Information diversity and group culture of creativity: A look into the innovation paradigm

JAYARAM UPARNA
Department of Psychology
Rutgers University
311 N. Fifth Street
Camden, NJ 08102
Phone: 856-225-6120
Fax: 856-225-6602
E-mail: upparna@camden.rutgers.edu

This research has been inspired, mentored, focused and finalized by my mentor **Dr.Katerina Bezrukova**. Every single word in this document is a reflection of her dedication to impart some of her knowledge to me.

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Address correspondence to Jayaram Uparna, Department of Psychology, Rutgers University at Camden, 311 N. 5th Street, Camden, NJ 08102 or via email upparna@camden.rutgers.edu, phone: 856-599-4336.

Do the trees not live? Do the bellows not breathe?

Do not the animals frolic and eat?

What differentiates you, child, is

***Knowledge**.*

-The Bhagawata Purana.

Dedicated to the sacrifices made by my family.

Yes mom, I know when you chose to walk so that I could have the bus fare,

Dad, I know how hard you work so that I can concentrate on studying,,

Suni, you have taught me the meaning of strength.

INFORMATION DIVERSITY AND GROUP CULTURE OF CREATIVITY: A LOOK INTO THE CREATIVITY PARADIGM

Abstract

This paper proposes a model of group culture, faultlines, and outcomes to explain how group faultlines can help solidify a group culture of creativity and influence performance in diverse workgroups. The hypotheses are tested using an archival field methodology and qualitative and quantitative data from 74 workgroups in a Fortune 500 company. The results reveal that the moderating role of actual culture in the positive impact that desired culture has on group performance is significant for the groups exhibiting strong information faultline strength. The implications of these findings for diversity training, HR programs, etc are discussed with an emphasis on information diversity.

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Key words: faultlines, information, diversity, creativity, innovation, group culture, organizational culture, dynamic culture and culture shift

Teamwork is now becoming ubiquitous in the business world, with this trend influencing a wide range of professions from scientific research to information technology (Guzzo, 1996; Wuchty, Jones & Uzzi, 2007). People bring a rich repertoire of experiences and unique viewpoints with them when they work together as a team, and this dissimilarity in perceptions provides a fertile ground for forging creative solutions (Ancona & Caldwell, 1992; Austin, 1997; McLeod, Lobel, & Cox, 1996; Nemeth, & Ormiston, 2007; Paulus, 2000; Pirola-Merlo & Mann, 2004; Perretti & Negro, 2007; Taggar, 2001; Thornburg, 1991; West, 2002a; 2002b). Couple this with the financial power that innovation engenders (Vanhaverbeke & Peeters, 2005), and it becomes clear why more and more businesses are focusing strategies to harness the advantages of diversity. It is thus very important for us to study in detail how the diversity and creativity interact, so that we can understand the interplay better. This is the broad focus of my study.

The dispersion of demographical attributes (e.g., race, gender) has been the traditional way to study diversity. Lau and Murnighan's (1998) genius lay in departing from this view and in accounting for the alignment of individuals along multiple attributes, thus splitting a diverse group into smaller subgroups of relatively uniform sub-group members. These imaginary lines splitting these groups are referred to as faultlines. This alignment of individuals along multiple lines is a complex interpretation, with several endemic inconsistencies. For example, while individuals (X) (Y) and (Z) in a team may split along (XY) and (Z) because both (X) and (Y) work in the same department, the same team may also split as (X) and (YZ) because the (Y) and (Z) are both engineering graduates whereas (X) is not. This complexity in accounting for multiple attributes both integrating and segregating subgroups may be one of the reasons for the divergent view of faultlines' effects on various team and individual outcomes. While Lau and Murnighan (1998), Pearsall, Ellis and Evans (2008) and others provide evidence for faultlines

being detrimental for group creativity, others (see Nishii & Goncalo, in press) have opined that such faultlines may actually stimulate creative activities in groups. For example, IBM's "The Black Team" epitomizes the idea of faultlines as having the potential to facilitate group creativity. Here, a faultline existed between testers (whose sole purpose is to find flaws in indigenously developed code) and the developers, both of which are the mainstays of software companies. Such group division brought in a spirit of competition across faultline subgroups that ultimately helped the team to come up with and share more ideas while dealing with mundane tasks such as testing (DeMarco & Lister, 1999). Gibson & Vermeulen's (2003) idea of faultlines operating as "healthy divides" also helps us understand how faultlines may act as positive forces bringing about healthy competition and facilitating creativity in diverse groups. The terms "diversity" and "diverse" used in this paper refer to forms of cognitive diversity primarily (information diversity) unless mentioned otherwise.

Several studies have looked at how group composition and *culture* interact to affect group performance (Chatman, Polzer, Barsade, & Neale, 1998; Ziller, Behringer, & Goodchilds, 1962) and group creativity and innovation (Bain, Mann, & Pirola-Merlo, 2001). These traditional approaches of organizational culture conceptualize it as an endemically stable entity – leading Mills (2002) to term this as a 'snapshot' approach (Audia & Goncalo, 2007; Caldwell & O'Reilly, 2003; Flynn & Chatman, 2001; O'Reilly & Chatman, 1996). While this research has added many important insights to our understanding of cultural influences, what has largely been missing is an examination of how culture may evolve over time and what factors may trigger the shifts in group culture.

