The Assets and Liabilities of Active Faultlines: The Role of Cognitive and Affective Processes in Team Performance

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The Role of Cognitive and Affective Processes in Team Performance

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Manuscript under review  
April, 2007
Abstract

We test how active faultlines affect group performance through both cognitive and affective integration processes. We develop a framework to explain how and when active faultlines strain the interpersonal relationships within a group or, on the contrary, maintain distinct perspectives and improve performance. We test this theory using 64 MBA project teams. Our findings support our general hypotheses that a common thinking style can integrate distinct viewpoints on the team and promote positive effects of diversity on team performance, while high trust, respect, and liking between group members will limit the negative effects of diversity on team satisfaction.

Keywords: disagreements, diversity, and group performance, faultlines
THE ASSETS AND LIABILITIES OF ACTIVE FAULTLINES:
THE ROLE OF COGNITIVE AND AFFECTIVE PROCESSES IN GROUP PERFORMANCE

The promise of diversity is that it brings together a variety of perspectives that can create novel solutions (Gruenfeld, Mannix, Williams, & Neale, 1996; Williams, Mannix, Neale, & Gruenfeld, 2004) and can help organizations remain competitive (Offerman & Gowing, 1990; Thomas & Ely, 1996). Organizations attempt to increase innovation by assembling diverse people (i.e., different training, background, experience) to work together on a problem. People with diverse backgrounds bring different knowledge bases and ways of understanding their environments (Dougherty, 1992), which can trigger new connections and innovative ideas (Galbraith, 1977; Milliken & Martins, 1996; Williams & O'Reilly, 1998). Moreover, alternative viewpoints can promote the divergent thinking that underlies innovation (Levine, Resnick, & Higgins, 1993; Nemeth, 1986). Thus, diversity is heralded as improving group performance because members’ unique ideas can be synthesized towards newer, better solutions.

Yet, the empirical reality is that diverse groups have a mixed track record (Early & Mozakowski, 2000; Harrison, Price, & Bell, 1998; Pelled, Eisenhardt, & Xin, 1999; Williams & O'Reilly, 1998). Many groups often suffer from misunderstandings, dysfunctionality, ineffective communication, and other problems related to members’ differences (Thomas & Ely, 1996). Diversity’s dark side shows that it can evoke ingroup biases to promote an “us versus them” mentality. Such a mentality can create destructive conflict (e.g., Jehn, Northcraft, & Neale, 1999; Pelled et al., 1999) and dissatisfaction (e.g., Cummings, Zhou, & Oldham, 1993; Thornburg, 1991). Social identification and social categorization processes resulting from diversity can divide a team into subgroups, leading members to have negative views of fellow
teammates and treat them poorly (Lau & Murnighan, 1998). For instance, people in one faction may disparage those in the other, who may do the same in retaliation causing a spiral of dislike (Hambrick & Li, 2005; Lau & Murnighan, 1998). In this study, we seek to clarify the current mixture of results about team member diversity’s benefits by developing and testing a theory of active faultlines that highlights the mechanisms through which team members experience diversity.

Faultlines are hypothetical dividing lines that split a group into relatively homogeneous subgroups based on members’ demographic alignment along multiple attributes (Lau & Murnighan, 1998). For instance, a faultline exists in a team when all the women in a team are young engineers and all the men are old industrial designers. While this example is rather extreme, it reflects the essence of faultlines in their potential to split a team and cause disruptive subgroup dynamics. According to the faultline perspective, faultlines are latent and only have power when subgroups are triggered (Cramton & Hinds, 2005). One of the important insights of this research is the recognition of the two states of faultlines -- potential (latent) and active. Potential faultlines are based on the objective demographics of group members, whereas active group faultlines exist when the members perceive and behave as if they are two separate, different (and potentially even opposed) subgroups. Despite the high level of attention to the faultline phenomenon, recent research has largely focused on the “potential” aspect of faultlines (e.g., Lau & Murnighan, 1998; Molleman, 2005; Thatcher et al., 2003), rather than the examination of active faultlines. Yet, what team members themselves perceive to be splits in the group is critical. The focus of our study is to understand how actively “felt” group splits can be directly responsible for any process and performance losses in diverse groups.
We hence argue that the assets and liabilities of team diversity stem from 1) the presence of active (“felt”) splits that divide the diverse group into subgroups and then 2) how groups use both cognitive and affective mechanisms to overcome (“integrate”) these group divisions, or not. We propose two different mechanisms to explain when active faultlines can help and when they can hurt. One is cognitive integration (CI), which explains how similar members perceive their thought processes to be. It reflects how accurately members believe they can anticipate and comprehend their teammates’ thoughts and ideas. The other is affective integration (AI), which describes members’ attitudes toward one another, specifically their mutual respect, trust, and liking. It can be intuitively understood as how people feel about each other. For instance, Bill’s actual working experience with Jen overshadows the beliefs about one another that come from Bill being an older male industrial designer and Jen being a young female mechanical engineer. Team members might be divided structurally, yet may trust, respect, and like different individuals in the “outgroup.” We argue that the effectiveness of a diverse group should depend on the relative mix of CI and AI; high levels of these constructs should allow teams to maintain a “mutual positive distinctiveness” (Cramton & Hinds, 2005) such that subgroups recognize and mutually appreciate their differences of opinion.

