	
Information elaboration	2.74	1.19	.28	2.30*	
Cognitive stimulation	3.66	1.11	.35	3.29**	
Model 3b: Creativity					.44***
Feedback valence	5.71	2.28	.40	2.50*	
Diversity	4.25	2.22	.30	1.92	
Feedback valence x diversity	-5.30	3.15	-.32	-1.68	
Information elaboration	-1.05	2.08	-.11	-0.50	
Cognitive stimulation	5.09	1.43	.49	3.55**	
Information elaboration x diversity	5.78	2.53	.47	2.29*	
Cognitive stimulation x diversity	-3.23	2.19	-.21	-1.45	

Note. Diversity and feedback valence are dummy coded variables (0 = homogeneous; negative). For all analyses involving the video-coded mediators (models 2a through 3b) the sample size is reduced to $N = 77$ teams.
 * $p < .05$ ** $p < .01$ *** $p < .001$.

Table 4.3: Conditional indirect effects of feedback valence on team creativity (Study 3)

	Effect	SE	Bootstrapping 95% Confidence interval (bias-corrected)	
			Lower	Upper
First stage and direct effect moderation model (Model 8)				
Mediator: Information elaboration				
Interaction	-4.50	2.06	-9.06	-0.87
Homogeneous	1.99	0.89	0.47	3.97
Diverse	-2.51	1.29	-5.59	-0.48
Mediator: Cognitive stimulation				
Interaction	-4.82	2.55	-11.54	-1.12
Homogeneous	2.42	1.37	0.43	5.85
Diverse	-2.39	1.41	-6.69	-0.48
First stage, second stage, and direct effect moderation model (Model 59)				
Mediator: Information elaboration				
Homogeneous	-0.76	1.16	-2.76	1.83
Diverse	-4.35	1.90	-9.79	-1.49
Mediator: Cognitive stimulation				
Homogeneous	3.38	2.25	0.66	9.66
Diverse	-1.22	1.42	-5.10	0.78

Note. Feedback valence and diversity are dummy-coded variables (0 = negative; 0 = homogeneous) and both mediators are mean-centered. The model numbers refer to the numbers provided by Hayes (2012). All effects are analyzed and reported at the team level.

Additionally, Hypothesis 2c predicted that diversity would not only moderate the path from feedback valence to elaboration but also the path from elaboration to team creativity indicating a higher benefit of elaboration for diverse teams in which members hold unshared information and perspectives. To test this hypothesis, we specified a multiple moderated mediation model with feedback valence as the independent variable, diversity as a moderator of both stages of the indirect effect as well as the direct effect, elaboration and cognitive stimulation as simultaneous mediators, and team creativity as the dependent variable (see model 59, Hayes, 2012). Regressing team creativity on feedback

valence, diversity, their interaction, elaboration, cognitive stimulation, as well as the respective interactions between diversity and elaboration and diversity and cognitive stimulation (see model 3b in Table 4.2) yielded the interaction between diversity and elaboration ($b = 5.79$, $SE = 2.53$, $t = 2.92$, $p = .03$) as a significant predictor of team creativity. Conversely, for cognitive stimulation, only the direct effect ($b = 5.09$, $SE = 1.43$, $t = 3.55$, $p < .01$), but not its interaction with diversity ($b = -3.23$, $SE = 2.19$, $t = -1.48$, $p = .15$) attained statistical significance. The significant effect of diversity's interaction with elaboration as well as the positive nature of the coefficient indicating a more positive effect of elaboration in the diverse condition support Hypothesis 2c. Finally, it is important to note that the direct effect of the interaction between feedback valence and diversity was not significant ($b = -5.30$, $SE = 3.15$, $t = 1.68$, $p = .10$) when accounting for the indirect effects through elaboration and cognitive stimulation.

To illustrate the nature of this multiple moderated mediation, we computed the specific conditional indirect effects of feedback valence on creativity for each level of the moderator diversity. Results indicated that feedback valence had a negative effect on team creativity (indicating a relative benefit of negative over positive feedback) for diverse teams through elaboration ($b = -4.35$, $SE = 1.90$, CI [-9.79, -1.49]) whereas the indirect effect of feedback valence on team creativity through elaboration was not reliably different from zero in the homogeneous condition ($b = -0.76$, $SE = 1.16$, CI [-2.76, 1.83]). In contrast, there was a positive conditional indirect effect of feedback valence (indicating the relative benefits of positive over negative feedback) through cognitive stimulation in the homogeneous condition ($b = 3.38$, $SE = 2.25$, CI [0.66, 9.66]) whereas the indirect effect of feedback valence on creativity through cognitive stimulation was not reliably different from zero in the diverse condition ($b = -1.22$, $SE = 1.42$, CI [-5.10, 0.78]). In sum, these results support our reasoning that different processes account for the differential effects of feedback valence in homogeneous and diverse teams.

Exploratory Analyses

The obtained results largely support our hypotheses. Yet our analysis also yielded an effect that we would not have predicted based on our theoretical arguments. More specifically, although our results point to the predicted positive effect of feedback valence

on cognitive stimulation for homogeneous teams, the effect of feedback valence on cognitive stimulation in diverse teams was not only less positive but in fact negative indicating higher levels of cognitive stimulation for diverse teams receiving negative feedback than for diverse teams receiving positive feedback. This suggests that in addition to positive affect, which we argue underlies the more positive effect of positive feedback on cognitive stimulation and higher creativity in homogeneous teams, there are other sources of cognitive flexibility and stimulation in teams. One potential post-hoc explanation for our findings is that in diverse teams, elaboration may itself be a source of cognitive stimulation as it involves the discussion of information that is new to some team members (see e.g., Brown & Paulus, 2002; Nijstad, Diehl, & Stroebe, 2003 for a discussion of how group interaction may feed into cognitive flexibility).

To provide a preliminary test for whether or not the levels of cognitive stimulation in diverse and homogeneous teams respectively might be accounted for by different antecedents, we conducted an exploratory analysis testing for the extent to which the effect of feedback valence on cognitive stimulation may be explained through its effect on positive affect and elaboration respectively. Positive affect was assessed by globally coding for each team member how overall positive or negative their displayed affect was (on a scale from "1 = very negative" to "7 = very positive"). We averaged these individual values to obtain a team score. Analyses indicate that in line with our post-hoc explanation, there was a negative effect of feedback valence on cognitive stimulation through elaboration in the diverse condition (b = -0.30, SE = 0.13, CI [-0.62, -0.09]) but no reliable effect of feedback valence on cognitive stimulation through positive affect (b = 0.03, SE = 0.07, CI [-0.03, 0.29]). Conversely, in the homogeneous condition, feedback valence had a significant positive effect on cognitive stimulation through positive affect (b = 0.46, SE = 0.27, CI [0.03, 1.09]) whereas the indirect effect of feedback valence on cognitive stimulation through elaboration was not reliably different from zero (b = 0.23, SE = 0.15, CI [-0.06, 0.54]). Although the simultaneous assessment of affect, elaboration, and stimulation, renders a conclusive interpretation of the directionality of these relationships premature, these findings are at least indicative that the sharing and discussion of unshared information may have contributed to this unexpected finding of higher cognitive stimulation following negative feedback in diverse teams.

