# Diversity in Demographic Characteristics, Abilities and Personality Traits: Do Faultlines Affect Team Functioning?

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*Abstract*

This study examines the impact of faultlines within teams on cohesion and conflicts. Faultlines concern the attributes of several team members simultaneously and mirror the structure of diversity within a team. The strength of a faultline indicates the level of similarity within potential subgroups and its width the extent of dissimilarity between them. The faultlines addressed in this study are based upon the demographic characteristics, abilities and personality traits of team members. We also address the interaction of team autonomy on the effects of faultlines. Data for this study were collected by means of questionnaires administered to 99 teams of undergraduate students. The results indicate that demographic faultlines directly impair the functioning of a team. Team autonomy conditioned both the relationship between the strength of the ability faultline and team cohesion and the relationship between the depth of the personality faultline and intra-team conflict. In other words, these faultlines are more detrimental to team functioning when team autonomy is high. Ability faultlines seem to emphasize similarities within subgroups, while personality faultlines accentuate dissimilarities between subgroups.

**Key words:** faultline strength, faultline depth, diversity, demographic characteristics, abilities, personality traits, team autonomy, team functioning, cohesion, conflict

## 1. Introduction

Teams are often introduced as a means of both improving organizational performance and enhancing worker outcomes (Cohen, Ledford, and Spreitzer 1996; Manz 1992). Teams are assumed to be capable of increasing an organization's ability to adapt to dynamic environments, of handling products and production processes that are more complex and variable, and of facilitating the mutual adjustment and coordination of the efforts of team members. Teamwork is further assumed to enhance the quality of working life and to entail jobs that are attractive and intrinsically motivating (Niepce and Molleman 1998; West, Borrill, and Unsworth 1998). Research on teamwork has yielded mixed and inconsistent results, however. Various studies have indicated that the positive effects of teamwork are not self-evident and that they are affected by characteristics of the team and its tasks, among other factors (e.g., Balkema and Molleman 1999; Barrick, Stewart, Neubert, and Mount 1998; Barry and Stewart 1997; Campion, Papper, and Medsker 1996; Driskell, Hogan, and Salas 1988; Liden, Wayne, and Bradway 1997; Neuman, Wagner, and Christiansen 1999; Stewart and Barrick 2000; Van Vianen and De Dreu 2001; Wageman 1995).

One important domain within which the effects of team characteristics have been investigated is the field of diversity studies. Lau and Murnighan (1998) and Thatcher, Jehn, and Zanutto (2003) argue that the inconsistency of the results of research on the impact of diversity in teams on team functioning is due to the focus of most studies on a single characteristic. To find more consistent effects of diversity in teams, more emphasis should be given to the *structure of diversity*: the simultaneous consideration of several dimensions of diversity. To consider several dimensions simultaneously, Lau and Murnighan (1998) introduced the concept of group faultlines. According to them, a group faultline "depends on the compositional dynamics of multiple attributes that can potentially subdivide a group" (p. 325), and "group faultlines increase in strength as more attributes are highly correlated . . . increasing the homogeneity of the resulting subgroups"(p. 328). The first contribution of the present study is its analysis of the impact of faultlines on team functioning.

Many authors have suggested that inconsistent findings in team research also may be explained by differences in team task characteristics (e.g., Barrick et al. 1998; Barry and Stewart 1997; Driskell et al. 1988; Hackman 1987; McGrath 1984; Molleman 2000; Neuman et al. 1999; Steiner 1972; Thorns, Moore, and Scott 1996; Tschan and Von Cranach 1996; Weaver, Bowers, Salas, and Cannon-Bowers 1997). The second contribution of the current study is the inclusion of an important characteristic of the team task – team autonomy – in explaining team functioning. More specifically, we argue that team autonomy will intensify the relationship between the structure of diversity in teams and team functioning.

The rest of the paper is structured as follows: In the next subsection, I will introduce the dependent variables, i.e. the team functioning variables 'group cohesion' and 'intra-team conflict'. Next, I will introduce the moderating variable 'task autonomy'. I will end this introductory section with a subsection in which I describe team characteristics and relate them to both dependent variables. In the second section, I will highlight the research method I have used. This section respectively considers the participants and procedure, the measures used and the way in which the data have been analyzed. In the third section, the results are presented, and in the final section these results are discussed.

## 1.1. Team functioning

Group cohesion and intra-team conflict are two aspects of team functioning that have received considerable research attention (e.g., Barrick et al. 1998; Bezrukova, Jehn, and Zanutto 2002; Jehn 1997; Van Vianen and De Dreu 2001; Williams and O'Reilly 1998) and are also the focus of this study. Although there is no general definition of group cohesion (Mudrack 1989), it is clear that cohesiveness is a "shared" construct representing a group-level phenomenon (Klein and Kozlowski 2000). Shared constructs stem from the perceptions of individual team members regarding team characteristics, with the assumption that team members share these perceptions (Chan 1998). Group cohesion refers to the extent to which individual workers identify themselves with the team, are committed to group goals and are subject to the influence of other team members (Guzzo and Shea 1992; Hogg 1992; Tajfel and Turner 1986). As individual team members perceive themselves more as part of the team than as single individuals, group cohesion increases.

A cohesive group has a strong impact on its members, who strive to keep the group intact and remain members of the group, conform to its norms and demands and emphasize its interest above their own. Because the willingness of team members to cooperate increases with the strength of the ties that bind them, cohesiveness is an important characteristic of teams (Mullen and Copper 1994). Cohesiveness emerges from interpersonal attraction and is closely related to the extent to which team members are similar or dissimilar with respect to demographic characteristics, abilities or attitudes (e.g., Castore and Deninno 1977; Hogg 1992; Miller and Suls 1977; Milliken and Martins 1996). Group cohesion is therefore relevant to investigating the impact of the structure of diversity on team functioning.