We follow Hackman’s (1987) suggestion to evaluate team outcomes on two dimensions: effectiveness (i.e., how well the team executes its function) and satisfaction (i.e., how positively members feel about the team). Though the dimensions are related (it is easier to feel satisfied with a high performing team), they represent two distinct parameters which must both be in the positive range to ensure long term viability and productivity of a team. We argue that the team’s CI will play a central role in the relationship between active faultlines and team effectiveness and that the team’s AI will play a role in the relationship between active faultlines and team
satisfaction. We use a highly objective measure of team effectiveness – company earnings – that does not conflate perceptions of team attributes with perceptions of team performance. We explore whether the integrating mechanisms of CI and AI mediate versus moderate how active faultlines’ divisiveness influences team outcomes.

**Overcoming Active Faultlines**

Active faultlines can be thought of as team members’ subjective experiences of splits in diverse groups (Cramton & Hinds, 2005). These splits provide the impetus for group members to differentiate themselves across a divide and fracture into competing subgroups (Lau & Murnighan, 1998). The novelty of Lau and Murnighan’s (1998) faultline perspective is in its recognition of the two states of faultlines; faultlines can be potential and latent, and they only become detrimental when they are activated in groups. Although the faultline framework is based on an intuitively powerful idea of group splits being inherently conflictual, there has been little research examining how people perceive, feel, and experience faultlines in diverse groups. Traditionally, faultline research has focused on understanding how the alignment properties of group composition based on *objective* demographic attributes may explain group processes and performance (e.g., Lau & Murnighan, 2005; Molleman, 2005; Thatcher, Jehn, & Zanutto, 2003). Faultlines were assumed to develop from specific categories (e.g., gender, age, functional background) into which team members fall or “assigned to” based on their objective demographic data. While this research has provided some important insights into how faultlines based on objective demographic attributes may explain variance in attitudes and behavior, we believe that true effects of faultlines can be only understood when “feelings” of member subjective experiences are taken into account.
As we try to understand how faultlines exist in the minds of those who perceive them, we also argue that no matter what characteristics align to create dividing faultlines, once activated, competing subgroups are in place. A guiding tenet of the faultline framework is that the intergroup dynamics between emerging subgroups should be stronger than the intergroup dynamics between individuals (matt, please cite any paper by Insko here). Additional perceptual categorizations and behavioral outcomes are expected as subgroups emerge based on overlapping similarities in faultline-based groups. These subgroups, however, may not be categorically harmful or helpful. For example, subgroups can promote healthy competition that improves decision making processes and learning (Cramton & Hinds, 2005; Gibson & Vermeulen, 2003). On the other hand, subgroup formation can set in motion the same ingroup/outgroup processes that can occur between groups (Tajfel, 1982), thus creating conflict (e.g., Jehn et al., 1999; Pelled et al., 1999), dissatisfaction (e.g., Cummings et al., 1993; Thornburg, 1991), and a spiral of dislike (Lau & Murnighan 1998; Li & Hambrick 2005). The critical factor seems to be how teams handle the group division, specifically the cognitive and affective integrating mechanisms they employ to manage the pressure that subgroup formation exerts.

Cognitive Integration and Team Effectiveness

Ideally, diverse viewpoints bring distinct knowledge that is synthesized by the team. This, however, assumes two things: 1) subgroups recognize that the knowledge generated by the other subgroups’ perspectives is “different” rather than “wrong,” and 2) that subgroups are capable of easily integrating the different knowledge. We argue it is not enough for members to accept they have different perspectives; rather, there must be some overarching commonality in
the team’s approach that will allow members to integrate the knowledge that results from those different perspectives.

Cognitive integration is the level of consonance between team members in how they reason, plan, and adapt as they work toward the team’s goal or purpose. This process is analogous to a shared mental model (Cannon-Bowers, Salas, & Converse, 1993; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000), except that a mental model is a model of something (e.g., the team, the task), and the level of sharedness is the similarity of those models. Cognitive integration, on the other hand, has no specific object, but rather represents the assimilation of approaches into a well (or poorly) integrated system. Moreover, CI does not require that a particular logic is shared, but that whichever ones are used are compatible so that they can be integrated. For example, consider a top management team deciding whether to enter a new market. If everyone saw the decision as a matter of determining the likely market size and ROI (their mental model of the task), but everyone had their own risk preference for when these parameters justified the investment, and people had no ability to mitigate each other’s view of risk, the team would have a shared mental model, but low CI. Alternately, if the team all shared a consistent notion of risk and what mitigates it (cognitive integration), but some saw the problem as determined by potential market size, others by ROI, and others by the effects of the new product on the current brand, the team would have high CI but no SMM. Note again that CI is about harmony among the thinking styles of the team members, and this relates more to the approach to problems in general, rather than the definition of any specific problem.