<center>**Discussion**</center>

In this study, we examined the interplay of the valence of externally provided feedback and team informational diversity in its effect on team information processing and creativity. In contrast to prior individual-level findings of a positive main effect of feedback valence on creativity, our theoretical reasoning and results suggest that at the team level, the effect of feedback valence is contingent on the distribution of informational resources between team members. In teams in which members hold diverse information and perspectives, negative feedback leads teams to develop more creative solutions by fostering higher levels of information elaboration. When team members hold mostly shared information and perspectives, in turn, positive feedback entails higher creativity by eliciting increased cognitive stimulation in teams. In sum, our findings point to the importance of considering the complex ways in which teams as processors of information (Hinsz, Tindale, & Vollrath, 1997), affective influences (Reus & Liu, 2004), and motivational factors (Chen & Kanfer, 2006; DeShon et al., 2004) filter, attenuate, or accentuate the impact of external influences such as evaluative feedback to shape subsequent team processes and (creative) performance and yield multiple important insights.

Theoretical Implications

First, the somewhat counterintuitive finding that negative feedback may promote team-level creativity when provided to informationally diverse teams adds to the literature on the effects of feedback on creativity in a number of important ways. In one of the first systematic tests of the effect of feedback valence on team-level creativity we are able to demonstrate that the consistent finding of a positive effect of feedback valence on individual-level creativity (Zhou, 1998, 2008) does not translate into a similarly consistent, homologous relationship at the team level. Our behavioral analysis of the team processes that contribute to this effect also shows that one of the reasons for the differential effects of feedback valence on the creativity of diverse and homogeneous teams is the potential of positive and negative feedback to influence different team processes over and beyond the motivational benefits traditionally argued to underlie the more positive effect of positive

feedback on individuals' creativity. In other words, feedback valence not only has differential effects on the creativity of informationally homogeneous and diverse teams, but in addition, these differential effects are attributable to the differential effects feedback has on the processes and information processing mechanisms unfolding in these different types of teams.

Second, with regard to these mechanisms, our analysis points to the crucial role of processes that pertain to a team's systematic exploration of the available information and viewpoints as well as the flexible and unconventional use of these resources. This pivotal role of information processing mechanisms is widely recognized within research on team diversity (van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007; cf. Dahlin, Weingart, & Hinds, 2005). In contrast, research on organizational creativity has largely focused on motivational and affective accounts to explain and predict when and how individuals achieve more creative outcomes in part at the expense of fully exploring the impact of cognitive factors (see Zhou & Shalley, 2010 for a review of creativity research along these three perspectives). As such, our study contributes to building our understanding of this important class of factors.

Interestingly, our theoretical arguments as well as our empirical analysis further suggest that studying the impact of affective, motivational, and cognitive factors in separation is likely to yield an incomplete understanding of how creative outcomes are achieved by a team of interdependent actors. For example, in line with research on affect and cognition more generally (Forgas, 2008), our results stress the important cognitive and team-level cognitive consequences of the affective repercussions positive and negative feedback entails (cf. Kooij-de Bode et al., 2010; van Knippenberg et al., 2010). In a similar vein, whether negative feedback mainly demotivates or serves as a trigger to pursue an alternative strategy with sustained or increased effort may hinge in part on the extent to which the team perceives that it possesses additional informational resources to improve their creative performance. In sum, this suggests the value of systematically investigating how these different types of processes and factors interact within and across multiple levels of analysis. For instance, the largely detrimental effect of negative feedback on individual-level creativity might be remedied or ameliorated by providing individuals working on creative tasks with additional (informational) resources.

In addition to these contributions to the literatures on creativity more generally and the effect of feedback on creativity more specifically, our results also have important implications for the study of the effect of team diversity. Although this research underscores the important role of team information processing mechanisms (van Knippenberg et al., 2004) and prior research points to the potential of formal, external interventions to affect these and other team processes (e.g., Okhuysen & Eisenhardt, 2002), we know of no prior research studying the differential impact of formal interventions such as performance feedback on the creativity or more generally the performance of diverse and homogeneous teams. Our results identify this as both an important oversight and an exciting avenue for future research. Studies addressing this gap may be especially relevant as these interventions represent common organizational tools which may affect key contingency factors shaping when and how diversity fosters desirable (or less desirable) team-level outcomes. As a case in point, the CEM points to the important role of task motivation and related research highlights the value in clarifying task requirements (van Ginkel & van Knippenberg, 2008, 2009) both of which may be influenced by formal interventions including feedback, task-design, and reward structures.

Finally, with regard to the team creativity literature, our findings add to our knowledge of which team processes are particularly conducive to higher creativity in diverse and homogeneous teams. In line with prior research on diversity and team creativity, our results underscore the value of elaboration as a precursor of team creativity (Hoever et al., in press). Yet in addition to replicating the mediating effect of diversity's benefits through elaboration, our study extends these findings by pointing to the value of also considering the extent to which teams engage in mutual cognitive stimulation on the basis of this information. Interestingly, our exploratory analysis suggests that especially in diverse teams, the extent to which team members fully share and integrate their informational resources is closely intertwined with the notion of cognitive stimulation as hearing about unshared information in my in turn trigger cognitive flexibility (Brown & Paulus, 2002).

Practical Implications

Our findings concerning the interrelated motivational, affective, and cognitive

consequences of positive and negative feedback for informationally homogeneous and diverse teams also have important practical implications. First and foremost, they indicate that managers might miss out on the good bearing of bad news by keeping all negative information away from teams (especially diverse teams) and stressing the positive aspects of a team performance as some managerial wisdom advocates (Egan, 2005). In contrast, we demonstrate that negative feedback need not constitute uniformly bad news for all teams but may instead stimulate diverse teams to more fully explore the informational resources that their members have as a function of different experiences, functional assignments, or training. Likewise, for these teams, if initial creative performance warrants positive feedback, this may be more effective in stimulating higher levels of creativity if the feedback also stresses the remaining room for improvement. Conversely, when providing feedback to teams with largely overlapping knowledge and information, it might be beneficial to highlight the positive aspects of a team's creative performance and complement potentially appropriate negative feedback with measures that inoculate teams against high levels of negative affect or provide additional resources that may help teams to overcome their initially low creativity.