Intra-team conflict is another important aspect of team functioning (e.g., Jehn 1995; Pelled 1996). Each individual joining a team brings along a unique set of personality characteristics, attitudes, values and methods of working. When working together on a common task, such a mixture of backgrounds is likely to be a source of disagreement, animosity or conflict. Team members may differ, for example, in the extent to which they feel personally responsible for attaining group goals. If some put forth all the effort they can while others behave as free riders, intra-team conflict is likely to arise. Although intra-team conflicts may be functional in some cases (e.g., Jehn 1997; Tjosvold 1997) they are generally considered undesirable, affecting the quality of intra-group life adversely (Saavedra, Earley, and Van Dyne 1993). Intra-team conflict is therefore an important aspect of team functioning to consider when investigating the effects of the structure of diversity.

### 1.2. Team autonomy

This study places particular emphasis on one characteristic of team tasks – team autonomy – that has become a popular item in studies of teamwork in recent decades (e.g., Cohen et al. 1996; Langfred 2000; Parker, Wall, and Cordery 2001; Springg, Jackson, and Parker 2000). Such studies consider team autonomy (or local decision-making) as a key mechanism in team functioning (e.g., Cohen et al. 1996; Dunphy and Bryant 1996; Manz and Sims 1987). The extent to which a team is free to make decisions about goals ("what"), work methods ("how"), planning issues ("when") and the distribution of work among team members ("who") is reflected in the concept of team autonomy (Breaugh 1985; Evans and Fischer 1992; Molleman 2000). The tasks of a more autonomous team are less structured or prescribed by routines from outside and therefore involve considerable decision-making. This, in turn, requires intensive communication and collaboration among team members and the mutual exchange and adjustment of thoughts concerning work methods, planning and the specification of goals. Team members must frequently analyze (or re-analyze) the tasks, appraise (or reappraise) the best working methods and, if necessary, reconsider the group goals collectively.

The extent to which team members must collaborate and mutually adjust their thoughts and actions is likely to accentuate differences between team members and to increase the salience of heterogeneity (Barry and Stewart 1997; Dreachslin, Hunt, and Sprainer 2000; Golembiewski 1995; Iles and Hayers 1997; Williams and O'Reilly 1998; Wrzesniewski and Dutton 2001). Team members are more likely to cooperate, for example, when they share

work-related attiudes. When these attitudes are not shared, however, conflicts are likely to erupt, posing problems particularly for tasks requiring extensive intra-team communication. To give another example, if some members of a team are prone to procrastinate while others deplore such behavior, serious disputes can arise. The problems posed by such disputes may be compounded when team tasks are unstructured and thus require intense collaboration. Consider, for example, a team comprised of some members who prefer unstructured tasks requiring creativity and experimentation and others who fear ambiguity and therefore prefer their work to be highly structured. If teams are heterogeneous on several overlapping dimensions, the chances of conflict increase with the intensity of the collaboration required. Less structured team tasks require more intense collaboration, and therefore are more vulnerable to conflicts arising from dissimilarities within the team (Pelled, Eisenhardt, and Xin 1999). Team autonomy is therefore expected to condition the relationship between the structure of diversity and team functioning.

### 1.3. Team characteristics

This study focuses on team characteristics as *configural concepts* (Klein and Kozlowski 2000). Configural concepts concern attributes of individual team members (such as personality traits, abilities or demographic characteristics) that are not assumed to be shared by all members of the team (see also Milliken and Martins 1996). The distribution of such attributes within a team (also known as *team composition, diversity in teams* or *team heterogeneity*), however, is expected to affect team functioning (e.g., Barrick et al. 1998; Barry and Stewart 1997; Campion, Medsker, and Higgs 1993; Jackson 1996; Jehn 1997; Milliken and Martins 1996; Thoms et al. 1996; Tschan and Von Cranach 1996; Van Vianen and De Dreu 2001). At the level of the team, diversity refers to the dispersion of a particular attribute among individual members (Blau 1977).

Thatcher and colleagues (2003) discuss a broad range of diversity research, concluding that the results of these studies concerning the relationship between diversity and group functioning are mixed (see also Kochan et al. 2003; Milliken and Martins 1996; Williams and O'Reilly 1998), due to the fact that most addressed single configural attributes. Multiple dimensions of individual differences are likely to be salient at the same time and must therefore be considered simultaneously. Because team members may differ with respect to multiple configural attributes, Lau and Murnighan (1998) argue that when different attributes overlap (e.g., when "the woman are the youngsters," or when "the introverts are prudent"), team composition becomes more critical for processes and outcomes. Faultlines mirror the diversity structure of a team, potentially dividing the group into two or more subgroups. If characteristics are highly correlated, faultlines become stronger, increasing the likelihood that subgroups will develop (e.g., Dreachslin et al. 2000; Pelled et al. 1999). Social categorization theory argues that group members tend to increase social interaction within their own subgroups and decrease their communication with other subgroups, thus reducing cohesion and social integration for the whole group (Dreachslin et al. 2000; Hogg and Terry 2000). The few published studies on faultlines show mixed results. Thatcher et al. (2003), for example, found that demographic faultlines have no effect on team functioning,

while knowledge faultlines have a negative effect. Bezrukova et al. (2002), however, reported that teams with stronger demographic faultlines have more conflicts. The present study considers the impact of faultlines arising from three categories of individual characteristics: demographic characteristics, abilities and personality traits.

### 1.3.1. Demographic characteristics

Diversity in such demographic attributes as gender, race and age has been studied extensively. Golembiewski (1995) argues that increasing diversity in the labor market is demographically inevitable and that managing demographic diversity in organizations is therefore one of the major management challenges for the coming decades (see also Milliken and Martins 1996). Although most studies indicate that similarity in these attributes enhances mutual liking and team functioning, and that demographic diversity decreases both social interaction and social integration (Dreachslin et al. 2000; Harrison, Price, and Bell 1998; Hinds, Carley, Krackhardt, and Wholey 2000; Milliken and Martins 1996; O'Reilly, Caldwell, and Barnett 1989; Pelled 1996; Tsui, Egan, and O'Reilly 1992), the overall results of demographic research have been mixed (Kochan et al 2003; Williams and O'Reilly 1998).