The need for cognitive integration is articulated by Dougherty (1992), who showed how multi-functional teams can have difficulty integrating their knowledge in productive ways because each function has a different lens to understand and interpret information related to the
team’s problem. Dougherty has in essence talked about teams with low cognitive integration, without explicitly naming or operationalizing the construct. The idea that team members interpret problems in terms of their familiar functional domain was originally recognized by Dearborn and Simon (1958). Dougherty pointed out that in addition to seeing the problem differently, the “thought worlds” for each function inhibited the understanding and use of knowledge coming from outside that thought world, thus limiting the purported benefit of different perspectives on a team.

We argue that cognitive integration can merge different thought worlds by creating a meta-framework that helps assimilate foreign knowledge in a consistent way. For example, my subgroup may not be able to generate the idea that your subgroup creates, but with a common interpretive framework, my subgroup can still incorporate the new ideas from your subgroup. Being able to incorporate other subgroups’ ideas means subgroups can build on each other’s ideas. Building on the ideas of others is fundamental to synergy—the notion that the whole will be greater than the sum of its parts. Subgroups’ ability to incorporate and build on other subgroups’ ideas should positively influence group effectiveness. An open question, however, is whether CI results from the divisiveness of active faultlines and subsequently mediates faultlines’ effects on team effectiveness or CI has an independent influence on team effectiveness such that it moderates faultlines’ effects.

Mediation. Faultlines have been shown to have a negative impact on group performance (Lau & Murnighan, 2005; Polzer, Crisp, Jarvenpaa, & Kim, 2006). To say that CI mediates the relationship between active faultlines and effectiveness means that faultlines decrease team effectiveness via lower levels of CI within the team. To wit, faultlines should decrease CI because subgroups might form around shared thinking styles, and members of subgroups are also
likely to develop common ways of thinking over time as they work together. This process might interfere with CI, as team members learn their own subgroup’s thinking style without considering those of others. When subgroups develop distinct ways of thinking, levels of CI are reduced. In this way, active faultlines should diminish the development of CI.

As noted above, when team members are cognitively integrated, they are able to act in coordinated ways because they can anticipate how other team members will react as a problem unfolds. Moreover, due to their shared cognitive framework they are able to integrate and develop the ideas of others. This should have a direct positive influence on group effectiveness. Hence we predict:

Hypothesis 1a: *Cognitive integration will mediate the negative relationship between active faultlines and group effectiveness.*

H1a(1): *Active faultlines will negatively influence group effectiveness.*

H1a(2): *Active faultlines will negatively influence cognitive integration.*

H1a(3): *Cognitive integration will be positively related to group effectiveness.*

*Moderation.* Alternatively, CI might moderate, rather than mediate, the relationship between faultlines and team effectiveness. Using this model, active faultlines again imply that the team is divided into distinct subgroups of different thought worlds, impeding communication and problem solving, and hence reducing team effectiveness as previously discussed. A purely moderated model, however, would also suggest that CI is not directly influenced by active faultlines. Instead CI would be driven by other factors, such as team longevity (assuming more exposure to other team members allows for opportunities to gain greater understanding; see (Weber & Camerer, 2003)). A purely moderated model also assumes that CI will not have a direct effect on team effectiveness, but rather will have its effect only as a mechanism for
bridging the active faultlines. Hence, it is possible that CI only influences effectiveness in groups that need it. That is, cognitive integration should serve as a bridge between subgroups, providing insight into the other group’s cognitive framework. The ability to translate between subgroups (i.e., cognitive integration) should have no independent benefit on group performance (e.g., it would not help produce new ideas or synergies); rather it would just correct a problem that faultlines can introduce. The overall implication is that active faultlines should impede group performance, but not when CI is high.

Thus we hypothesize:

Hypothesis 1b. Cognitive integration will moderate the relationship between active faultlines and team effectiveness. That is, cognitive integration will weaken the negative relationship between active faultlines and team effectiveness.

Affective Integration and Team Satisfaction

Just because a team performs well does not necessarily mean people enjoy being on the team. Active faultlines can be a liability in this regard; if people evaluate those in other subgroups poorly, it will lead to unpleasant interactions between team members. As discussed above, active faultlines should trigger the same categorization processes and negative judgments that are seen amongst groups who view each other as different (Tajfel & Turner, 1986). We expect faultlines to increase mistrust, suspicion, and disrespect of the out-groups, while bolstering in group favoritism (Cramton & Hinds, 2005). Active faultlines are the stimuli that start the categorization processes. The notion that faultlines are active (perceived) rather than just potential indicates that teammates have themselves made distinctions among their teammates. As Cramton and Hinds (2005) argue, subgroups with clear boundaries become ethnocentric, seeing the out-group (i.e. the other subgroups) in overly simplified and negatively evaluated
stereotypes. Once this happens, we expect overall satisfaction with the team as a whole to decrease.