In addition to this suggested tailoring of feedback messages to highlight the respective elements that are particularly likely to yield higher creativity in diverse and homogeneous teams, team leaders and managers in charge of judging the creative efforts of teams may also decide to counteract the respective negative side effects of positive and negative feedback for diverse and homogeneous teams. For diverse teams, potential measures might entail fostering beliefs in the value of diversity (Homan et al., 2007), creating suitable reward structures (Homan et al., 2008), have team leaders display a transformational leadership style (Kearney & Gebert, 2009), stimulating perspective taking between teammates (Hoever et al., in press), or more generally increasing epistemic motivation among team members (De Dreu, Nijstad, & van Knippenberg, 2008), all of which prior research suggests foster elaboration in diverse teams. Furthermore our results indicate that team leaders and managers may also try to nurture cognitive flexibility and stimulation in homogeneous teams. Whereas our exploratory analysis indicates that in homogeneous teams, cognitive stimulation is closely linked to positive affect, the fact that elaboration and the ensuing discussion of partially unshared information fosters cognitive

stimulation in diverse teams points to the value of exposing homogeneous teams to alternative information or viewpoints from outside the team. Moreover, certain leadership interventions such as leader unconventional behaviors (Jaussi & Dionne, 2003) may stimulate higher levels of cognitive flexibility among team members and aid its verbalization by stressing that the expression of creative ideas is norm-congruent which may foster team creativity (cf. Goncalo & Duguid, 2012). In sum, our findings may thus inform managerial practice both by outlining which forms of feedback might prove particularly effective for diverse and homogeneous teams as well as by showing which processes teams should be supported to engage in if the situation requires feedback that might otherwise lead to less desirable outcomes.

Limitations and Directions for Future Research

Given the novelty of the proposed relationships as well as the central role of team communication processes in our theorizing, we used an experimental approach to test our hypotheses. This procedure entails the advantages of allowing us to make inferences about the causal nature of the proposed relationships (Colquitt, 2008) and to systematically observe the involved team processes which is in many respects superior to assessing them through retrospective self-assessment (Weingart, 1997). At the same time, although experiments are rarely conducted to achieve high levels of external validity (Mook, 1983), the chosen procedure raises the question of how externally valid the reported findings are. Answering this question eventually requires a series of future studies to systematically replicate the obtained results. Yet in the absence of this data, prior research may inform the extent to which such a generalization may be successful.

More generally, meta-analyses covering a range of psychological effects show substantial convergence between the effect sizes obtained in the laboratory and in the field (Anderson, Lindsay, & Bushman, 1999). Concerning the specific variables of feedback (see Kluger & DeNisi, 1996 for a meta-analysis of individual-level feedback interventions) and diversity (van Dijk, van Engen, & van Knippenberg, 2012), meta-analytic reviews failed to yield reliable differences between the effects obtained in the laboratory and in the field. Likewise, with regard to elaboration, prior research suggests its role in bringing about the benefits of diversity for team creativity (Hoever et al., in press) and performance

in both the laboratory (Homan et al., 2007, 2008) and the field (Kearney & Gebert, 2009; Kearney et al., 2009). Thus, although more definite statements would require the support of future empirical studies, these findings of a general convergence together with evidence supporting the generalizability of important parts of our model suggest that our findings may hold beyond the specific situation we studied.

One core feature of our approach that may raise questions concerning the generalizability of our findings is the choice to manipulate feedback valence experimentally and thus to assign teams randomly (and not based on the actual creativity of their initial ideas) to the conditions of positive and negative feedback. Creativity judgments are inherently subjective (Katz & Lorne, 1982) and discrepancies between self-perceived and externally rated creativity have been observed in prior research (Kurtzberg, 2005). Moreover, a review of the video-data yielded no indication that teams doubted the feedback information they were provided with. Nevertheless, one may ask to which extent the obtained findings extend to situations in which teams receive feedback that is based on their actual level of creativity. As noted earlier, research examining the systematic interplay of diversity and feedback remains scarce to date. Nonetheless, studies which follow diverse teams longitudinally throughout a series of tasks on which teams receive periodic feedback (e.g., Watson, Kumar, & Michaelsen, 1993) report that diverse teams are able to improve both their performance (including aspects that may be interpreted as creative performance) and their group orientation from initially very low levels to higher levels at later stages. This provides at least circumstantial evidence that more realistic negative feedback can have creativity-enhancing effects. Moreover, individual-level research indicates that the credibility of task feedback interacts with its valence such that feedback of higher credibility accentuates the effects of feedback valence on individual performance (Podsakoff & Farh, 1989) suggesting that if teams tacitly doubted the credibility of the feedback, our findings might prove to be conservative estimates of the effects.

In a similar vein, our results are mainly informative about the effect of relatively early feedback interventions on newly formed groups. In this regard, it is possible that in teams with a longer tenure and a more pronounced history of success or failure, this prior experience affects a team's reaction to present feedback. In this sense, repeated

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experiences of negative feedback might diminish the positive effect of negative feedback by substantially lowering the team's creative efficacy and in turn their creativity (Shin & Zhou, 2007) or by harming beliefs in the value of the team's diversity (van Knippenberg & Haslam, 2003) which in the case of repeated negative feedback is less likely to be considered a resource that may help the team turn around their creative performance. Likewise, the experience of prior negative feedback may render repeated negative feedback more stressful, with possible detriments for individual (Byron, Khazanchi, & Nazarian, 2010) and potentially team creativity.

Moreover, we directly manipulated the existence of differences in underlying perspectives and information instead of relying on a specific diversity dimension (such as ethnicity or study major). We chose this approach in line with more recent work stressing that the extent to which a diversity attribute is task-relevant is context dependent and that the mere existence of diverse cognitive resources within a team does not guarantee its optimal use (van Knippenberg et al., 2004). This approach implies that there is considerable value in investigating the conditions under which existing cognitive resources are successfully harnessed by a team. Nonetheless, our procedure raises the question of how the effect of feedback valence affects teams diverse with regard to other, specific diversity attributes (e.g., gender or educational background) and potential faultlines formed between them. For instance, negative feedback might come at a higher cost in situations in which diversity is likely to lead to social categorization and subgroup formation. Here, negative feedback might function as a threat to the team's identity and in turn elicit intergroup bias and detrimental conflict (van Knippenberg et al., 2004). Future research is thus clearly needed to establish the boundary conditions of the effects we report.

Conclusion

Team creativity is widely considered important for organizations thus making managing for creativity an important task for team leaders and managers. Yet to date, our understanding of how teams react to and benefit creatively from external managerial interventions such as feedback is limited. With this study, we provide important first insights into how teams with diverse and homogeneous informational resources react to and perform creatively after positive and negative feedback provided on their creative

efforts. Our findings point to a complex interplay of these interventions with the characteristics of the team on both creativity and the different team processes fostering it. As such, they provide interesting avenues for future research and useful implications for practitioners seeking to enhance their teams' creativity.