Lau and Murnighan (1998) state that, in practice, multiple demographic characteristics are salient and therefore suggest analyzing several variables simultaneously. They reason that subgroups become more visible as demographic attributes overlap, setting the stage for social categorization processes, instigating the actual formation of subgroups and the eruption of disputes between them. Social identity research adds that demographic attributes that co-vary increase the likelihood of both subgroup formation and inter-group conflict (for an overview, see Hogg and Terry 2000), and that the effects will be particularly strong under conditions requiring intense collaboration.

The following hypotheses are derived from the arguments discussed above (see also Figure 1): Demographic faultlines will be negatively related to group cohesion within a team (H1a) and this relationship will be strengthened by team autonomy (H1b). Demographic faultlines will be positively related to intra-team conflict (H1c) and this relationship will be strengthened by team autonomy (H1d).

### 1.3.2. Abilities

Diversity of abilities within a team offers the advantage of allowing members to learn from each other and to generate new ideas by combining or merging their qualifications (Jackson 1996). Complementarity of the abilities within a team may enhance the extent to which individual members identify with the team and expect this complementarity to contribute to team performance (e.g., Jellison and Arkin 1977). Being a specialist reinforces feelings of uniqueness and indispensability and draws attention to an individual's contribution to group performance. Studies on diversity show that creativity and motivation are greater in teams whose members differ according to skill or functional background (e.g., Iles and Hayers 1997; Jackson 1996). A substantial body of research has shown, nevertheless, that some overlap in skills and work-related knowledge creates a buffer of capacity that helps the team to deal more effectively with shifts in the demand of work and with fluctuations in the availability of human resources caused by attrition, turnover, absenteeism or illness, among other factors (e.g., Campbell 1999; Ebeling and Lee 1994; Fry, Kher, and Malhotra 1995;
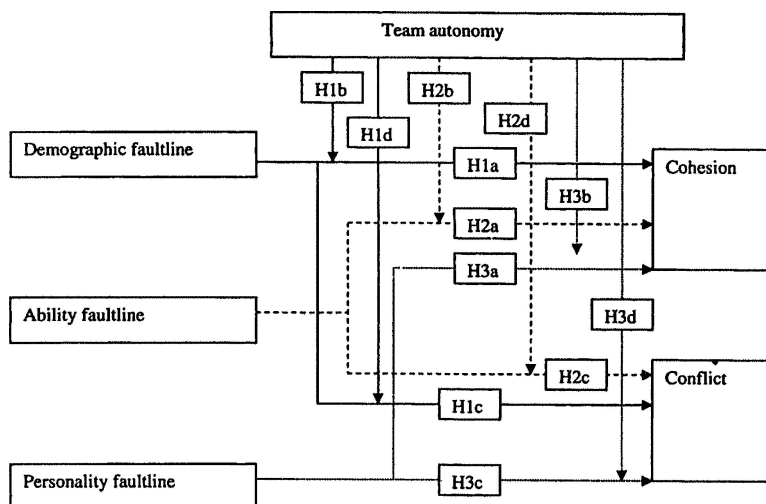
*Figure 1.* The conceptual model (H1a = hypothesis 1a, etcetera).

Malhotra and Ritzman 1990; Molleman and Slomp 1999; Van den Beukel and Molleman 1998).

When abilities overlap, however, subgroups may easily emerge according to qualifications, such that qualifications are similar within but are dissimilar across subgroups. In a study of the effects of various patterns of qualification within teams, Brusco and Johns (1998) found that subgroups of workers were coupled with subsets of qualifications in some patterns while no such overlaps were found in other patterns. Figure 2 provides a rather simple illustration: in the left matrix there are two subgroups of two workers. The two groups have no abilities in common, while within each subgroup the members share all abilities. In the right matrix such subgroups cannot be distinguished. Where qualifications were not coupled, such as in the right matrix, Bruso and Johns found that the workload within the team could be balanced more easily (see also Jordan and Graves 1995). Because
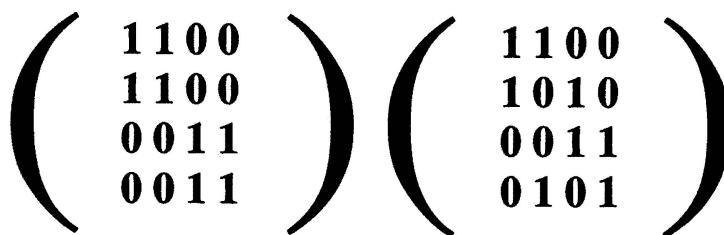
$$\begin{pmatrix} 1\,1\,0\,0 \\ 1\,1\,0\,0 \\ 0\,0\,1\,1 \\ 0\,0\,1\,1 \end{pmatrix} \begin{pmatrix} 1\,1\,0\,0 \\ 1\,0\,1\,0 \\ 0\,0\,1\,1 \\ 0\,1\,0\,1 \end{pmatrix}$$

*Figure 2.* In both matrices, the rows refer to team members and the columns represent abilities. The numeral 1 indicates that the worker has the ability and the numeral 0 indicates that the worker lacks the ability. The left matrix has a stronger ability faultline than the right one.

workers whose qualifications do not align have more opportunities to share the workload and help each other, feelings of interpersonal justice and equity are likely to be enhanced (e.g. Adams and Freedman 1976; Wilke and Meertens 1994). A balanced workload is likely to be preferable to an unbalanced workload and to be perceived as fair, while an unbalanced workload may give rise to conflicts between more heavily and less heavily loaded subgroups. Moreover, if there are subgroups with completely different expertise, subgroups will differ substantially in their frame of reference, thus facilitating communication within but hindering communication across these subgroups (Mishra and Spreitzer 1998; Volpe, Cannon-Bowers, Sales, and Spector 1996). Lau and Murnighan conclude that, while diversity according to ability has the potential to improve performance, strong ability faultlines have the potential to generate intra-team conflict and inhibit group cohesion. The effects should be particularly profound when team tasks require intense collaboration.