Hence, I intend to explore the dynamic nature of team culture. I argue that a culture shift will occur when a group's desire and need for creativity is well recognized, accepted, and

manifested in actual creativity culture and that this process will be facilitated by group faultlines. As Perretti and Negro (2007) further noted, group composition may induce exploration and creativity, yet the resulting product may not necessarily achieve commercial success. I follow their suggestion to develop the links across various dimensions of group performance, and consider creative as well as practical performance of diverse groups.

The topic of culture has attracted a lot of attention in the management field and has often focused on organizational culture, conceptualizing it as a complex set of values, beliefs, assumptions, and symbols that define the way a firm conducts its business (Barney, 1986). I focus principally on the paradigms of creativity (production of novel and useful ideas in any domain) and innovation (the successful implementation of creative ideas within an organization) (Amabile, 1988). While organizational scholars agree that innovation is critical for organizational survival (Flynn & Chatman, 2001), long-term corporate success (Amabile, 1997), and employees' interest and engagement in work (Kozlowski & Farr, 1988), little is known about how group cultures cultivate such innovation and creativity. Besides, most research on culture has emphasized the homogeneous and undivided nature of culture in an organization (e.g., Chatman et al., 1998; O'Reilly, Caldwell, & Barnett, 1989); yet largely missing in this prior work has been its extension to group culture (see for an exception Jehn, 1994; Self, Holt, & Schaninger, 2005). I therefore, concentrate on *group culture* that revolves around an important aspect of *creativity*. Creativity-focused group culture refers to the extent to which group members value and encourage the development of novel ideas, challenge traditional ways of doing things, learn from others (with regard to experiences, backgrounds, and work) and believe that creativity is important for their group (adapted from Van der Vegt, Van de Vliert, & Huang, 2005).

Research, which primarily views organizational culture as a relatively *stable,* structured set of symbolic meanings shared by a group of people, has contributed significantly to our understanding of organizational processes (Audia & Goncalo, 2007; Caldwell & O'Reilly, 2003; Flynn & Chatman, 2001; O'Reilly & Chatman, 1996), especially in the area of cross-cultural comparisons (Goncalo & Staw, 2006). However, there has been some evidence in literature supporting the idea of organizational culture's changing nature: evolutionary and sociocultural psychology has discussed the evolution of culture and views culture as constantly adapting to change, proposing a number of evolutionary models of cultural change (Kashima, 2002; Sterelny, 2006). Similarly, social psychology research also indicates how individuals who interface over time engender norm change (MacNeil & Sherif, 1976; Sherif & Sherif, 1969). Further on, the research on transformational leadership in an organization also points to how certain leadership ideals can seed cultural change, resulting in overall culture change towards quality improvement values and beliefs (Waldman, Lituchy, Gopalakrishnan, Laframboise, Galperin, & Kaltsounakis, 1998). Even though these schools of thought imply that it is difficult to change culture (Dombrowski, Kim, Desouza, Braganza, Papagari, Baloh, & Jha, 2007), a new culture of creativity *can be* developed and become sustainable if certain key elements (e.g., flexibility, collaboration) are embedded in the culture (Dombrowski et al., 2007; Zairi & Al-Mashari, 2005).

In this study, I continue this 'temporal' tradition in research on culture and draw on both Choi's (2004) and Young and Parker's (1999) work that differentiates between desired and actual ideals and views culture as malleable and evolving. According to the authors, when such desired cultural ideals transmute into actuality, a culture shift is said to have occurred. In other words, a culture shift towards creativity occurs when a set of desired ideals and goals regarding

levels creativity within a group (desired culture) becomes accepted and actualized in practice and norms within the group, and the group actually starts functioning on the desired intensity of creative behavior (actual culture). A desired culture of creativity exists within the group when there is recognition within the group of a common desire regarding creativity that is yet unattained. An actual culture of creativity is when these desires are realized and become recognizable norms of the group processes. The scope of this topic in the current paper is to determine *if* the said shift occurs, rather than exactly *when* it occurs, within a given time frame in a group. I extend this prior work and examine the process by which a desired culture of creativity changes into actual culture of creativity in diverse groups. Desired culture of creativity reflects a group's need for a social environment that accepts creativity and innovative ways of doing things and promotes beliefs in value of creativity (adapted from Choi, 2004). Actual (or current) culture of creativity refers to a group's cognitive representations of the present work environment and the extent to which this environment accepts and encourages creativity (adapted from Choi, 2004). I further argue that a culture shift will occur when a group's desire and need for creativity is well recognized, accepted, and manifested in actual group culture of creativity and that this process will be moderated by group faultlines.

Group Composition, Information Faultlines, and Creativity

Research indicates that behaviors like creativity, in a group, are influenced by both contextual (organizational culture) and structural (group composition) factors (Chatman et al., 1998). There is also evidence that suggests that the surface level characteristics of group members (ethnicity, gender etc.) may affect various group processes and outcomes (including

creativity) (c.f., Harrison & Klein, 2007; Williams & O'Reilly, 1998). Although this research has led to many important insights, they have largely been inconsistent. Recent research has looked at group composition in a different way: as a moderator in influencing the attitudes and behaviors in diverse groups (e.g., Cummings, 2004; Joshi, Liao, & Jackson, 2006). I extend this line of research by focusing on the moderating role of group faultlines. This is also because past research has primarily examined faultlines as factors affecting group processes and outcomes (e.g., Homan, Van Knippenberg, Van Kleef, & De Dreu, 2007; Lau & Murnighan, 2005; Molleman, 2005; Polzer, Crisp, Jarvenpaa & Kim, 2006) and not as catalysts which impact outcomes within boundary conditions.