Active faultlines can decrease member satisfaction in one of two ways. First, active faultlines can increase disharmony in the group’s functioning. In this case, each subgroup may blame another for the team’s lack of interpersonal harmony promoting spirals of dislike (Lau & Murnighan, 2005) and decreasing satisfaction. Second, active faultlines can decrease member satisfaction simply because team members prefer to interact with similar others rather than members who are different. Perceived similarities increase people’s mutual attraction and the ease with which they form working relationships (Byrne, 1971; Wexley, Alexander, Greenwalt, & Couch, 1980; Wexley & Pulakos, 1983), perhaps because they anticipate less cooperation and harmony from different others. In both these processes, affective integration, or members’ attitudes towards one another, will be important.

Affective integration is a composite construct representing the psychological bond team members have with one another. Affective integration is not about thinking style or domain knowledge. Affective integration is rooted in how people feel about each other individually, in particular the levels of liking, respect, and trust amongst team members. Liking is a general positive feeling that attracts one person to another (Chaiken, 1987). If I like someone, I would choose to spend time with him or her, and would enjoy his or her company. Respect is esteem for a person based on his or her abilities and character (Cronin, 2004). If I respect someone, I believe that he or she deserves attention and consideration, even if I disagree with him or her. Trust is the belief that the other person tells the truth (Hass, 1981), and will not harm me even if I cannot monitor their behavior (Mayer, Davis, & Schoorman, 1995). If I trust someone, I will allow
myself to be vulnerable to him or her because I believe there is no malice or duplicity in his or her motives.

Affective integration scales to collections of people via a generalization of experience and emotional contagion. That is, if I have a good relationship with an individual, and I categorize this person according to group membership, then I may generalize my positive beliefs to other people who fall into that category. This is like positive stereotyping (Prentice & Miller, 2002), for example, my friends Bill and Joe are likable engineers, therefore I’ll tend to like the other engineers in my team. This process is internal to the individuals, where feelings of trust, respect, and liking will be primed when discovering one person shares a social identity with others (Tajfel & Forgas, 2000). Capitalizing on a more externalized, group level, process, emotional contagion might also act to homogenize feelings within the group (Barsade, 2002). Here, as members interact, they express their positive affect, influencing both the recipient and witnesses to the interaction. Again, we explore the question of whether AI mediates or moderates the relationship between active faultlines and satisfaction.

Mediation. A mediation model suggests that active faultlines reduce team member satisfaction via a reduction in the affective integration in the group. First, the negative judgments arising from social categorization processes inherent in active faultlines should reduce the trust, respect, and liking amongst subgroups. People are suspicious of outgroup members, leading them to make attributions of malice where there may be none, and reducing trust. Categorizing a collection of team members as a separate and “other” outgroup should amplify this effect (Insko, Schopler, & Hoyle, 1990). People will also devalue the outgroup (Glick & Fiske, 2001), reducing members’ respect for those of other subgroups. Finally, people tend to rate dissimilar
others as less likable (Fiske, Xu, Cuddy, & Glick, 1999), and active faultlines call attention to that dissimilarity, reducing liking.

Team members who do not trust, respect, or like one another are unlikely to be satisfied with their team. The day to day experience with teammates will be wrought with negative (e.g., fear, anger) rather than positive (e.g., contentment, happiness) emotions when team members do not trust, respect, and like those with whom they work. Moreover, because team members experience the day to day interactions more frequently than they do specific outcomes or rewards, the negative emotions will be a more constant association with the team. Also, when teams are low in affective integration, they may be more defensive, and thus any disagreeable event can be interpreted as a direct and premeditated attack or the result of malice aforethought, making team life very unpleasant. Teams high in AI would, in contrast, have the emotional wherewithal to bolster against the stress of whatever challenge the team faces.

Hypothesis 2a (H2a). *Affective integration will mediate the negative relationship between active faultlines and team satisfaction.*

*H2a(1): Active faultlines will negatively influence team satisfaction.*

*H2a(2): Active faultlines will negatively influence affective integration.*

*H2a(3): Affective integration will be positively related to team satisfaction.*

**Moderation.** A moderation approach suggests that active faultlines will have different effects on satisfaction depending on the amount of AI in the group. We could argue that as AI increases, it will essentially nullify the negative effects of faultlines on satisfaction. The negative categorization processes discussed above all assume changes in the way team members feel about one another. However, we know from the research on stereotyping (Kunda, Davies, Adams, & Spencer, 2002), and from theorizing about subgroups (Cramton & Hinds, 2005), that
negative evaluation of those that are different does not preclude people from getting along with
and thinking highly of specific individuals who are members of the out group. We believe a
similar argument could be made here; that in groups where trust, respect, and liking have
developed, the evaluation and treatment of team members will be positive enough to mitigate the
negative categorization processes associated with active faultlines much the way positive contact
between groups does as groups interact (Allport, 1954; Pettigrew, 1988).

Hypothesis 2b (H2b). Affective integration will moderate the relationship between active
faultlines and team satisfaction. That is, affective integration will weaken the negative
relationship between active faultlines and team satisfaction.

Method

Participants

Participants were 321 MBA students in 88 five to six person teams. Students ranged in
age from 22 to 54, and approximately one quarter were women. The teams were engaged in a
realistic business simulation called Management Game (Cohen, Dill, Kuehn, & Winters, 1964).
Participation in the study earned students a chance to win 6 prizes ranging from $250 - $550.