Chapter 5: General Discussion

Developing ideas for products, services, or procedures that are both novel and useful is seen as an important first step for organizations seeking to innovate, create value, and adapt to changing environments (e.g., Florida & Goodnight, 2005; George, 2007; Rank, Pace, & Frese, 2004; also see Gilson, 2008, for an overview of the personal, group-level, and organizational consequences of creativity). As a result of a trend towards organizing work in (partially) autonomous work teams (Guzzo, 1996; Ilgen, 1999), teams are frequently set to work on creative tasks. And, as a reflection of the common belief that especially diverse teams are a particularly suitable means to the end of higher creativity (Egan, 2005; Robinson & Dechant, 1993), these teams are often composed of members with different functional accountabilities or roles (Bunderson & Sutcliffe, 2002). Yet despite the widely recognized importance of team creativity, a number of recent reviews on creativity stress that our understanding of how this important organizational outcome is best achieved remains limited and fragmented (e.g., George, 2007; Shalley, Zhou, & Oldham, 2004; West, 2002; Zhou & Shalley, 2010). Furthermore, existing findings on commonly assumed antecedents such as diversity remain inconsistent (Hülsheger, Anderson, & Salgado, 2009).

In an attempt to reduce this discrepancy between the perceived relevance and our systematic understanding of this important phenomenon, this dissertation was designed to address the question of which factors and processes promote creativity in teams and allow teams to use their informational resources for higher creativity. The findings of the three empirical chapters, which are summarized below, provide a number of important insights in response to this question. They direct attention to variables that have heretofore only received scant consideration with regard to their potential to promote team creativity and demonstrate the need to revise our understanding of factors that have long been believed to be clearly beneficial or detrimental for it.

Summary of the Main Findings

Chapter 2: Perspective Taking as Key to Unlocking Diversity's Potential

In this chapter, we set team interaction and communication processes which

arguably are among the most proximal and influential antecedents of team creativity (e.g., Hülsheger et al., 2009) center stage. In our theoretical analysis, we focused on the question of which team processes (among a number of alternative processes used or debated in the literature) are particularly suited to entail higher levels of team creativity. In line with the categorization elaboration model (CEM, van Knippenberg, De Dreu, & Homan, 2004), we argued that information elaboration has the biggest potential to mediate the positive effects of diversity on team creativity. The distinguishing conceptual characteristics of information elaboration which are (a) the explicit incorporation of team members not only sharing but also attending to and integrating their information and viewpoints (in contrast to information sharing per se) and (b) the constructive nature of these discussions (in contrast to task conflict, Jehn, 1997), point to the cognitive process of perspective taking between team members as a potent moderator of the effect of diversity of perspectives on team creativity.

In line with our predictions, results from a large group experiment in which we manipulated both diversity and perspective taking as between-group factors showed that perspective taking moderates the effect of diversity of perspectives on team creativity. More specifically, we find that diversity has a positive effect on team creativity in the perspective taking condition whereas diversity did not significantly predict team creativity when members did not engage in perspective taking. This finding highlights the value of considering team- and other-focused cognitions and behaviors as an additional class of moderators of the effect of diversity on workgroup outcomes. Furthermore, on the basis of video-tapes obtained from the team task, we were able to empirically address an ongoing theoretical debate concerning the precise nature of the team processes underlying the beneficial effects of diversity for team creativity. In line with our predictions, we found that information elaboration mediated the joint effect of diversity on team creativity such that in diverse teams, perspective taking led to higher levels of elaboration which in turn was positively related to creativity. Moreover, we were able to show that task conflict (Jehn, 1995, 1997) and information sharing were unable to fully account for the observed effect. We found that the indirect effect the interaction between diversity and perspective taking on team creativity through elaboration was significantly stronger than the indirect effects through information sharing and task conflict when compared in the same model. In

sum, the results of chapter 2 underline the potential of perspective taking to bring out higher levels of information elaboration and, as a consequence, creativity in teams in which members hold diverse viewpoints.

Chapter 3: Within-Team Feedback as a Tool to Mobilize Tacit Task-Relevant experiences

In chapter 3, we extended this focus on the effect of other-focused behaviors and cognitions and tested the impact of a feedback between team members as a behavior that is particularly contested in its effect for the specific outcome of team creativity. Within-team feedback is generally considered undesirable or even detrimental for group idea generation within the brainstorming paradigm on the basis of its assumed potential to induce evaluation apprehension and self-censorship with regard to less conventional ideas (Camacho & Paulus, 1995). In contrast, we argued that in teams in which team members have diverse viewpoints and knowledge as a function of different life experiences, feedback between team members may represent an important behavior to mobilize these diverse cognitive resources and thus allow teams to develop more creative solutions. Accordingly, we proposed that mutual feedback provided by fellow team members throughout the team's creative process moderates the effect of team nationality diversity on team creativity such that diversity in terms of nationality has a more positive effect on team creativity when team members engage in high levels of mutual feedback.

We studied the proposed relationships using a sample of student teams working on a joint course project which required them to observe a team and develop creative solutions to improve the team's effectiveness and interaction. For this task, teams with members who have different backgrounds and life experiences as a function of differences in nationality should have a potential advantage compared to teams in which members share a more similar background. Our findings support the proposed moderating role of team members' mutual feedback in bringing out these tacit differences in knowledge and viewpoints and help teams to translate them into more original and useful ideas. More specifically, we find that diversity in terms of members' nationality is positively related to team creativity under conditions of high mutual feedback which may serve as a way to verbalize existing differences and similarities in their view of the task and its solutions.

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Conversely, nationality diversity has a negative effect under conditions of low levels of mutual feedback. Exploratory analyses further indicate that these findings hold when controlling for important team member personality variables (e.g., openness to experience; see Feist, 1998 for a discussion of the impact of this personality on individual-creativity and Homan et al., 2008 for an analysis of its potential in bringing out the value of diversity for team performance) and team climate variables (e.g., team psychological safety; Edmondson, 1999). Taken together, these results challenge the common brainstorming wisdom to withhold feedback and instead point to the value of a more nuanced consideration of its effects in teams.

Chapter 4: Feedback Valence and Informational Diversity: The Good Bearing of Bad News

In chapter 4, we broadened our focus to not only consider processes within the team but also external interventions in their effect on team processes and creativity. In a large group experiment, we tested the effect of feedback valence on the creativity of teams with diverse or homogeneous information and perspectives. In contrast to extant individual-level research stressing the motivational benefits and higher subsequent creativity following positive as compared to negative performance feedback (Zhou, 1998; also see Zhou, 2008 for an overview), we argued that the effects of feedback valence on team-level creativity are contingent on the distribution of a team's informational resources and that the differential benefits of positive and negative feedback are attributable to differential processes. In line with our predictions, we find that the effect of feedback valence on team creativity is moderated by a team's informational diversity such that positive feedback has a more positive effect on creativity for homogeneous teams whereas negative feedback has a more positive effect on the creativity of teams in which members hold diverse information and viewpoints. Moreover, our analysis of the interaction behaviors following the feedback supports our prediction of differential processes underlying these effects. More specifically we find that the negative effect of feedback valence on team creativity in the diverse condition is attributable to higher levels of information elaboration in diverse teams following negative feedback. Conversely, for

homogeneous teams, the more positive effect of positive feedback on the teams' creative performance is mediated by higher levels of cognitive stimulation.