Although faultlines can arise from differences across a number of dimensions, I focus on the kind of faultlines that develop along informational attributes. Information faultlines are group splits based on differences in task-relevant categories; they are based on attributes of individuals that are directly related to their professional performance (Bezrukova, Jehn, Zanutto, & Thatcher, in press). Examples of facets of information faultlines include education (both field and level), amount of work experience relevant to current job, tenure in a company, position in organizational hierarchy, pre-task information level etc.

This choice of information faultlines was driven by two reasons. First, researchers have suggested that the effects of diversity depend on the degree of job-relatedness of the attribute (Webber & Donahue 2001) and the potential for information use (Dahlin, Weingart & Hinds 2005). Jehn and her colleagues (1997; 1999) have also stressed the value in differentiating between types of diversity. There has been prodigious research on the impact of demographical faultlines on the team processes and outcomes (e.g., Earley & Mosakowski, 2000; Lau &

Murnighan, 2005; Li & Hambrick, 2005; Molleman, 2005; Pearsall et al., 2008), yet little is known about the effects of information faultlines.

Second, I believe that this type of faultline would have most implications for creative processes in diverse groups. Research suggests that diversity can widen the scope of disparate, external information. For example, people with dissimilar experience, background or perspectives may bring all of these into problem solving discussions, thus increasing the possibility for creative solutions to be sparked (Watson, Kumar, & Michaelson, 1993). De Dreu and West (2001) have also indicated that informational diversity and opinion minorities may elicit more out-of-the-box thinking and creativity. Additionally, research on new members of a group has shown that new configurations reached because of their addition (i.e., newcomers versus old-timers) may actually stimulate creativity (e.g., Choi & Thompson, 2005; Perretti & Negro, 2007). In line with this research, recent theorizing on faultlines has suggested that demographic faultlines can be good for creativity under certain conditions (Nishii & Goncalo, in press). I follow this work and, in contrast to prior work on faultlines (Lau & Murnighan, 1998; Pearsall et al., 2008), argue that faultlines may facilitate creative processes in diverse groups.

Hypotheses

Burrell and Morgan (1979), in their theorizing about multiculturalism, stress that personal ideals and views about distinct cultures may be either explicit (actual values) or latent (desired values). Organizational literature also indicates that people with compatible views about creativity (desired culture) will have a greater probability of coming together and actualizing this in their group culture. When this happens, they may interpret organizational events through this

paradigm. Furthermore, when the desire to achieve goals that are congruent with the organizational goals arises in a team, research suggests that there will be more efforts towards the actualization of these intended cultural changes (Meglino, Ravlin, & Adkins, 1989; Sørensen, 2002).In addition, in group contexts, individuals have been found to offer fewer ideas because of feelings of inhibition and fear of being negatively evaluated by group members (Camacho & Paulus, 1995; Diehl & Stroebe, 1987). However, when members' desire to change towards more creative solutions is expressed in diverse groups, creative ideas are no longer stifled and social inhibition is reduced; this ultimately may manifest itself in an actual group culture of creativity. Thus, I predict the following main effect:

Hypothesis 1 (H1): Desired culture of creativity will be associated with actual culture of creativity in diverse groups.

As teams split and form subgroups across faultlines, this very separation can be a factor affecting group behavior and outcome, which is not seen in a large undivided group. For example, such group splits may lead to detrimental behaviors (Li & Hambrick, 2005), where as members in a subgroup enjoy informational similarities which provide them with social support (Phillips, 2003). This subgroup support network also facilitates within subgroup communication (Lau & Murnighan, 2005), thus enhancing confidence and self-efficacy (Gibson & Vermeulen, 2003). Self-efficacy is an individual's belief in his or her capability to organize and execute the course of action required to produce given attainments (Bandura, 1997: 3). Hence, with their self-efficacy beliefs bolstered, members may feel confident enough to voice their viewpoint, even though it may be divergent. Phillips (2003, study 2) has also shown that subgroup members expect the differences in outgroup member opinions, and that these opinions may be valued. As

such, members of groups with faultlines may adopt an attitude of mutual positive distinctiveness (Brewer, 1999; Cramton & Hinds 2005) and value their informational differences. Under these circumstances, alignments along informational lines may reduce social inhibition and stoke the creative spark necessary for creativity (Nishii & Goncalo, in press).Here, such disparity in viewpoints reduces conformity pressures, allowing group members to defend their opinions in spite of opposition (Nemeth, 1985). The range of ideas and viewpoints expressed and the acceptance of this diversity of opinion may also allow for creativity to grow (Goncalo & Staw, 2006). Further on, this tolerance may also allow members to partner across subgroups (Cramton & Hinds 2005; Gibson & Vermuelen, 2003), and campaign for the benefits of differing viewpoints…thus buttressing an actual culture of creativity. Also, Kanter (1988) notes that the very nature of innovation involves controversy and the conditions that promote creativity should allow for coalition formation. "Innovation requires preserving (not reducing) the uncertainty and diversity in the environment" (Van de Ven, 1988, p.605). Groups with faultlines will tend to be more polarized (Lau & Murnighan, 1998) and hence, these conditions may work as moderators in the change from a desired culture to actual culture. Thus, I predict the following moderated effect:

> *Hypothesis 2 (H2):* The positive effect of desired culture on actual culture of creativity will be stronger for the groups with strong faultlines than it will be for the groups with weak faultlines.