Setting

The MBA teams act as the top management team (TMT) of a wristwatch company. The
simulated companies operate in a virtual world for a virtual three-year period over 14 weeks.
Sixty-seven parameters in the simulation (e.g., demand, competition, cost of labor, stock price,
etc.) interactively determine the dynamics of the world, and the worlds evolve over time in
partial response to the organizational decisions made by the teams. The teams make decisions
about issues such as product positioning, production method, distribution channels, R&D
spending, and organizational financing. These decisions are put into the simulation twice a week
as moves. Teams also have to deal with exogenous shocks and opportunities that arise in the world such as a class action lawsuit, a labor negotiation, and a new factory purchase. At the end of each year, the teams present a report to their board of directors, local business executives who volunteer to act in the simulation. The presentations last about three hours. During this time, teams justify their decisions, summarize their market position, and present their strategy for the coming year.

The simulation begins in March. The team presidents are selected by the students via popular vote. The rest of the teams are then picked by the presidents in a round-robin draft. The first year ends with a board meeting in April. The simulation is inactive over the summer break. After summer break, the simulation intensifies. The second board meeting is held after the second simulation year ends the third week in September. It was after this meeting that participants completed the first survey (time 1). The third year and final board meeting took place in mid October. Participants filled out the second group survey after the third board meeting (time 2).

Measures

Faultlines items were adopted from Jehn and Bezrukova, (1993)(2003), affective and cognitive integration items were adopted from Cronin (Cronin, 2004). These were measured at time 1 (the third week in September), see the Appendix for items and alpha levels. Team satisfaction and earnings were measured at time 2 (after the final team meetings in mid October). Satisfaction was measured using the Kunin Faces as anchors (Kunin, 1955), ranging from 1 (very negative) to 5 (very positive). Participants were asked to rate their satisfaction with the team using this scale. Earnings were measured as the gross income of a company minus cost of goods
sold and operating expenses (R&D, salaries, marketing, etc.). These were calculated by an algorithm within the simulation.

**Analysis**

Hypotheses were tested using regression analysis. We ran separate equations to test the AI and CI hypotheses due to the moderate correlation between AI and CI \( (r = .41, p < 01) \) and our relatively small sample size \( (N = 88 \text{ teams}, 64 \text{ teams after attrition}) \). Note, however, that entering both CI and AI, with or without the interaction terms, did not change the pattern of results, although in some cases standard levels of statistical significance were not reached.

**Results**

We aggregated our data to the group level by averaging group member responses. To justify aggregating the data, we calculated the \( r_{WG(j)} \) coefficient (James, Demaree, & Wolf, 1984) for each multi-item scale, all of which were above the standard .70 cutoff (faultlines = .88, AI = .96, CI = .78). Since satisfaction was measured using a single item, we used the \( r_{WG(1)} \) and found it to be slightly low (.55). When aggregating this variable, we recognize that the within group variability is not being captured in our analysis. We collected additional evidence regarding the validity of our group-level constructs, following the suggestions of Bliese (2000). We first conducted one-way analysis of variance and found between-groups variance for the variables significant at the .001 level. To justify aggregation, we calculated the intraclass correlation coefficients (ICC[1]) that estimate the proportion of variance in the variable between groups over the sum of between- and within-group variance. We obtained the following values of ICC[1]: faultlines, .53; AI, .44; CI, .55; team satisfaction, 48. On the basis of these results, we concluded that aggregation was justified.
The number of people on a team who filled out a particular survey ($n_t$) at time 1 or time 2 varied from one to six ($M = 2.4$). To determine whether the scores were affected by the number of respondents per team, we tested whether $n_t$ (the number of respondents per team) was related to the score for each of the different variables using regression analysis. No relationship was found (faultlines: $F_{(1,63)} = 1.31, p = .26$; AI: $F_{(1,63)} = 2.28, p = .14$; CI: $F_{(1,63)} = 0.43, p = .49$; satisfaction: $F_{(1,63)} = 0.64, p = .42$), so elimination of low response rate groups was not necessary. After aggregating the scales to the team level, the variables were centered (Myers, 1990). This was particularly important when calculating the interaction terms, as uncentered data biases the estimates of interaction term Beta weights (Aiken & West, 1991). Table 1 presents the correlations between the variables.