In addition to the important way in which these results qualify existing individual-level findings when moving to the team level, the results of a more exploratory analysis further point to an interesting interplay of different team processes. More specifically we find that not only homogeneous teams receiving positive feedback display higher levels of cognitive stimulation but that the same holds true for diverse teams following negative feedback. The results of sensitivity analyses suggest that one possible explanation for this seemingly counterintuitive finding lies in the potential of higher levels of information elaboration and the ensuing discussion of initially unshared information and viewpoints to serve as a basis for divergent thinking which might express itself in attempts to stimulate a team's discussion to move into a new direction or to consider seemingly unrelated viewpoints and information.

Theoretical Contributions and Implications for Future Research

The findings outlined above complement and contribute to the existing literatures on diversity, creativity, team processes, and feedback in a number of ways. Whereas the more specific theoretical and practical implications of each study are discussed at the end of each chapter, in this section, I will largely focus on the broader implications that can be drawn from combining the specific insights each chapter provides.

Implications for Research on Diversity and Team Creativity

First and foremost, the empirical chapters yield consistent support for the notion that diversity, even when it directly entails differences in knowledge and perspectives that have a clear relevance for the task, does not constitute a competitive advantage that teams consistently use on creative tasks. This has important implications for both the diversity and creativity literatures where these relationships are frequently assumed. The arguments against a consistent main effect of diversity on team outcomes more generally have been raised elsewhere (van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007). Existing attempts to clarify these inconsistent findings often involve a differentiation between different diversity types (e.g., Harrison & Klein, 2007; Jackson & Joshi, 2011;

Webber & Donahue, 2001), distinguishing in a more fine-grained fashion between specific diversity attributes (e.g., Bell, Vilado, Lukasik, Belau, & Briggs, 2011), or positing task types (Bowers, Pharmer, & Salas, 2000; van Knippenberg et al., 2004), or a combination of task and diversity types or attributes (e.g., Bell et al., 2011) as contingency factors. Although the logic underlying these attempts makes intuitive sense, these efforts have been met with mixed success at best (see, e.g., van Knippenberg & Schippers, 2007 for a critical discussion) and failed to yield consistent meta-analytical support in particular with regards to diversity types as a reliable moderator (e.g., Bowers et al., 2000; Webber & Donahue, 2001). Our findings complement these findings by showing across three studies that even for the theoretically "ideal" case in which team members differ with regards to their underlying perspectives and information and jointly work on a complex task that has high informational demands and requires a creative solution, the predicted rewards of diversity are not invariably reaped. This finding is also important for research on creativity where, although more recent findings suggest that a more complex understanding of the effects of diversity is needed (Shin & Zhou, 2007; Zhou & Shalley, 2010), diversity (especially diversity in the sense of information and perspectives) remains one of the most frequently discussed antecedents of higher creativity (e.g., Hülsheger et al., 2009; Paulus, 2008; West, Hirst, Richter, & Shipton, 2004).

In addition to challenging what seems to be an oversimplified account of the relationship between diversity and team creativity, the studies included in this dissertation point to a number of important moderators of this effect which have the potential to stimulate both future research on team diversity and team creativity. More specifically, our findings highlight the crucial role of cognitive processes and behaviors directed at both the team and fellow teammates as an important, but to date largely neglected class of moderators of diversity's effect on creativity. These other-focused cognitions and behaviors seem most proximal to a team's information processing and communication which prior research posits as key antecedents of team performance and creativity (e.g., Hülsheger et al., 2009; cf. LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Yet current diversity theories mainly focus on team member characteristics (e.g., motivation, personality, ability) and task characteristics as moderators of the relationship between diversity and valued team outcomes (van Knippenberg et al., 2004). The research reported

in chapters 2 and 3 adds to this approach by illustrating how two specific examples of this class of team- and other-directed behaviors and cognitions may aid teams to make creative use of their differences. In chapter 2 we show that actively analyzing and thinking about other team members' perspectives (Parker, Atkins, & Axtell, 2008) has considerable potential to foster higher levels of information elaboration and creativity in diverse teams. In a similar vein, chapter 3 demonstrates the value of obtaining feedback from and providing it to team members as a way to verbalize different viewpoints on the task as a result of more tacit differences in experience. These positive first examples suggest the value of considering additional other-focused behaviors and cognitions in their impact on team creativity and as moderators of the effect of diversity on creativity and related team outcomes. In this regard, additional insights may be gleaned from the literatures on helping (Podsakoff, Ahearne, & McKenzie, 1997) or advice giving (Bonaccio & Dalal, 2006; also see Alexiev, Jansen, Van den Bosch, & Volberda, 2010) as well as their antecedents which may in turn prove effective in fostering processes involving a deliberate processing of the viewpoints, information, and experience provided by others.

Finally, with regard to research on diversity, the reported studies also show the shortcomings associated with current approaches to conceptualizing diversity by means of pre-existing classification schemes differentiating between a limited number of distinct types (see, e.g., Harrison & Klein, 2007, Jackson & Joshi, 2011 for prominent examples). One of the major pitfalls of this approach to conceptualizing diversity is that surface-level similarity between different teams' compositional characteristics is often assumed to represent a reliable, context-invariant source of deep-level similarity of the underlying meaning (and presumably effects) of these apparently similar team compositions. This is especially apparent for our study of nationality as a diversity attribute that may equip team members with a broader range of experiences and as such represent a source of tacit task-relevant knowledge and perspectives (chapter 3). This approach differs from prior work in which diversity in terms of nationality or related attributes such as race or ethnicity is traditionally classified as easily detectable, relations-oriented diversity (Jackson & Joshi, 2011) or surface-level diversity (Harrison, Price, & Bell, 1998). In contrast to the negative consequences that are frequently assumed to flow from these types of diversity attributes (see Williams & O'Reilly, 1998 or van Knippenberg et al., 2004 for a (critical) overview

of the effects proposed by the social categorization perspective on diversity), the potential informational value demonstrated to arise from diversity in terms of nationality under certain conditions points to the danger of misclassifying diversity attributes if they are seen as context-invariant factors. In line with recent calls for a more contextualized understanding of diversity attributes and their impact on work teams (van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007) and these previously outlined considerations, we decided to manipulate differences in underlying perspectives and information in chapters 2 and 4 directly instead of relying on a more distal diversity attributes. Although we explicitly do not adopt this approach with the aim to establish a diversity main effect, a more careful attention to the actual meaning of a given diversity attribute within specific situations may make research efforts across studies more comparable and foster research into the boundary conditions for the effectiveness of different moderators and mediators (see Calvard & Hoever, 2012 for a detailed discussion of the potential benefits of replacing existing diversity typologies with a more fine-grained dimensional approach to conceptualizing diversity).