Kirton (1976) has shown that when groups aim for incremental improvement, practical ideas are usually less divergent and more useful, while radical creative ideas can be less practical and take the group in a new direction. Given that efficient behavior (i.e., quantity and quality) may not

necessarily share the characteristics of creative behavior (Staw, 1984), the antecedents of creative performance may differ from those of practical performance. For example, Staw (1995) opines that creative groups must tolerate greater variance in both work attitudes and actions. Hence, the group's goals toward deliverables may not necessarily coincide with its search for new ideas and creative solutions (Bain et al., 2001). In addition, creative teams may have a greater potential for conflict and hence performance losses (Jehn et al. 1997; Pelled, Eisenhardt, & Xin, 1999) due to hindered interactions resulting from members' differences in viewpoints and opinions (Lovelace, Shapiro, & Weingart, 2001; cf., Williams & O'Reilly, 1998). Hence, I argue that groups with a strong emphasis on creativity may not be as efficient as a group without such focus, but they are likely to provide strong impetus for creative ideas.

Hypothesis 3 (H3): Actual culture of creativity will be positively associated with creative performance and negatively associated with practical performance.

2. Empirical Example

The following is an empirical illustration to provide support for the predictions made thus far. The analyses I conducted on archival data completely validate the second and third predictions. I did not find full support for the first hypothesis and find only marginal significance for it. To elucidate, faultline strength was positively associated with actual culture of creativity. Actual culture of creativity was also positively related to awards; yet both desired and actual cultures of creativity were negatively correlated with performance ratings. I examine the relationships between desired and actual culture of creativity, faultlines, and outcomes further using multiple hierarchical regression analyses.

3. Method

Research Site and Data:

Data for this study were previously collected as a part of a large-scale multi-method study conducted at a large Fortune 500 company in the information processing industry. This organization has a long-standing commitment to diversity; a number of practices and initiatives have emerged to promote and maintain diversity within the company. This company is also committed to superior technology and supports it with R&D investment and product innovation. Because the focus on diversity provides ample scope for faultlines to emerge, and because this line of business values innovation, I believe that this company is best suited to test the propositions. Multiple data sources are used: qualitative data come from multiple sources (company documents and a pre-designed, internal HR survey) using different data collection methodologies; while quantitative measures of employees demographic characteristics (to measure group faultlines) and performance are obtained directly from organizational archives.

Sample and Participant demography: Data come from a pool of both quantitative (demographical), and qualitative (resume details, training details, evaluations) of over 2874 employees over collected at 3 intervals (1995, 1997 and 1999). The 1997-1999 timeframe was chosen for analyses because information form personal development plans of employees was also available for this period. Of these, seventy four groups (N ind = 354) were determined as participants. Participants were chosen when they satisfied two criteria: if they reported to a common manager over a two year time period (1997 – 1999) and if the team had at least three members. The workgroups and departments were identified using a reporting system developed by the company and supplementary organizational charts provided by key senior staff. For example, the unique identifier of the manager was used to determine which employees were

reporting to each manager – in turn helping me determine other statistical information of the group (size etc.). In sum, around 35% of the groups had three members, 40% of the groups had between four and ten members, and 4% of the teams had more than ten members. Groups were verified as actual working groups (i.e., they interacted frequently, displayed task dependency, identified with the group, and were seen by others as workgroups, Goodman, Ravlin, & Argote, 1986) via a series of interviews and observations (conducted internally by HR). Mostly top- and middle-level managers who were responsible for a number of complex and non-routine tasks comprised the group. Examples of tasks include monitoring the development, sales, marketing and distribution of the company's products in their respective markets. . The age of employees ranged from 32 to 73 years (M = 56 years, SD = 7.113). Around 75 percent of the employees were male. The majority of employees (90.113%) were white; 4.519% were African American, 1.977% Asian, 3.389% Hispanic. The level of education ranged from grade school to the Ph. D. level; the modal level was a Bachelor's degree. Tenure with the company ranged from 3 years to 43 years (M = 25 years, SD = 8.315).

Faultlines measure: The faultline measures used in this study follow established protocols which stem from Lau and Murnighan's (1998) framework of how group splits can arise due to the alignment of subgroup members over similar demographic attributes. More specifically, the algorithm used here was developed originally by Thatcher, Jehn and Zanutto (2003), and that was recently revised by Zanutto, Bezrukova and Jehn (2004). These algorithms have subsequently been used in other faultline research (e.g., Lau & Murnighan, 2005). Data on employees' functional background, tenure, and education (to measure group faultlines) were obtained directly from organizational archives. These variables were chosen based on previous

research on informational diversity (cf., Shin & Zhou, 2007). The strength of faultline splits is measured using a multivariate measure of group similarities over these 3 variables as stipulated in Jobson's (1992, p.549) research. This statistic measures the degree of correlation of attributes within subgroup members. Faultline strengths range from 0 to 1, with 1 being the maximum faultline strength possible. More specifically, the values of faultline strength ranged from .55 (weak faultlines) to 1.00 (very strong faultlines) in this dataset.