The following hypotheses are derived from the arguments discussed above (see also Figure 1): Ability faultlines will be negatively related to group cohesion (H2a) and this relationship will be strengthened by team autonomy (H2b). Ability faultlines will be positively related to intra-team conflict (H2c) and this relationship will be strengthened by team autonomy (H2d).

### 1.3.3. Personality
Several studies have examined the impact of team member personality traits on the functioning and outcomes of teams (Barrick et al. 1998; Barry and Stewart 1997; Heslin 1964; Neuman et al. 1999; Thoms et al. 1996; Van Vianen and De Dreu 2001). Some of these studies have also dealt with the effects of team composition and diversity with respect to personality traits. Barrick et al. (1998) and Van Vianen and De Dreu (2001) found that variation in the conscientiousness of team members has a negative influence on performance and group cohesion. Conscientiousness reflects working style and such attitudes as feelings of responsibility for good performance, exertion, persistence, goal-directedness and distaste for procrastination. Similarity of such work-related attitudes within a group results in a friendly atmosphere and a strong identification with the team (Hogg and Terry 2000). When some workers are highly conscientious and others are not, intra-group conflicts are likely to arise. Van Vianen and De Dreu also found that group cohesion was lower when team members differed with respect to emotional stability. Emotional stability refers to an individual's level of self-confidence and balance with respect to work, and to the individual's response to new and ambiguous tasks (Barrick and Mount 1991). Barrick and colleagues (1998) state that unstable people tend to demonstrate more anxiety and negative affect. They easily become uncomfortable or insecure in ambiguous work environments, thereby experiencing decreased confidence and heightened anxiety or fear of failure. Stable people may respond differently to such situations, perceiving them as challenges rather than threats. Faultline theory asserts that, when various traits are correlated, sub-groups are likely to emerge that are homogenous with respect to personality traits and related work styles (for example, one subgroup of conscientious and stable individuals and another comprised of unstable, less conscientious individuals). Disputes are likely to arise easily between subgroups having different patterns of personality traits. This should be especially true when team tasks demand intense collaboration.

The following hypotheses are derived from the arguments discussed above (see also Figure 1): Personality faultlines will be negatively related to group cohesion (H3a) and this relationship will be strengthened by team autonomy (H3b). Personality faultlines will be positively related to intra-team conflict (H3c) and this relationship will be strengthened by team autonomy (H3d).

## 2. Method

### 2.1. Participants and procedure

First-year undergraduate business school students from a Dutch University participated in the study. In their first trimester, the students took part in a 13-week course during which they collaborated in groups of four, each of which was supported by a tutor. The main purpose of the course was to apply behavioral and design theories to the description and analysis of organizational problems. They were expected to employ theoretical knowledge received during the first two major courses – organizational design and organizational behavior – which ran parallel to the course in question. During the course, the groups were required to accomplish several tasks. One assignment, for example, required each group to conduct an in-depth analysis of a case study. The case pertained to the business school and the tutor operated as the principal. Students were expected to analyze and describe the dynamics of the organizational environment and the impact of these dynamics on problems within the organization. In another assignment they observed, measured and described a workplace setting at the micro level, determining, for example, the waiting, processing and consumption time in a fast food restaurant during a single hour. Tutors had considerable freedom in developing their own roles in supporting the teams and in deciding on the extent to which they wished to direct the teams. In this way, teams had variable levels of autonomy.

Around the mid-point of the course, tutors distributed questionnaires among the participating students. Although a total of 529 (81%) questionnaires were returned, those missing substantial data were excluded from analyses. To ensure the validity of faultline scores for each team, data from teams with non-responding students were also excluded, resulting in a data set of 396 respondents participating in 99 teams. The age of respondents ranged from 17 to 24, with a mean age of 18.7 years. Slightly more than 66% of the respondents were male.

### 2.2. Measures

#### 2.2.1. Personality
The Five-Factor Personality Inventory (FFPI; Hendriks 1997) was used to measure extraversion ("Likes talking," "Avoids company" – reverse scored), agreeableness ("Asks how someone is doing," "Becomes angry easily," – reverse scored), conscientiousness ("Works systematically," "Procrastinates" – reverse scored), emotional stability ("Keeps emotions under control," "Is at one's wits' end," – reverse scored), and openness to experience

("Is full of ideas," "Waits to see what others do" – reverse scored). The answer categories for the items ranged from 1 (*completely inapplicable*) to 5 (*completely applicable*). Each of the five scales had 20 items. The reliability coefficients ranged from .80 to .89.

### 2.2.2. Demographic characteristics

Three demographic items were included in the questionnaire: gender, age and having a part-time job. The last variable is actually a 'social-demographic' characteristic (Hakim 1998). In general, a characteristic of this kind might affect team functioning in another way than demographic characteristics, such as gender or age. However, in the context of the present study these characteristics have in common that they refer to attributes that manifest themselves in the initial stage of working together. The first thing the students had to do when they met was to arrange meetings to work on the assignments. It is likely that having a part-time job seriously restricted the opportunities to arrange meetings and participate optimally.

### 2.2.3. Abilities

Because the course in which the students participated was their first post-secondary academic experience, abilities were measured by grouping final scores from secondary school into three types of qualifications: languages (e.g., Dutch, English, French, German, Latin, Greek, writing skills), sciences (mathematics, physics, chemistry) and human and social sciences (psychology, sociology, political interest, social skills). The grouping of qualifications into these three categories resembles the structure of the Dutch school system. Therefore, it is likely that, for example, language abilities will generally be in synch. It is also likely that these three types of abilities vary in relevance according to the assignment to be accomplished. The in-depth case study, for example, called for especially strong social skills, the calculation of queuing and processing times required primarily mathematical skills and writing skills were most relevant to the writing of essays. Final scores in the Dutch secondary school system range from 1 (*extremely bad*) to 10 (*excellent*).