Implications for Research on Team Processes

A further major contribution lies in the specific analysis of the team processes that function as important antecedents of team creativity. Although process variables are a central component of explaining team performance more generally (e.g., Ilgen, Hollenbeck, Johnson, & Jundt, 2005; LePine et al., 2008; Marks, Mathieu, & Zaccaro, 2001) and feature prominently in research on team diversity (e.g., Pelled, Eisenhardt, & Xin, 1999; van Knippenberg et al., 2004) as well as team creativity and innovation (e.g., Hülsheger et al., 2009; Kurtzberg & Amabile, 2001), the specific nature of these processes is unclear. Frequently, different (sometimes upon closer inspection related) team processes are used in different studies with little or no direct discussion of how they relate to other, existing processes. Moreover, even in cases where different processes are conceptually contrasted in a systematic fashion (see, e.g., van Knippenberg et al., 2004 for a comparison of task conflict and elaboration) this theoretical debate is rarely complemented by a direct empirical comparison. In this regard, the reported research helps pinpoint the specific

nature of the processes most strongly related to team creativity under a number of conditions while ruling out the potential role of theoretical alternatives.

The in-depth behavioral observation we conducted in chapters 2 and 4 yields converging evidence for the value of information elaboration as a process related to higher creativity in (especially diverse) teams. Prior research has established the importance of elaboration for team decision making (e.g., Kooij-de Bode, van Knippenberg, & van Ginkel, 2010; van Ginkel & van Knippenberg, 2008, 2009) and team performance (e.g., Homan, van Knippenberg, van Kleef, & De Dreu, 2007; Kearney & Gebert, 2009; Kearney, Gebert, & Voelpel, 2009). Yet the research reported in this dissertation represents the first direct evidence for information elaboration as an antecedent of higher team creativity and as a mediator in diversity's effect on this valued organizational outcome.

In addition, by relying on video-tapes of the teams' interaction, we are not only able to obtain comparatively high quality data on these processes (Weingart, 1997) but also to directly compare different processes in their viability as mediators of the studied effects on team creativity more generally (chapter 2) or for specific types of teams (chapter 4). By empirically ruling out that our effects can be accounted for by task conflict (Jehn, 1995, 1997) or mere information sharing and showing that information elaboration has a reliably stronger effect than these theoretical alternatives, we are able to provide a stronger test for the proposed importance of information elaboration than if we had merely tested its impact against the absence of an indirect effect (van de Ven, 2007). Incidentally, although not part of the specific analysis reported in chapter 4, the finding that neither task conflict nor mere information sharing function as mediators of the effect of the manipulated variables (i.e., diversity of perspectives and perspective taking in chapter 2) extends to the factors studied in chapter 4 (i.e., the interplay of feedback valence and informational diversity) suggesting that the findings reported in chapter 2 are more than an idiosyncratic by-product of a certain setting or set of manipulations.

This approach of behaviorally coding for observable team processes and empirically comparing their effects has the potential to stimulate research into teams and team processes as it provides a procedure through which future research may strive towards higher levels of theoretical integration. Currently, the range of team processes that

has been argued to foster higher team creativity in its relatively short history of more systematic investigation is staggering and often it is not clear how these different processes relate to each other. For example, the process of within-group collaboration which Baer and colleagues define as "active participation of all group members in collaborative idea generation (i.e., developing, sharing, and attending to others' ideas) and decision making (i.e., deciding which ideas to pursue and which to abandon)" (Baer, Leenders, Oldham, & Vadera, 2010, p. 839) or the notion of team-level knowledge-integration capability which Gardner and her colleagues conceptualize as "a reliable pattern of team communication that generates joint contributions to the understanding of complex problems" (Gardner, Gino, & Staats, 2012, p. 3) seem to bear considerable resemblance to the concept of team information elaboration as well as with each other. A stronger focus on comparing potential alternative processes theoretically and empirically may help to prevent a potentially unnecessary proliferation of largely overlapping constructs and thus foster the extent to which individual studies can meaningfully contribute to a broader picture.

Implications for the Study of Creativity across Levels of Analysis

In a broader sense, the outlined findings and implications also allow us to critically reassess the questions raised in the general introduction concerning the extent to which the relationships between creativity and its antecedents are homologous across different levels of analysis as some authors propose (e.g., Gilson, 2008). Although the results of the three empirical chapters highlight the impact of variables that can be seen as team-level manifestations of important individual-level variables, they also reveal that in addition to these surface-level similarities a number of between-level differences emerge. In part this is due to the qualitatively different nature of the involved concepts at different levels of analysis. For example the nature of some of the factors that jointly determine creativity in Amabile's componential model of creativity (1988, 1996) changes or expands when switching to the team level. More specifically, 'domain-relevant knowledge' may differ not only between but also within teams as the creative actors rendering its impact less direct than that of individual-level domain-relevant knowledge. Supporting this idea, our analysis indicates that teams are not always able to make use of the broader knowledge base that diversity equips them with (see chapter 3, cf. chapter 2 and 4). On a related note,

the 'creativity-relevant processes' used to translate these cognitive resources into creative ideas extend beyond the individual-level cognitive styles and additionally manifest themselves in teams' information processing mechanisms. As outlined above, all three studies point to the crucial importance of communication behaviors and team information processing mechanisms in one way or another.

Yet in addition to these differences inherent in the nature of the specific concepts that emerge at higher levels of analysis (such as information elaboration or diversity), some of our findings also suggest the need to qualify the effect of variables that can be argued to be relatively isomorphic across levels of analysis. This is readily apparent for chapter 4 and its analysis of the effects of feedback valence on team creativity. In contrast to the positive effects of feedback valence on the creativity of individual actors (see Zhou, 2008 for an overview), at the team level, this effect is contingent on the team's informational diversity to the extent that the benefits of negative feedback may sometimes even outweigh those of positive feedback. In a similar vein, the more detailed analysis of the mediating mechanisms also indicates that feedback does not have homologous effects on team-level information processing. These differences point to the value of systematically exploring to which extent other variables which are frequently studied at the individual-level generalize to or differ at the team-level.

Although the outlined findings point to a number of important between-level differences, they also have the potential to inform individual-level or cross-level research. A growing number of studies show how the creativity of individual actors is shaped by an interaction of the characteristics of the individual and those of the teams these individual actors are embedded in. Different studies underscore the role of teams as a context which may foster (or constrain) individual creativity by facilitating or inhibiting the expression of individual learning orientation (Hirst, van Knippenberg, & Zhou, 2009) or serving as a potential source of information or insights (Shin, Kim, Lee, & Bian, 2012). In a similar vein, some of the factors that interact with a team's diversity in terms of task relevant-information and perspectives on team-level creativity might also represent viable ways to boost individual creativity in the right team setting. For instance, perspective taking might help individual team members mobilize the informational resources within their team for their own creativity, as may receiving or seeking feedback from team members (cf. De

Stobbeleir, Ashford, & Buyens, 2008; 2011) or even giving feedback if it fosters follow-up discussions between team members. Conversely, future research might test to which extent negative feedback may induce higher levels of epistemic motivation in individuals which in the presence of additional informational resources for the individual to access might also aid individual-level creativity. Yet although these considerations suggest that certain synergies may ensue from considering prior individual-level research on creativity to inform research on creativity at the team-level (and vice versa), our findings suggest that the conclusion of full homology (Gilson, 2008) might both be premature and not fully justified.