Culture of creativity: The primary source of data for this construct were company documents (personal development plans) that were designed to appraise groups' creativity values based on member needs (desired culture at Time 1) and competencies (actual culture at T2 with a two year time lag. Both the desired culture and actual culture measures defined the scope of management's objectives and values regarding aspects of the workgroup environment in relation to creativity. These measures were chosen based on Boisnier and Chatman's (2003) work which suggests that group members' individual characteristics along with their competencies contribute to the group culture formation. They serve an important function in creating, embedding and transmitting desired cultural attributes (Schein, 1985; Stewart, 1996). Employees with performance-based compensation and their direct reports were required to participate in the process and take responsibility for planning and managing their groups' growth and development. As a part of this process, they were given a company guide describing a set of behavioral values (e.g., "risk taking," "creativity," "leadership," "career"). Each value was described in terms of specific behaviors. Some examples of behaviors describing a "creativity" value were "identifies new approaches to work," "seeks input and ideas from a variety of sources." Participants were then asked to pick only those values they thought were most representative of their group environment.). The members recorded both their opinions of the

group needs and strengths at T1 and T2, which were then corroborated by the immediate group manager (at both times). Each participating employee thus provided information about various behavioral features of their groups that served an important function in creating their group culture (Boisnier & Chatman, 2003). These data were collected with a two year time lag, which allows testing the cause – effect relationships in this study.

Following a content analysis procedure employed in prior research (e.g., Abrahamson & Hambrick, 1997; Kabanoff, 1997), two raters blind to the hypotheses and purpose of the study independently reviewed the company guide describing each behavioral value. The raters then sorted these values (e.g., "Creativity") into a key phrase list (e.g., innovation, creativity) representing creativity based on relevant organizational theories regarding creativity culture (e.g., Flynn & Chatman, 2001), as well as the concepts used in the company's rhetoric. A conventional Pearson product-moment correlation (Schneider, Wheeler, & Cox, 1992) was used to assess the level of initial agreement between the two raters (r = .97). When the key phrase list was complete, the raters searched the data for the words from the key phrase list and summed all the relevant terms describing workgroup creativity culture for each employee report. Bliese's (2000) suggestions were used to test for the level of agreement and the validity of this group-level construct, which have also been used to represent a culture-level variable elsewhere (e.g., Glisson & James, 2002). First, a one-way analysis of variance was done which revealed between-groups variance for this variable significant at the .001 level. To justify aggregation, intra-class correlation coefficient (ICC [1]) analyses that estimates the proportion of variance in the variable between groups over the sum of between- and within-group variance, were performed. The ICC [1] value of .72 was obtained for the desired culture of creativity and the

ICC [1] value of .78 for actual creativity culture and based on this result, I concluded that aggregation was justified.

Dependent Variables. Two outcome variables were obtained from archival company data: awards based on group creative accomplishments and group performance as defined by group managers. Awards were based on team creative performance (teams formally recognized by department or business unit as eligible for an award) and were granted to a team in the form of number of awards and medals. Some examples included "Strathmore Graphics Award - 1st place", "IW Innovation in Imaging Leadership Award." The performance rating awarded by the managers during the company's annual employee appraisal process (5 point scale ranging from 1= Unsatisfactory to 5=Outstanding) was used as the other outcome variable to measure the practical performance of a group.

Control Variables. Group size, group heterogeneity, and faultline distance were included as control variables in regression analysis. Blau's (1977) heterogeneity index (calculated as $H = -\Sigma P_i^2$, where P represents the fractional share of team members assigned to a particular grouping within a given characteristic and i is the number of different categories represented on a team) was used to measure group heterogeneity for categorical variables (i.e., function). The coefficient of variation is used to measure heterogeneity for continuous variables (e.g., tenure) (Allison, 1978) per prior diversity research that compares diversity across groups of different sizes (O'Reilly, Williams, & Barsade, 1998; Pelled et al., 1999; Polzer, Milton, & Swann, 2002). As indicated by Jehn et al. (1999) and used by Polzer et al. (2002), I averaged the heterogeneity variables to arrive at the overall heterogeneity control variable. Group size has been shown to be of great importance for group processes and outcomes (Goodman et al. 1986). The degree of difference between faultline subgroups was controlled using the measure of faultline distance.

The distance measure was adapted from multivariate statistical cluster analysis (e.g. Jobson, 1992; Morrison, 1967; Sharma, 1996) and was calculated as the distance between subgroup centroids (the Euclidean distance between the two sets of averages). Faultline distance can take on values between 0 and ∞, with larger values indicating a larger distance between the resulting subgroups. Possible values of faultline distance in this dataset ranged from 1.78 (weak faultline distance) to 17.45 (very strong faultline distance).

----------INSERT TABLE 1 ABOUT HERE ----------

Hypothesis Testing

The main effects of desired culture of creativity at T1 on actual culture of creativity at T2 (see Table 2, Model 1) are measured at the onset. Step 1 of the hierarchical regression contains controls including group size, heterogeneity, and faultline distance. Step 2 includes the main effect of desired culture of creativity. In partial support of Hypothesis 1, groups with high levels of desired culture of creativity tended to have an actual culture of creativity 2 years later (*Beta* = .220, $p = .061$) as predicted. The change in R squared from step 1 to step 2 for the faultline model indicated a significant increase above and beyond the control variables at $p < .1$.