### 2.2.4. Team autonomy

Team autonomy was measured by means of four 5-point items (Cronbach's $\alpha = .72$), e.g., "As a team, we are free to choose our work methods," "Our team is free to plan tasks," and "We can decide autonomously what the final outcome of an assignment will be." The average inter-member agreement ($r_{WG}$) for team autonomy was .71.

### 2.2.5. Team cohesion

Team cohesion was measured using a 10-item scale adapted from the Gross Cohesion Questionnaire (Stokes 1983), which contains such items as, "We are a cohesive team" and "We help each other." The Cronbach's alpha for this scale was .88, and the mean $r_{WG}$ was .81.

### 2.2.6. Team conflict

Team conflict was measured using a 17-item scale, adapted from Jehn (1995, 1997), including such items as, "We have conflicts about how to handle assignments" and "There are conflicts between team members." A principal components factor analysis revealed

eigenvalues of 7.40, 1.93, 1.42 and .90, respectively, for the first four un-rotated factors, indicating that a one-factorial solution was preferable (see also Pelled 1996; Williams and O'Reilly 1998). The Cronbach's alpha for this scale was .92 and the average $r_{WG}$ was .84.

### 2.2.7. *Faultlines*

For each type of team attribute and for each team, two faultline scores were computed: the strength of a faultline and its width (see Bezrukova et al. 2002; Thatcher et al. 2003). We followed the procedure developed by Thatcher et al. (2003) to compute the strength of a faultline, $\text{Fau}_g$. A group with $n$ members can potentially be split into two groups in $S = (2^{n-1} - 1)$ ways. For teams with four members (as in this study), a maximum of two subgroups sounds realistic, and thus $S = 7$. If we label the four members a, b, c and d respectively, the following seven splits may emerge: a + b versus c + d; a + c versus b + d; a + d versus b + c; a versus b + c + d; b versus a + c + d; c versus a + b + d; d versus a + b + c. The ratio of the sum of squares between the subgroups and the total sum of squares was computed for each possible split:

$$\text{Fau}_g = \left( \frac{\sum_{j=1}^{5} \sum_{k=1}^{2} n_k^g (\bar{x}_{\bullet jk} - \bar{x}_{\bullet j\bullet})^2}{\sum_{j=1}^{5} \sum_{k=1}^{2} \sum_{i=1}^{n_k^g} (x_{ijk} - \bar{x}_{\bullet j\bullet})^2} \right) \quad g = 1, 2, \ldots, S,$$

where $x_{ijk}$ stands for the score of the $i$th member of subgroup $k$ on the $j$th personality trait, $\bar{x}_{\bullet j\bullet}$ denotes the overall group mean of trait $j$ (in this case $j = 1, 2, 3, 4, 5$ since five personality traits are considered), $\bar{x}_{\bullet jk}$ indicates the mean of trait $j$ in subgroup $k$, and $n_k^g$ denotes the number of members of the $k$th subgroup ($k = 1, 2$) under split $g$.

The strength of the faultline Fau was calculated as the maximum value of $\text{Fau}_g$ over all possible splits $g = 1, 2, \ldots, S$. The value of Fau is invariant with respect to scale and can range from 0 to 1, showing a higher value as the faultline is stronger. This means that teams that can be split into fairly homogenous subgroups will have a high Fau value.

The width of a faultline is the distance $D$ between the centroids of two sets of averages, each belonging to one of the potential subgroups:

$$D_g = \sum_{j=1}^{j=5} |\bar{x}_{\bullet j1} - \bar{x}_{\bullet j2}|,$$

in which $\bar{x}_{\bullet j1}$ denotes the mean of personality trait $j$ in subgroup 1 and $\bar{x}_{\bullet j2}$ the mean of subgroup 2 on this trait under split $g$. The distance $D$ is the maximum value of $D_g$ over all seven possible splits. This computation was adapted from Bezrukova et al. (2002), who borrowed it from the literature on cluster analysis (e.g., Morisson 1967).

The distance or width of the faultline can take on values equal to or above 0, whereby larger values indicate a greater distance between potential subgroups. The maximum value of $D$ that one might find depends on the scale range. While the strength score reveals how neatly a group can be split into subgroups and emphasizes the homogeneity of the subgroups, distance indicates the extent of variation among subgroups. Even if subgroups are completely homogeneous with respect to the attributes under consideration ($\text{Fau}_{max} = 1$),

both subgroups may differ only slightly (see Bezrukova et al. 2002). For example, a group consisting of four members aged 20, 20, 21 and 21, the two youngest being 6 feet in height and the two oldest being 1 inch taller, has the same faultline strength score as a team whose members are 15, 15, 60 and 60 years old, the two youngest being 5 feet in height and the two oldest 6 feet tall. In the latter case, however, the distance score will be much higher. For extensive examples on how to calculate faultline width and depth, I refer to Thatcher et al. (2003) and Bezrukova et al. (2002). The width of a faultline indicates the extent of variation among subgroups, ignoring the differences within them. In other words, the strength score emphasizes the *similarity within* subgroups, while the width refers to *dissimilarities between* subgroups.

The procedure described above was also used to determine the strength and width of the demographic and ability faultlines. The demographic variables, however, do not all have the same range and, having had no reason to weight them unequally, all variables were rescaled to obtain a range of 1 before calculating faultlines.

## 2.3. Data analysis

All analyses were performed at the team level. Table 1 provides the means, standard deviations and the correlations among the variables considered in this study. The two dependent variables are highly correlated and the strength and the width of the faultline stemming from the same group of characteristics are moderately correlated. Further, the demographic faultline variables are related to the team functioning variables.