Finally, our findings draw attention to an interesting implication for the different theoretical lenses used to study creativity. In their recent review of research on organizational creativity, Zhou and Shalley (2010) differentiate between motivational, affective, and cognitive approaches to studying creativity and highlight the different factors studied as antecedents of creativity within these lines of research. Our findings indicate that these three lenses may not be as separable when considering the antecedents of team creativity. As a case in point, chapter 4 (and in a more implicit way chapter 3) highlight the cognitive repercussions of feedback and evaluation which are traditionally seen as contextual factors that affect creativity through their motivational consequences. Chapter 4 further illustrates that state affect under certain conditions shapes team information processing – which can be regarded an inherently cognitive factor. Finally, perspective taking, which some authors demonstrate follows from higher levels of prosocial motivation (Grant & Berry, 2011) may be seen as another link between motivational factors and cognitive individual and team-level consequences. Taken together, our findings thus demonstrate the value to systematically explore the interplay of these motivational, affective, and cognitive factors in their impact on creativity over and beyond their specific isolated effects.

Implications for the Study of Creativity across Different Conceptualizations of Creativity

Whereas the above highlights not only the opportunities but also the limits to potential synergies between research on creativity at different levels of analysis, our

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findings also caution against generalizing the results obtained from group idea generation to organizational research on team creativity as proponents of both group brainstorming (e.g., Paulus, 2000) and organizational research on creativity (e.g., Kurtzberg & Amabile, 2001) suggest. In part these difficulties are already apparent based on the differences in conceptualizing and operationalizing creativity across these two streams of research discussed in the introduction. On the one hand, research on group brainstorming relies on a relatively narrow conceptualization of group creativity as divergent thinking in groups (Paulus, 2000) and predominantly makes use of the more quantifiable and objective operationalizations of creativity in terms of ideational fluency, flexibility, and to a lesser extent elaboration, and originality. In contrast, organizational research adopts a broad, general definition of creativity and uses a range of indicators including not only divergent thinking tests but also, and more frequently, (inter)subjective creativity assessments of an individual's or team's output through selected experts (Egan, 2005), researchers (e.g., Taggar, 2001, 2002; Pearsall, Ellis, & Evans, 2008), the teams' supervisors (e.g., Gilson & Shalley, 2004; Kratzer, Leenders, & van Engelen, 2004; Kurtzberg, 2005), and/ or the participants or their peers (e.g., Kratzer, et al., 2004; Pirola-Merlo & Mann, 2004; Kurtzberg, 2005; Chen, 2006).

Perhaps not surprisingly, given these differences in the traditional ways to conceptually and operationally define team creativity within these streams of research, a number of our findings suggest that the results obtained when focusing on these different indicators do not perfectly align. Most importantly, the results of chapter 3 indicate a moderating role of within-team feedback on diversity's influence on team creativity challenge the common brainstorming wisdom to refrain from evaluative reactions to the ideas of others (Camacho & Paulus, 1995). In a related vein, whereas brainstorming research points to the manifold ways in which team interaction may foster production blocking (Diehl & Stroebe, 1987) and cognitive interference (Nijstad, Diehl, & Stroebe, 2003) and suggests remedies to these problems that largely aim to curtail immediate interaction (e.g., Dennis & Williams, 2003), the results reported in the three empirical chapters consistently demonstrates that team-focused cognitions and behaviors as well as team information processing patterns as the key to higher team creativity. Finally, although not part of the major analysis of either paper, the data for all three empirical chapters

shows that the relationships between the number of distinct ideas suggested in a team's discussion and the creativity of the final idea (chapters 2 and 4) as well as between the number of ideas mentioned in a team's assignment and the maximum creativity of these ideas (chapter 3) are moderate at best. This implies that the different conceptualizations do not only represent different perspectives on the same phenomenon but rather different phenomena. Minding these differences and being consistent in the labeling, definition, and discussion of these phenomena might constitute a further step in increasing our knowledge of how teams perform creatively – from the initial generation of ideas to the elaboration and development of these ideas into final plans.

Concluding Remarks

As its overall title suggests, in this dissertation I set out to explore the conditions under which teams achieve higher levels of creative synergy by optimally using and integrating the different information and perspectives team members hold. Taken together, the reported results of the empirical chapters indicate that although these broader cognitive resources may present these teams with a higher creative potential, its realization critically hinges on the team information processing mechanisms these team members engage in and the team member behaviors and cognitions, as well as the external factors that shape the nature of these processes. In addition to pointing to several factors that may influence the extent to which creative synergy is achieved by teams (i.e., team members' perspective taking, mutual feedback, and the valence of external feedback) and the processes underlying these effects (i.e., information elaboration, cognitive stimulation), the results, in a broader sense, also inform the extent to which different streams of research on creativity (i.e., group brainstorming, organizational research on individual- and team-level creativity respectively) may mutually inform each other. Although the discussed implications indicate that certain synergies may arise, the outlined differences in findings in conjunction with the conceptual problems that arise when generalizing across levels of analysis or research traditions emphasize that these synergies are not an automatic consequence of a growing number of studies on team creativity. Instead this creation of synergies between research traditions and levels of analysis requires researchers to carefully consider and elaborate on the available information and research perspectives. We hope that the

reported research presents a first step in this direction and serves as a stepping stone for future research investigating the contingencies surrounding the ways teams develop creative solutions.

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Appendix: Coding Scheme Information Elaboration

The definition of information elaboration as the exchange, individual-level processing, discussion, and integration of different perspectives and information specifies a set of interrelated processes that are logically ordered in a way in which the higher order sub-processes presuppose the lower order sub-processes. In line with this definition, elaboration was coded on a scale from 1 to 7 that indicates the extent to which teams engage in the full set of inter-related processes that jointly define elaboration. A score of 1 was given to teams that immediately started developing ideas with little or no systematic discussion of the information and/ or the different perspectives. A score of 2 was given to teams in which members expressed most of the information about the theater and the different perspectives but this was largely ignored by the fellow team members. Teams received a score of 3 when the information about the theater and the perspectives was expressed and acknowledged by some but not all team members. Teams received a score of 4 if all members acknowledged the information and perspectives shared by their team members but no attempts were made to jointly discuss or elaborate on this information. A score of 5 was awarded when all the previous conditions for a score of 4 were met and teams additionally engaged in a constructive joint discussion in which different pieces of information and perspectives were used to elaborate on each other's ideas and suggestions. Teams were assigned a score of 6 if they additionally developed suggestions to combine at least two of the different perspectives and information sources. Finally, a score of 7 was awarded to teams that fulfilled the criteria of scale level 5 but developed suggestions to integrate all three perspectives or three different information sources on the task.