Hypothesis 2 predicted that the positive effect of desired culture on actual culture of creativity will be stronger for the groups with strong faultlines but become less pronounced for the groups with weak faultlines. In full support of H2 (see Table 2, Model 2), faultline strength moderated the effects of desired culture on actual culture of creativity (*Beta* = .272, $p = .030$). The change in R squared from step 2 (main effects) to step 3 (interaction) for the model indicated a significant increase above and beyond the control variables (8% of the variance in actual culture was accounted by the interaction term). Graphing the relationship reflected that groups

that had high levels of desired creativity culture had higher levels of actual culture of creativity two years later if they had splits along informational characteristics (high faultline strength) (Lau & Murnighan, 1998) (see Figure 1).

Hypothesis 3 predicted that actual culture of creativity would be positively associated with creative performance and negatively associated with practical performance. The results show that there was a statistically significant positive relationship between actual culture of creativity and awards based on creative accomplishments (*Beta* = .333, *p* = .005), in contrast, there was a statistically significant negative association between actual culture of creativity and performance ratings (*Beta* = -.345, *p* = .004). The changes in R squared from step 1 to step 2 for both models indicated significant increase beyond controls. In general, actual culture of creativity accounted for 10.5% of the variance in awards and 11.3% of the variance in performance ratings.

----------INSERT TABLE 2 AND FIGURE 1 ABOUT HERE ----------

5. Discussion

The purpose of this study was to understand the semantics of interplay between group faultlines, group culture of creativity, and group creativity and performance. A theoretical model of culture shifts in diverse groups is proposed and the relationship between a desired culture of creativity and an actual culture of creativity is examined. I also investigated how the strength of the information faultline can elicit such culture shifts in teams. Finally, I predicted how group's culture of creativity might have opposite effects on team creativity and group performance. I tested these hypotheses using an archival field methodology and multiple source data (qualitative

and quantitative) from 74 workgroups in a Fortune 500 information processing company that has an established track record on diversity commitment and creativity promotion.

Main findings. Although not reaching statistical significance, I found that groups with high levels of desired culture for creativity were more likely to also have high levels of actual culture of creativity two years later (at $p = .06$). This finding provides only partial support for my proposition that desired cultural changes may lead to actual cultural changes in diverse teams (H1). This rather weak support for H1 is not entirely surprising because I further hypothesized that cultural shifts would be contingent upon the strength of information faultlines. One possible explanation is that the positive effects of culture for the groups with strong information faultlines and its negative effects for the weak faultlines groups may cancel each other out so that only a marginally significant effect obtains for the relationship between desired and actual culture of creativity.

Further strong support is found for the second hypothesis suggesting that groups with strong information faultlines may exhibit significantly greater possibilities for the culture shift to occur than groups with weak information faultlines (H2). This finding is consistent with past research on minority influence that has shown how dissent may trigger the free flow of ideas and creativity (De Dreu & West, 2001; Nemeth & Staw, 1989). It is also consistent with past research on diversity and faultlines that has closely looked into the processes behind the effects of group composition on creativity. Homan and colleagues (2007) along with Van Knippenberg, De Dreu, and Homan (2004) have argued that greater information diversity begets more intense elaboration and discussion of the matter at hand due to the variety of information levels available in the team members. Nishii and Goncalo (in press) further opine that groups with strong faultlines may offer some form of social support within their subgroups, and that because of this,

the subgroup members may voice their ideas freely, without fear. This, coupled with the decreased possibility of groupthink in strong faultline teams due to the greater chance of conflict (Jehn, 1994), makes the situation ripe for maximum creativity to emerge. These results extend this past research into the dynamics of cultural shifts and show that information faultlines may have that potential to bring alive such dissent and facilitate the shift in creativity culture from a desired state to actual. I further found strong support for the second hypothesis suggesting that groups with strong information faultlines may exhibit significantly greater possibilities for the culture shift to occur than groups with weak information faultlines (H2). This finding is consistent with past research on minority influence that has shown how dissent may trigger the free flow of ideas and creativity (De Dreu & West, 2001; Nemeth & Staw, 1989). It is also consistent with past research on diversity and faultlines that has closely looked into the processes behind the effects of group composition on creativity. Homan and colleagues (2007) along with Van Knippenberg, De Dreu, and Homan (2004) have argued that greater information diversity begets more intense elaboration and discussion of the matter at hand due to the variety of information levels available in the team members. Nishii and Goncalo (in press) further opine that groups with strong faultlines may offer some form of social support within their subgroups, and that because of this, the subgroup members may voice their ideas freely, without fear. This, coupled with the decreased possibility of groupthink in strong faultline teams due to the greater chance of conflict (Jehn, 1994), makes the situation ripe for maximum creativity to emerge. These results extend this past research into the dynamics of cultural shifts and show that information faultlines may have that potential to bring alive such dissent and facilitate the shift in creativity culture from a desired state to actual.