Hypotheses 1a and 1b posited either a mediated (1a) or moderated (1b) relationship between faultlines, cognitive integration, and team effectiveness. There was no evidence of mediation (rejecting hypothesis H1a), as faultlines had no effect on cognitive integration (Std. Beta = -.16, $F_{(1,62)} = 1.69, ns.$) and neither faultlines or CI had an independent effect on earnings (see Table 2, Models 1 and 2 respectively). Instead, cognitive integration moderated the effect of faultlines on earnings (see Table 2, Model 4), as suggested by H1b, although the effect fell just below standard significance levels ($p < .06$). Figure 1 plots this interaction using the approach advocated by Aiken and West (1991), and shows that the form of the interaction deviated from that predicted. We also tested whether the slopes of the lines are significantly different from zero (Cohen, Cohen, West, & Aiken, 2003). The slope of the low faultline group was marginally significantly different from zero ($t_{(62)} = -1.94; p = .056$), while the slope of the line for the high faultline group was not ($t_{(62)} = .58, p = .53$). It appears that in the absence of active faultlines, diminishing CI actually increased group effectiveness (earnings).
Hypotheses 2a and 2b posited either a mediated (2a) or moderated (2b) relationship between faultlines, affective integration, and team effectiveness. Supporting H2a, affective integration fully mediated (rather than moderated) the relationship between faultlines and team satisfaction (Table 3, Model 4). Faultlines decreased satisfaction (supporting H2a(1), see Table 3, Model 1) and AI (supporting H2a(2); Std. Beta = -.39, F(1,62) = 11.32, p = .001). Affective integration improved team satisfaction (supporting H2a(3), see Table 3, Model 1), and when AI was in the same model as faultlines, the faultlines Beta weight became smaller and non-significant (see Table 3, Models 1 and 3). A Sobel test mostly confirmed this (t = -1.87, p = .06). Although the p statistic was just shy of the standard .05 level, we were not concerned because as others have argued, the Sobel test is based on the assumption that the product of the two slopes will be normally distributed (which it is not), so it will typically yield underpowered tests of mediation (Preacher & Hayes, 2004, p. 702).

**Discussion**

Our results show that team integration helps to explain the impact of active faultlines on team outcomes. The story for team satisfaction is one of simple mediation: active faultlines decrease team satisfaction by decreasing the team’s affective integration. Said more positively, teams without active faultlines will tend to be higher in trust, respect, and liking, which will improve members’ satisfaction with the team. Because faultlines can decrease affective integration, it may be useful to counteract this effect by increasing trust, respect, and liking early in a team’s development in teams prone to active faultlines.

The performance story is one of moderation rather than mediation. As hypothesized, when there are active faultlines, CI has a weak positive effect on performance. However, we must interpret these results with caution since the slope for groups with high faultlines was not
significant, although trending in the right direction. It appears that active faultlines interfere with team performance and that CI may aid groups plagued by subgroup distinctions. Subsequent research using larger samples is needed to determine the veracity of this trend. Unexpectedly, cognitive integration was more likely to influence teams who were not affected by subgroup splits; the performance of more homogeneous teams (with limited active faultlines) was lower for teams who reported having similar thinking styles. That is, our highest performing teams were those with low levels of both faultlines and cognitive integration. Although this might appear to contradict our reasoning (that CI helps performance), it does make sense when one considers that diversity of thinking (low CI) can help improve group decision making on complex tasks (Janis, 1972; Nemeth, Mosier, & Chiles, 1992). It appears that diversity of thought can be managed, and in fact capitalized on, but only by groups without active faultlines. Although members of these groups approach problems in diverse ways (i.e., low CI), they appear able to use the differences for the benefit of the group, as evidenced by their company earnings (a highly objective measure of team performance).

Our results also suggest that diverse teams need two concurrent processes to maximize their effectiveness, as the CI and AI processes appear to be quite separate—uncorrelated and operating on different dependent variables. In supplementary regression analyses we found further evidence for the assertion that affective and cognitive mechanisms operate separately. There were no “cross path” effects between AI and CI (i.e., AI did not affect earnings, CI did not affect satisfaction), and the addition of the second team integration term in a given equation did little to change the relationships among the variables (e.g., AI still mediated the relationship between faultlines and satisfaction, with or without CI in the model). Moreover, team satisfaction and earnings were uncorrelated. One implication of these separate processes is that team
interventions need to be directed to the right process. For example, it may be a mistake to hope to make diverse team members more satisfied through improving their coordination and consequently the team’s performance. That may simply delay the point when the team falls apart because the members cannot tolerate each other.

Implications for Theory

Affective integration we see as a critical component of what it means to be part of a team, in that how people “get along” should fundamentally affect the pleasantness or unpleasantness of being associated with a team. This dimension has been explored by others with concepts like cohesion (ref), but AI may be more about the day to day experiences of relating to others. When people have a choice of teams, or decision power over whom to include or exclude, we argue that AI will have a lot of weight in this decision beyond the simple functional analysis.

Although we have used affective integration as a composite for the general way people feel about each other, the components (trust, respect, and liking) are likely to have unique effects on people’s interrelationships. Elsewhere, people have demonstrated differences between trust and respect in their influence on negotiations (Cronin & Weingart, 2005) and group problem solving (Cronin, 2004). Thus there is a research opportunity here to both unpack affective integration, as well as to explore the other consequences of how the interpersonal relationships between team members color their experience of being on a team.