Hypotheses Ib, Id, 2b, 2d, 3b and 3d predict interaction effects for team autonomy and the faultline variables upon team functioning. The procedure recommended by Aiken and West (1991) was followed to test these interactions: (1) center – but do not standardize – the predictor (in this case, the faultline variable) and the moderator (in this case, team autonomy) around their overall mean to reduce multi-collinearity between these variables and their interaction term, (2) multiply both variables to calculate their interaction terms,

*Table 1.* Means, standard deviations (SD) and correlations among variables ($n = 99$)

| | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Demographic faultline | .84 | .11 | | | | | | | | |
| 2. Demographic distance | 1.19 | .41 | .25* | | | | | | | |
| 3. Ability faultline | .70 | .12 | −.09 | −.13 | | | | | | |
| 4. Ability distance | 2.76 | 1.03 | −.19 | −.15 | .27** | | | | | |
| 5. Personality faultline | .64 | .10 | .02 | .05 | .09 | .13 | | | | |
| 6. Personality distance | 2.65 | .71 | .07 | .11 | .04 | .05 | .29** | | | |
| 7. Team autonomy | 3.72 | .40 | .14 | −.05 | .08 | .11 | .01 | −.05 | | |
| 8. Group cohesion | 3.83 | .46 | −.21* | −.22* | −.11 | −.04 | .12 | .07 | .10 | |
| 9. Intra-team conflict | 2.03 | .37 | .17 | .27** | −.01 | .01 | −.06 | −.03 | −.17 | −.76*** |

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

(3) always include the main effect in the model to prevent a biased estimate of the interaction, (4) compute two regression equations by using values of the predictor and moderator lying one standard deviation (in both directions) from their centered means to draw a significant interaction.

## 3. Results

We hypothesized that demographic faultlines would decrease team cohesion (H1a) and increase intra-team conflict (H1c), and that these relationships would be intensified by team autonomy (H1b and H1d). As shown in Table 2, the results of the regression analyses provide support for Hypotheses 1a and 1c for both the strength and the width of the faultline. The higher the strength or the larger the distance of the demographic faultline in a team the less cohesion and the more intra-team conflict were reported by team members. The interaction effects of the strength and width of the demographic faultline and team autonomy were

*Table 2.* Regression analyses with cohesion and team conflict as the dependent variables and maximum faultline strength, maximum faultline width, team autonomy (TA) and the interaction of maximum faultline and team autonomy (Strength × TA) and the interaction of maximum distance and team autonomy (Width × TA) as independent variables for demographic characteristics (top), abilities (middle) and personality traits (bottom). The standardized weights are reported

|             |                 | Cohesion | Team conflict |
|-------------|-----------------|----------|---------------|
| Demographic | $R$             | .38*     | .40*          |
|             | Strength        | −.31**   | .21*          |
|             | Width           | −.28**   | .29**         |
|             | TA              | .07      | −.11          |
|             | Strength × TA   | −.09     | −.10          |
|             | Width × TA      | −.07     | .04           |
| Ability     | $R$             | .33*     | .19           |
|             | Strength        | −.08     | −.02          |
|             | Width           | −.04     | .04           |
|             | TA              | .12      | −.19          |
|             | Strength × TA   | −.25*    | .08           |
|             | Width × TA      | .01      | −.07          |
| Personality | $R$             | .22      | .34*          |
|             | Strength        | .13      | −.10          |
|             | Width           | .02      | .04           |
|             | TA              | .10      | −.15          |
|             | Strength × TA   | .12      | −.17          |
|             | Width × TA      | −.07     | .21*          |

*Notes. R* represents the multiple correlation.
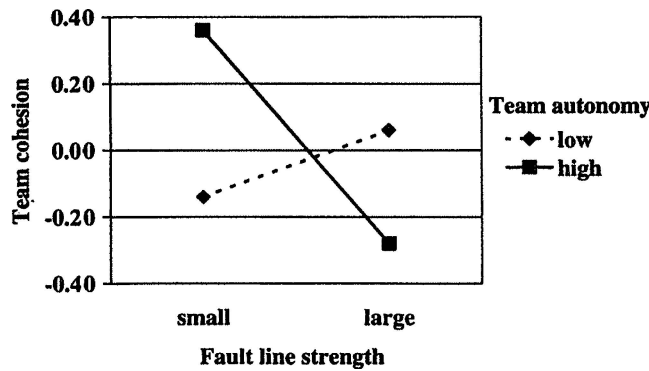$^*p < .05; ^{**}p < .01.$

*Figure 3.* Interaction of ability faultline strength and team autonomy with team cohesion as dependent variable.

significant neither for group cohesion nor for intra-team conflict. Hypotheses 1b and 1d are therefore not supported.

Hypothesis 2 predicted that ability faultlines would also affect team functioning negatively and these relationships are supposed to be strengthened by team autonomy. As shown in Table 2, neither the strength nor the width of the ability faultline is related either to team cohesion or intra-team conflict, thereby providing no support for Hypotheses 2a and 2c. For the ability faultlines, the only significant interaction effect is that of faultline strength and team autonomy in case of team cohesion, providing partial support for Hypothesis 2b. This interaction indicates (see Figure 3) that the strength of the ability faultline is negatively related to cohesion only when team autonomy is high. In accordance with Hypothesis 2b, when team autonomy is low, the ability faultline is more or less unrelated to team cohesion. Hypothesis 2d is not supported, as no significant interaction effects were found for intra-team conflict.

Hypothesis 3 predicted that the strength and the width of the personality faultline would be negatively related to team cohesion (H3a) and positively to intra-team conflict (H3c). It further predicted that these relationships would be intensified by team autonomy (H3c and H3d). The results indicate that neither faultline is directly related to both team functioning variables, and that neither Hypothesis 3a nor Hypothesis 3b is supported. The interaction of the strength and width of the personality faultline and team autonomy is significant for the width of the faultline only when intra-team conflict is the dependent variable. As shown in Figure 4, this interaction effect indicates that the larger the width of the personality faultline in a team, the more intra-team conflict there will be when team autonomy is high. If team members have little autonomy, the width of this faultline is more or less unrelated to intra-team conflict. This result supports Hypothesis 3d. No significant interaction effect was found for group cohesion and Hypothesis 3b is therefore not supported.