Finally, I found strong empirical evidence for my proposition that when the actual group culture of creativity is fully realized, there will be more creativity in teams, but group performance may be adversely affected (H3). This finding is again not surprising, as past research has shown how quantity of ideas can be negatively correlated with their quality. For instance, Cady and Valentine (1999) report the negative correlation between these two constructs (r = -.34, p < .01). Because a creative idea usually requires one to do something in a new and different way (Amabile, 1988), the greater the novelty of an idea the more likely will there be a departure from current organizational beliefs and values. This is probably why managers may perceive groups with a strong innovative drive as inherently threatening and evaluate group performance as low. It is also possible that the dissent caused by this drive towards creativity may lead to more conflict within the group and may thus provide more impetus towards deviation from the smooth functioning of the team. On the other hand, the managers are goal-oriented and conduct evaluations frequently on the "bottom-line" basis where the absolute outcome achieved by the employee is measured, while ignoring the other intangible contributions to the group processes. This downward spiral born from the strong affiliation with creativity may have a deleterious effect on performance outcomes and may lead to a negative appraisal by the manager.

Study Limitations and Future Research. Some limitations of this study are common to demographic studies that use archival file data. First, whereas I was able to construct reliable measures of the culture variables using content analysis of company documents, no direct measures of these variables were available. One may raise the question of how objective these data are since the actual minutes of the group meetings that would demonstrate creative processes or third-party information from the teams' day-to-day functioning that would reflect

espoused cultural values were not available in this study. To account for this, two sources of the data collected from groups' managers as well as from team members are used, both reflecting on desired and actual group culture of creativity. Besides, the data that I used to measure desired culture were collected two years prior to the data on actual culture. I thus believe this study has an advantage over many archival studies because of relevant text data, something often missing in large archival datasets. Another related limitation is sample selection and survivor bias. Groups that ceased to exist within the two year timeframe were more likely to be excluded from the analysis. While this issue appears to be problematic, it is outweighed by the fact that this longitudinal design allowed us to adequately test my hypotheses. Most importantly, the purely cross-sectional design would not allow one to observe the shift in creativity culture from desired to actual over time.

Contributions to theory. This study extends and integrates three independent streams of scientific literature. First, the research on innovation and creativity has been extended. Previous research on creativity has primarily focused on environmental and organizational determinants (Chatman et al., 1998; Goncalo & Staw, 2006). I extend this literature by developing a theoretical model explaining the relationships between group faultlines, culture of creativity, and group creative and practical outcomes. More specifically, I provide empirical evidence for creativity being fostered by a group culture supportive of creativity into the domain of faultlines. This shows how faultlines can be viewed as pockets of social support and contexts that facilitate creativity by directing employees' attention and cognitive energy toward generation of new and useful ideas.

Second, the research on faultlines is extended by conceptualizing them as a structural characteristic of a group that *moderates* the evolution of the team's desired culture into actual

culture of creativity. Since faultlines have a deeply ingrained dichotomy in their role, I focus on information faultlines, as I believe that this type of faultlines would have most implications for creative processes in diverse groups. While prior arguments put forth by Lau and Murnighan (1998) and recently empirically supported by Pearsall and colleagues (2008) focused on the detrimental nature of faultlines, I argue that informational facets of faultlines may produce the potential for creativity. More specifically, this research extends Gibson and Vermeulen's (2003) idea of faultlines operating as "healthy divides" by studying how faultlines act as a *positive* force and a catalyst that stimulates a cultural shift in diverse groups. Finally, despite the fact that the value in diversity hypothesis has emphasized groups' creative and innovative solutions as the expected beneficial outcome of diversity (McLeod et al., 1996), most diversity research has primarily focused on other than creativity and creativity-performance dimensions (c.f., Williams & O'Reilly, 1998). My focus on creative outcomes in addition to group performance allows us to understand better the diversity implications for creative group processes.

A third contribution this study makes is to the literature on organizational culture. I add to research in this domain by applying a dynamic perspective on the micro culture (group level) rather than focusing on invariable nature of macro culture (organizational level). Though organizational culture of creativity and the various factors (information, diversity etc) that influence an employee's assimilation into it are well documented (Baer & Frese, 2003; Flynn & Chatman, 2001; Klein & Sorra, 1996), it has not been studied extensively at the group level (see for exceptions Bain et al., 2001; Caldwell & O'Reilly, 2003). Most research on organizational culture has also viewed culture as a relatively stable structured set of symbolic meanings that are shared by a group of people (Audia & Goncalo, 2007; Caldwell & O'Reilly, 2003; Flynn & Chatman, 2001; O'Reilly & Chatman, 1996). This research takes a 'temporal' perspective and

examines how group culture can evolve over time. More specifically, I examine the process by which a desired culture of creativity changes into actual culture of creativity in diverse groups and focus on how this process will be facilitated by group faultlines. I also address the performance implications of creativity group culture by developing the links across various dimensions of group performance, and considering creative as well as practical performance of diverse groups.

Practical Implications. From an organizational perspective, evidence for H1 and H2 suggests that work groups for whom *creativity* is a critical-to-quality characteristic (e.g., research teams) would benefit enormously by assimilating members from informationally diverse backgrounds. Groups with information faultlines may have the most return on investment in the form of creative outputs, whereas workgroups without such divisions may not achieve the desired outcome. This is only true for the teams where creativity and innovation are required professional qualifications and are main criteria of group performance. For example, propagating a great desire for creativity among teams whose professional concentration should be only on efficiency and practical performance outcomes would most probably be counter productive. In conclusion and at a more general level, by illuminating the interaction between cultural shifts and group faultlines, I have analyzed how group diversity may actually stimulate a shift in groups' culture and indirectly influence group creativity and performance. Thus, a first step has been taken towards developing a new map of the diversity-creativity terrain to help businesses navigate better towards their goals.