The interaction between CI and faultiness on performance suggests that we should not think about the effect of active faultlines without considering what teams do to bridge those differences. This is consistent with our initial argument, however the form of this relationship was different from what we expected. There was no correlation between faultlines and CI (Table 1), so misunderstanding of other’s knowledge was not the problem that faultlines created.
Rather, the presence of subgroups could make non-conformity threatening, thereby making those with different thinking styles seem wrong because they different (not because they are misunderstood, which was our original thesis). Thus theorizing should recognize that groups with divisions might benefit from CI if something could be done to make the alternative perspectives seem legitimate. Two suggestions would be to increase psychological safety (Edmonson, 1999) so people feel empowered to pursue a minority viewpoint, and to increase identification with the team. Kane, Argote and Levine (2005), found that team identification mediated a group’s likelihood of using useful but novel ideas from new members. Unified teams (low active faultlines) would be able to capitalize on different thinking styles because they are not threatened by outgroup others in the team. However, it is important to remember that teams that are unified can be harmed by that same CI because they become too homogeneous in their thinking. Unified groups therefore need different thinking styles to shake things up.

To understand the “cognitive path” in team functioning will probably require further exploration of the interrelationship of understanding and evaluation. That is, while not understanding a perspective will no doubt negatively impact the evaluation of that perspective, we must also consider the possibility that people do understand each other’s perspectives, but because of their own experience or training, come to different conclusions about the usefulness of these perspectives. These type of disagreements of usefulness are common in cross functional teams solving complicated problems because there tend to be no certain answers (Cronin & Weingart, in press). In this case, more work needs to be done on how active faultlines degrade the evaluation of different perspectives in a prejudicial rather than analytical way.

Limitations and Future research
This research is, of course, not without faults that we hope can be corrected by future research. We studied MBA teams without perfect response rates, these teams were at a specific point in their development (near the point of adjourning), and were a simulated top management team. Thus the results need to be reaffirmed in other contexts. However, much of what we saw fits with theory developed by Cramton & Hinds (2005, see their figure 2), namely that that activation of faultlines can *simultaneously* produce learning and subsequent performance increases as well as ethnocentrism. Although we could not measure potential faultlines (these data were not available), we were able to accurately assess active faultlines by directly soliciting the subgroups experienced by team members. This allowed us to know which categorizations are salient and meaningful to the team members, rather than assuming that, for example, people pay more attention to their ethnicity than functional background or gender.

We have also tried to articulate and test the mechanisms here; cognitive integration helps learning and performance, while affective integration (or a lack thereof) can play a part in ethnocentrism. Cramton and Hinds’ prescription for teams with heterogeneous subgroups is, mutual positive distinctiveness (Cramton & Hinds, 2005), the notion that teams both recognize and value subgroup differences, which fits very well with our concept of team integration. Cognitive integration is an understanding of the subgroup differences, while affective integration is an appreciation of them.

Future research might develop alternative measures of CI and AI. CI, for example, was measured as the aggregation of perceived similarities of thought styles. There may be other ways to capture cognitive integration, such as having group members each solve the same complex problem (as individuals) and then develop a scale to measure the similarity of people’s approach. An alternative would be to see how accurately team members can predict the way which their
teammates might solve a problem, or how accurately they can comprehend each other’s arguments and their implications.

**Implications for Practice**

As noted above, affective integration is the mechanism through which active faultlines decrease team satisfaction. Assuming AI can be isolated and developed separately from the dynamics of active faultlines, interventions that encourage team members to foster the trust, respect, and liking across subgroup divisions will enhance members’ satisfaction. Some interventions already exist; there are a myriad of exercises designed to develop trust within teams (e.g., Newstrom & Scannell, 1980). The large majority of these activities involve exercises outside of the work context and research is needed to determine their impact on affective integration in the workplace. Affective integration might also be increased by promoting activities to help develop liking via personal and familial bonds in a non-work context (e.g., social gatherings for team members and their families). Again, there are a number of research avenues to explore in terms of whether these activities actually develop trust, respect, or liking, as well as the mechanisms through which they operate. For instance, is familiarity enough to maintain liking in the face of an ongoing relationship? Can one have trust without respect? Which of these develop first? Are the development processes asymmetrical (e.g., easier to lose than gain)?

In addition, there may be other ways to develop personal relationships that affect trust, respect, and liking indirectly. For example, increasing cohesion may lead people to opportunities to increase trust, respect, and liking. Alternately, it may be possible to reduce the salience of the subgroups (or faultlines) within the team (Cramton & Hinds, 2005; Lau & Murnighan, 1998). It may be possible to make other distinctions more salient (such as team membership, a shared
superordinate goal, or other characteristics that are shared by team members but differentiate themselves from others) so that people feel less split into factions or more competitive with people outside the group. Future research could address how to minimize the salience of some characteristics while maximizing the salience of others. Alternately, Dougherty & Takacs (2004) describe “team play”, a process by which groups engage in experimentation, heedful interrelating and ultimately innovation. Such heedful interrelating requires a combination of trust, respect, and liking. Future research could look at the various ways each of the subcomponents of affective integration relates to team play.

An important point here is that the trust, respect, and liking must be fostered across subgroup divisions—not simply developed overall. Moreover, as noted above, the direct effect of faultlines on AI suggests that trust, respect, and liking will begin to falter early in teams subject to active faultlines, so that early intervention may be critical.