Summary (English)

This dissertation investigates the conditions and processes that enable teams to develop more creative solutions and optimally use their informational resources for higher creativity. Whereas teams, especially those composed of members with different task-relevant information and perspectives are considered a particularly viable means to the end of higher creativity, systematic research on the factors that facilitate team creativity and the processes conducive to it is sparse and its findings remain fragmented to date.

The three empirical studies included in this dissertation contribute to a more complete understanding of how teams achieve creative outcomes by addressing different aspects of this question. Our findings highlight that other-focused behaviors such as perspective taking and mutual feedback between team members represent important mechanisms to bring out the potential of team diversity for team creativity. Furthermore, on the basis of an in-depth behavioral observation of the teams throughout their creative process, we are able to develop a more nuanced understanding of the processes that underlie these observed effects. This analysis yields converging evidence for the importance of information elaboration as a precursor of higher creativity in diverse teams but not for other processes frequently suggested to transmit the benefits of diversity when they occur. Finally, the reported research points to the differential impact of formal external interventions in shaping team processes and information processing mechanisms in teams with diverse informational resources.

Together, the reported research has important implications for future work on team creativity, diversity, and team processes. With regards to team creativity and diversity the results call into question the straightforward nature of the frequently proposed link between diversity and creativity and highlight a number of important moderators of this effect. Moreover, the findings indicate that the relationship between creativity and its antecedents at the team level do not fully mirror the effects observed at the individual level of analysis. Finally, they direct attention to the need to systematically investigate the extent to which diverse and homogeneous teams react differently to common managerial interventions such as feedback.

Summary (Dutch)

Deze dissertatie onderzoekt de voorwaarden en processen die teams in staat stellen om meer creatieve oplossingen te ontwikkelen en informatiebronnen optimaal te benutten voor meer creativiteit. Hoewel teamwerk, en in het bijzonder in teams die bestaan uit leden met verschillende taak-relevante informatie en gezichtspunten, wordt beschouwd als een bijzonder vruchtbare methode om meer creativiteit te bereiken, is systematisch onderzoek naar de factoren die bijdragen aan team creativiteit en de processen die eraan ten grondslag liggen tot op heden slechts gefragmenteerd beschikbaar.

De drie empirische studies die deel zijn van deze dissertatie dragen bij aan een completer inzicht in hoe teams creatieve uitkomsten bereiken door verschillende aspecten van deze vraag te belichten. Onze bevindingen benadrukken dat gedragsvormen gericht op anderen, zoals het innemen van de anders' perspectief of wederzijdse feedback tussen teamleden, belangrijke mechanismen vormen voor het uiten van het potentieel van diversiteit in teams voor creativiteit. Bovendien hebben we, op basis van een diepgaande gedragsobservatie van de teams gedurende het creatieve proces, de mogelijkheid gehad een meer genuanceerd beeld te vormen van de processen die ten grondslag liggen aan de geobserveerde effecten. Deze analyse biedt opbouwend bewijs voor het belang informatie elaboratie als een veroorzaker van hogere creativiteit in teams met hoge diversiteit, maar niet voor andere processen die regelmatig worden voorgesteld als overdrager van de voordelen van diversiteit wanneer deze voorkomen. Tot slot geeft dit onderzoek de onderscheidende invloed van formele externe interventies aan voor het vormen van teamprocessen en mechanismen voor informatie verwerking in teams met diverse informationele bronnen.

Het onderzoek in deze dissertatie heeft gezamenlijk belangrijke implicaties voor toekomstig onderzoek naar creativiteit in teams, diversiteit en team processen. Met betrekking tot creativiteit in teams en diversiteit stelt het onderzoek vraagtekens bij de directe aard van de veel voorgestelde relatie tussen diversiteit en creativiteit, en belicht het een aantal belangrijke moderatoren van deze relatie. Bovendien geven de bevindingen aan dat de relatie tussen creativiteit en zijn antecedenten op team niveau niet precies de tegenhangers zijn van de effecten die zijn vastgesteld op individueel niveau van analyse.

Tot slot richten de resultaten de aandacht op de behoefte aan systematisch onderzoek naar de mate waarin diverse en homogene teams verschillend reageren op interventies van het management, zoals bijvoorbeeld feedback.

About the Author

Inga Jasmin Hoever was born in 1982 in Hürth, Germany. She obtained her Diplom in Psychology from the University of Cologne in 2007. During her time as a student and before joining the ERIM PhD-program she worked in a number of research projects in the field of Cognitive Psychology.

In 2008, Inga started her PhD-candidacy in the Department of Organisation and Personnel Management at the Rotterdam School of Management, Erasmus University Rotterdam. In her dissertation, she investigates the factors that contribute to a team's capacity to develop creative ideas and solutions. As part of her PhD-trajectory, she spent four months as a visiting scholar at Rice University. Inga's research interests include team diversity, team creativity, as well as the communication and interaction patterns in teams. Her work is forthcoming in the *Journal of Applied Psychology* and some of her prior research has appeared in the *Journal of Memory & Language* and *Memory & Cognition*. Inga has presented her work at various international conferences such as the meetings of the *European Association for Work & Organizational Psychology* and of the *Academy of Management.* In 2010 and 2012 her work was also featured in the Best Paper Proceedings of the Academy of Management Meeting. Currently, Inga works as an Assistant Professor in the Department of Economics and Business at the Universitat Pompeu Fabra, Spain.

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DIVERSITY AND CREATIVITY
IN SEARCH OF SYNERGY

In this dissertation, I investigate the conditions and processes that enable teams to optimally use their informational resources to develop creative solutions. Whereas teams, especially those with diverse task-relevant information and perspectives, are considered a viable means to the end of higher creativity, systematic research on the factors that facilitate team creativity and the processes conducive to it remains sparse to date.

The three empirical studies included in this dissertation extend this understanding of how teams achieve creative outcomes. The findings highlight the role of other-focused behaviors including perspective taking and feedback between teammates in bringing out diversity's potential for team creativity. Furthermore, in-depth behavioral observation of the teams' creative process yields converging evidence for the importance of information elaboration as a precursor of higher creativity in diverse teams but not for alternative processes frequently suggested to transmit the diversity's benefits instead. Finally, the reported research points to the differential impact of formal external interventions in shaping team processes and creativity in diverse and homogeneous teams.

Together, these findings have important implications for future research on team creativity, diversity, and team processes. They call into question the straightforward nature of the frequently proposed link between diversity and creativity and identify important moderators of this effect. Moreover, the findings indicate that the relationships between creativity and its team-level antecedents are not fully homologous to the established individual-level relationships. Finally, the results underscore the need to systematically investigate the differential impact of managerial interventions such as feedback on diverse and homogeneous teams.

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