In general, the results supported Hypotheses 1a and 1c, while Hypotheses 2b and 3b were partially supported by the data. The other hypotheses were not supported.
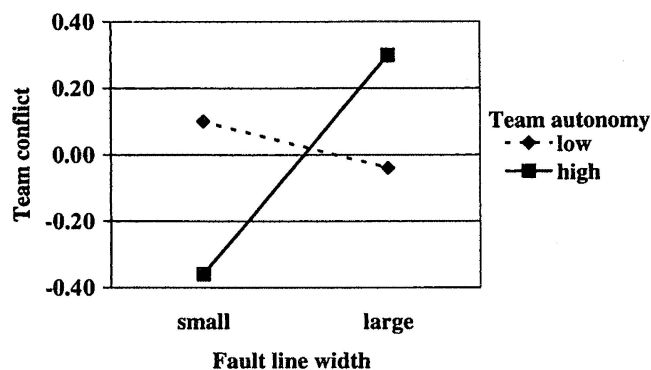
*Figure 4.*  Interaction of personality faultline width and team autonomy with team conflict as dependent variable.

## 4. Discussion

This study investigated the relationships of demographic, ability and personality faultlines within teams with team cohesion and intra-team conflict. Both the strength and the width of faultlines were considered. We expected that faultlines would affect team functioning negatively and, more specifically, would inhibit group cohesion and increase intra-group conflict. We further expected the relation between faultlines and team functioning to be strengthened by team autonomy. The hypotheses found only partial support in the data. The relationship of both the strength and the width of demographic faultlines with team functioning were indeed significant in the predicted direction (decreasing cohesion and increasing intra-team conflict). They were not, however, intensified by team autonomy. Neither the ability nor the personality faultlines were directly related to team functioning, but two of these relations did become apparent when team autonomy was considered. More specifically, the results show that the relationship between the strength of the ability faultline and team cohesion and the relationship between the width of the personality faultline and intra-team conflict are affected by team autonomy. Overall, the results indicate that demographic faultlines are related to team functioning only directly and, to the extent that ability and personality faultlines are related to team functioning, these relations are affected by team autonomy.

Although the theoretical paper of Lau and Murnighan (1998) suggests that faultlines, regardless of their origin, are likely to impair team functioning, some recent studies in the area of the expectations states theory and social identity theory indicate that the impact of diversity might differ for the three types of characteristics (e.g., Harrison, Price, and Bell 1998; Harrison, Price, Gavin, and Florey 2002; for an overview, see Milliken and Martins 1996). These theories might help to find post hoc explanations for the pattern of results (and non-results) pertaining to the three types of attributes. Both theories argue that, because demographic characteristics are generally clearly noticeable, they may easily lead to stereotyping, the emergence of subgroups and eventually to conflicts between these subgroups (see e.g. De Gilder and Wilke 1994; Tajfel and Turner 1986). It has been further argued that this effect will be fostered when various demographic attributes overlap

(Hogg and Terry 2000). Harrison et al. (1998) labeled easily observable or detectable aspects as *surface-level* attributes. In their study, surface-level attributes proved especially important at the very early stages of a team formation, directing initial interactions that immediately affect the functioning of a team before it actually starts working to its task. In expectation states theory, such attributes are labeled *diffuse status characteristics,* with "diffuse" indicating that they are not directly related to fulfilling the task. This may explain why the demographic faultlines in our study were directly related to team functioning and why these relationships were not affected by team task autonomy.

In the expectation states theory, abilities are referred to as *specific status characteristics,* because their relevance is related to the specific task the team must perform (e.g., see Berger, Rosenholtz, and Zelditch 1980). It is obvious that the relevance of an ability depends on the team task and it is therefore understandable that relations between ability faultlines and team functioning would be affected by characteristics of the task. The same may be true for personality traits. Harrison et al. (2002) refer to personality traits as *deep-level* attributes, which manifest themselves through interactions among team members, therefore becoming salient over time. As argued in the introductory section, if a team has a high level of autonomy, its tasks will be less structured or prescribed by routines from outside and therefore require considerable decision-making, which in turn requires intensive communication among team members. When team members must collaborate and make extensive mutual adjustments to their thoughts and actions, personality traits become more noticeable and become more salient. Extraversion and agreeableness, for example, indicate the extent to which team members are willing to cooperate and participate in team decision-making requiring intense intra-team communication (e.g., Barry and Stewart 1997). Emotionally stable people may perceive autonomy as a challenge, while the same condition may lead unstable people to feel insecure (Bowen, Qiu, and Li 1994; Molleman and Broekhuis 2001), thereby generating different and conflicting responses. Conscientiousness refers to the extent of orderliness with which individuals approach work and level of antipathy they have to procrastination. Such attributes reflect work styles that, if shared by teammates, facilitate cooperation and if not shared, result in conflict. If a team is autonomous and must make decisions on all kinds of work issues, such heterogeneity may become more prominent, especially if various traits align.

The arguments presented above are tentative and require further empirical investigation. They nevertheless can help to explain the direct relationship of demographic faultlines to team functioning and the interaction effects of team autonomy on both the relation between ability faultlines and team functioning and the relation between personality faultlines and team functioning. It remains unclear, however, why only the strength of the ability faultline is related to team cohesion and the width of the personality faultline to intrateam conflict when team autonomy is taken into account. As stated earlier, the strength score emphasizes similarity within subgroups and the width the dissimilarities between subgroups. This difference may help to explain the results of the analyses of ability and personality faultlines.

When faultlines are strong, the focus of the individual team members is likely to be directed more toward similarities within the subgroup of which they are part than toward dissimilarities between subgroups. Considerable overlap in abilities may lead to the formation of subgroups that are homogeneous with respect to qualifications, knowledge fields and

frames of reference. Under such conditions, members may-prefer to communicate within rather than across subgroups, which is likely to reduce the cohesion of the whole group. Subgroups may, however, still respect the qualifications of other subgroups that may be required to fulfill a task. As described in the Methods section, the different assignments demanded different types of skills and abilities. If subgroups have different ability profiles, it is likely that different subgroups will take the initiative and make greater contributions to specific tasks, depending upon the types of skills demanded by particular tasks, an effect that becomes more salient when team autonomy is high. Subgroups depend upon each other to achieve good overall group results and therefore respect each other's contributions. This may explain why the strength of the ability faultline was negatively related to the overall group cohesion, but not to intra-team conflicts.