Whereas affective integration should be developed regardless of faultlines within the group, cognitive integration should only be encouraged when teams are expected to divide into strong subgroups. Cognitive integration might be improved by having one team member shadow another while the target person goes through his/her daily routine. Job shadowing can provide insight into the ways teammates approach the problems that they face on a regular basis. The target person should explain his/her perspective on each given situation when transitioning from one activity to the next (a talk-aloud type of technique). Alternately, the shadowing person can ask questions when puzzled by the teammate’s activities, which promotes the practice of asking for clarification in times of uncertainty. Team members can interview one another to try to understand what goals, constraints, or challenges others face in performing their job. When team members provide one another with information about the methods they use to decompose and
solve problems, it may educate teammates about the other subgroup’s thinking styles, and also make their logic more transparent, and hopefully less disagreeable.

**Conclusion**

Results from testing our active faultline theory show that experienced diversity in teams is an important predictor of both team performance and member satisfaction. Moreover, both affective and cognitive integration play a significant role in understanding the liabilities of active faultlines. Cognitive integration has a moderating effect on team effectiveness. Affective integration has a mediating effect, being directly influenced by active faultlines, AI in turn directly influences levels of member satisfaction. Thus, CI and AI are useful mechanisms that help to reconcile the ongoing debate in the literature regarding the assets and liabilities of diversity.
References


Presented at the International Association for Conflict Management Conference, Seville, Spain, 
July 2005.


Lenth, R. V.; Java Applets for Power and Sample Size; 1/12, 2007.


Cognitive and affective integration


Footnotes

1 Teams had at least 3 different people who filled out the survey, but in some cases there was a single respondent for a team for a time period (specifically, three teams at t1 and one team at t2).

2 This is not surprising given the difficulty of detecting interactions when sample size is not large and reliabilities are moderate as in our study (Aiken & West, 1991). The actual power of the overall equation is .49 (Lenth, 2006).

3 Available from the authors on request.
Table 1. Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Faultlines</th>
<th>Affective integration</th>
<th>Cognitive integration</th>
<th>Satisfaction</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faultlines</td>
<td>--</td>
<td>-0.41**</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective integration</td>
<td>-0.16</td>
<td>0.44**</td>
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<td></td>
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<tr>
<td>Cognitive integration</td>
<td>-0.24†</td>
<td>0.45**</td>
<td>0.03</td>
<td></td>
<td></td>
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<tr>
<td>Satisfaction</td>
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<td>0.04</td>
<td>-0.14</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Earnings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 64 teams; † p < .10, * p < .05, ** p < .01, *** p < .001
Table 2. Cognitive integration moderates the effect of faultlines on team earnings

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faultlines</td>
<td>-.17</td>
<td></td>
<td>-.23 †</td>
<td>-.13</td>
</tr>
<tr>
<td>Cognitive integration</td>
<td>-.15</td>
<td>.15</td>
<td></td>
<td>-.15</td>
</tr>
<tr>
<td>Fau x CI</td>
<td></td>
<td></td>
<td></td>
<td>.26 a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>R²</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>.029</td>
<td>.022</td>
<td>.048</td>
<td>.104</td>
</tr>
<tr>
<td>df</td>
<td>1, 63</td>
<td>1, 63</td>
<td>2, 62</td>
<td>3, 61</td>
</tr>
<tr>
<td>F</td>
<td>1.82</td>
<td>1.40</td>
<td>1.53</td>
<td>2.32 †</td>
</tr>
</tbody>
</table>

Note: † p ≤ .10, a p = .057, *p < .05, **p < .01
Table 3. Affective integration mediates the effect of faultlines on team satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faultlines</td>
<td>-.26*</td>
<td>-.07</td>
<td>-.08</td>
<td></td>
</tr>
<tr>
<td>Affective integration</td>
<td>.39**</td>
<td>.32*</td>
<td>.32*</td>
<td>-.07</td>
</tr>
<tr>
<td>Fau x AI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.067</td>
<td>.151</td>
<td>.139</td>
<td>.144</td>
</tr>
<tr>
<td>df</td>
<td>1, 63</td>
<td>1, 63</td>
<td>2, 62</td>
<td>3, 61</td>
</tr>
<tr>
<td>F</td>
<td>4.42*</td>
<td>11.06**</td>
<td>4.94*</td>
<td>3.35*</td>
</tr>
</tbody>
</table>

Note: † p < .10, *p < .05, **p < .01
Figure 1. Interaction between faultlines and cognitive integration on earnings
APPENDIX. Scale items and reliabilities

Affective integration (alpha = .93)
[r] I do not particularly enjoy my team's company.
I generally like my team.
I am friends with my team.
I would socialize with my team members
I hold the team in high regard
I think highly of my team members
Our team has a reason to be proud
I respect my team members
I trust my teammates
[r] I have little faith that my teammates will consider my needs when making decisions.
I believe my teammates are truthful and honest.

Cognitive integration (alpha = .80)
We tend to think the same way on this team.
My teammates tend to have a similar perspective on things.
Sometimes it is like my team "shares a brain"
[r] We have different thinking styles on this team

Faultlines (alpha = .84)
To what extent has your team split into subgroups?
To what extent has your team cracked into smaller cliques?
To what extent has your team divided into subsets of people?
To what extent has your team broke into two groups?