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Table 1. Means, Standard Deviations, and Zero-Order Correlations Among Variables.

Correlations	*Mean (N = 74)*	*S.D (N = 74)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Group size	4.783	2.331							
2. Heterogeneity	.325	.133	.261*						
3. Faultline Strength	.857	.999	-.515*	-.149					
4. Faultline Distance	8.735	3.817	.185	-.427**	.039				
5. Desired Culture of Creativity	.587	.115	.115	.059	.049	.041			
6. Actual Culture of Creativity	.030	.084	-.055	-.134	.231*	.098	.208		
7. Practical Performance	3.897	.422	.005	.062	-.056	.028	-.390**	-.336**	
8. Creative Performance	.497	.566	-.112	.037	.006	.143	-.041	.340**	.006

*p < .05; ** p < .01

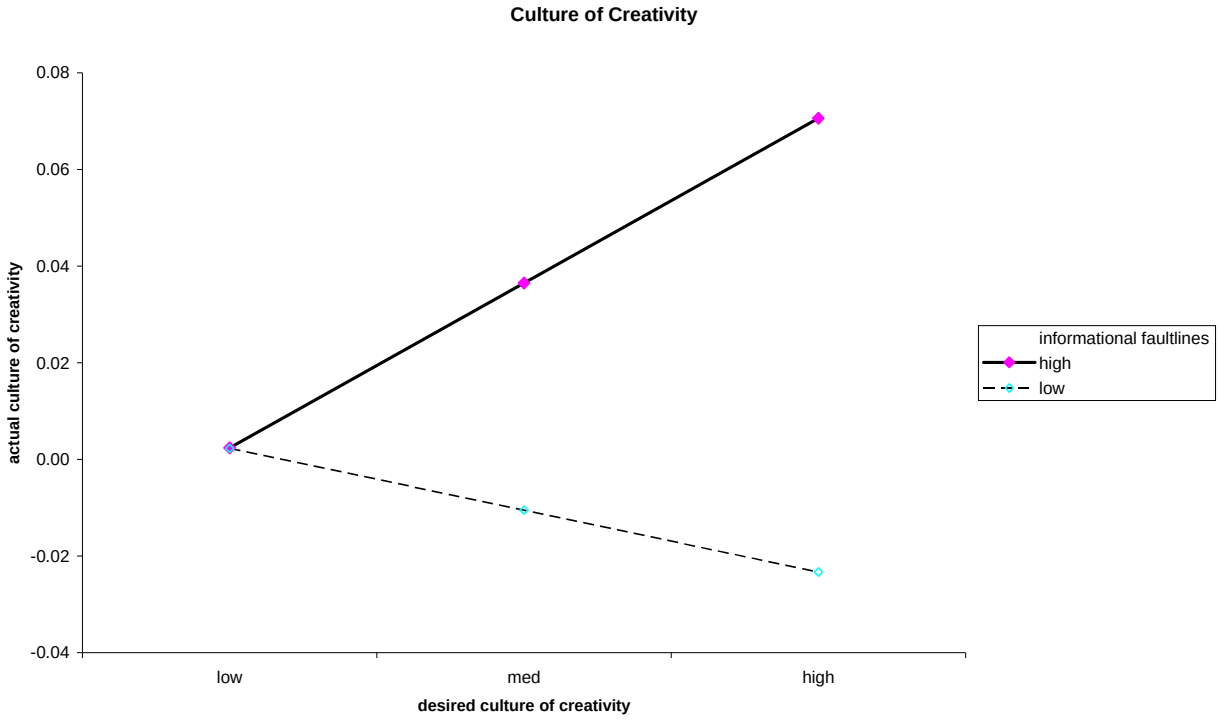
Table 2. Hypothesis Testing using Hierarchical Regression Analysis

DV	Actual Culture	Actual Culture	Creative Performance	Practical Performance
	Model 1 (H1)	Model2 (H2)	Model3 (H3)	Model 1 (H4)
Step 1: Controls				
Group Size	-0.036	-0.036	-0.144	-0.012†
Heterogeneity	-0.207	-0.207	0.003	0.064
Fau Distance (FD)	0.193	0.193	0.168	0.003
R^2	0.049	0.049	0.040	0.004
Adjusted R^2	0.008	0.008	-0.001	-0.039
F	1.190	1.190	0.982	.092†
Step 2: Main Effects				
Desired Culture of Creativity (DCC)	0.220†	0.197†		
Fau Strength (FS)		0.215		
Actual Culture of Creativity			0.333**	-0.345**
Change in R^2	0.048	0.080	0.105	0.113
F change	3.639†	3.124*	8.498**	8.835**
R^2	0.096	0.129	0.146	0.117

Adjusted R^2	0.044	0.065	0.096	0.066
F	1.836†	2.007†	2.940*	2.286†
Step 3: Interaction				
DCC x FS		.272*		
Change in R^2		.060		
F change		4.913*		
R^2		.188		
Adjusted R^2		.115		
F		2.588*		

$^{\dagger}p < .1$; *p<.05; **p<.01; ***p<.001.

Figure 1: Interactions: Moderated Effect of Faultlines[1]



[1] Low and high values represent 1 standard deviation below the mean and 1 standard deviation above the mean. Analysis is based on centered values (cf. Aiken & West 1991).