The opposite seems to hold for groups divided according to personality characteristics. Under such conditions, group members are likely to focus more on dissimilarities in working styles, anchored as they are to the personalities of the team members. Dissimilarities become particularly evident when the faultline is wide and the need for collaboration (group autonomy) is high. Conflicts may arise as subgroups direct their actions and criticism towards the operation of other subgroups. Again, these explanations are tentative and in need of further validation.

Several limitations of this study may provide direction to further research. First, this study has a cross-sectional design, thus limiting internal validity and causal interpretation. In addition, with the exception of abilities, variables were measured with self-report instruments. The use of other sources and other types of measurements would have strengthened the reliability and validity of the study. Although several statistically significant relationships were found, they explained a relatively small amount of the variance. Groups of undergraduate business students are likely to be fairly homogeneous with respect to the attributes studied here. It is therefore likely that, in more heterogeneous populations, the impact of faultlines is greater and explains more of the variance in team functioning. We therefore recommend that this study be replicated using a stronger (experimental or longitudinal) design to involve other and more diverse work settings and to apply multimeasurement methods. Another limitation of the study might be that the respondents are not representative. It is possible that, for example, respondents and non-respondents differ with respect to conscientiousness, and that persons high in conscientiousness were more inclined to participate in the study than those low in conscientiousness. This could limit the generalizability of the findings.

This study has focused on team autonomy as a conditioning task characteristic. Although the results indicate that team autonomy does indeed affect certain relationships between faultlines and team functioning, other characteristics of teamwork – task interdependence, for example – might also be relevant (Wageman 1995). Task interdependence refers to a situation in which the processing and outcome of one worker affects the processing and outcome of another. Interdependence therefore demands intra-team communication, cooperation and collective decision-making. It is possible that some are better equipped than others to cope with interdependence and that team task interdependence, like autonomy, will therefore affect the relationships of team composition attributes and team functioning. Useful results are also likely to be obtained by extending this study to address variations in group size and the number of potential subgroups. In this study, all the groups had

four members and only situations with two potential subgroups were considered. In larger groups, more than two subgroups may emerge, which may lead to such additional group dynamics as coalition formation among subgroups.

The results indicate that it might make sense to consider the impact of faultline depth and strength separately. However, in advance I did not come up with different hypotheses with respect to both constructs. The theoretical explanations have been offered post hoc and need further support. Moreover, it might also be desirable to consider them jointly. The same holds for the three categories of individual characteristics. The hypothesized! relationships of faultlines with cohesion and conflict and the moderating role of team task autonomy were identical for each of the three types of characteristics. The results, however, show that the consequences of faultlines differ with regard to demographic characteristics, abilities and personality traits. Again, the explanations are post hoc and need further support, and it might also be worthwhile to consider the three sets of characteristics not only separately, but to combine them in an overall faultline.

Despite the limitations mentioned above, this study has produced worthwhile results. First, it contributes to diversity research in general and to the study of faultlines in particular by showing that it makes sense to distinguish faultiness that may emerge from different types of individual team member characteristics and that also the distinction between faultline strength and depth might be theoretically meaningful. Second, it contributes to theory that captures the combined input of team and task characteristics; it shows that it is important to incorporate team task characteristics when studying team composition and group dynamics. In addition to its theoretical contributions, this study also has practical implications for the design and development of teams. When composing teams, homogeneity with respect to demographic characteristics may be attractive, as the absence of diversity prevents the formation of faultlines leading to division into subgroups. Demographic attributes are usually easily noticeable and will affect team functioning especially in its early stage (Harisson et al. 1998). If subgroups emerge along demographic faultlines in a very early stage, it will negatively influence group processes and processes between these subgroups, and, therefore, affect team functioning in the long run. This suggests that it is better to create homogenous groups with respect to demographic characteristics. However, because the labor market is diverse, it might also be desirable with respect to a firm's corporate identity and social responsibility to recruit people with a diverse demographic background. Therefore it may be better to manage demographic diversity by composing groups in which the different demographic attributes do not align too much.

Like demographic characteristics, personality traits cannot easily be altered. Although it is likely that diversity with respect to personality traits is not so relevant in the early stage of a team, it will become relevant after some time, and, therefore it is wise to consider this issue when composing teams. One may question if it is attractive to compose teams that are homogeneous with respect to the personality traits of its members, and it may probably be best to make sure that personality traits do not align too much. The results of this study further suggest that this is especially important if team autonomy is high and members have to cooperate intensely.

Several studies have shown that, depending on the team task, diversity with respect to abilities and knowledge may improve group functioning (e.g., Van der Vegt and Janssen

2003). Diversity in abilities and work-related knowledge may be particularly important in managing complex work requiring a large variety of inputs (Milliken and Martins 1998; Molleman 1998). In this way, opportunities to learn from each other and create new knowledge may be enhanced (Jackson 1996). This study suggests that if different abilities align, subgroups may emerge that could hamper communication and cooperation among subgroups, which, in turn, inflates learning. In situations in which learning and creativity is less important, the alignment of abilities might be less problematic, as long as the subgroups that may emerge have overarching common goals and are not highly dependent when working on a specific task. If one subgroup has the expertise to accomplish one overarching group goal and another subgroup another one, subgroups might still respect each other, not withstanding the fact that they identify more with their own subgroup (see, for example, Gaertner and Dividio 2000). Furthermore, in comparison with demographic and personality traits, abilities are more easily to develop after team formation.

A last point that might have practical relevance is the difference between faultline strength and depth. As argued, the strength emphasizes the similarity within a subgroup and the width represents the dissimilarities between subgroups. This study suggests that a strong faultline may primarily lead to positive behavior directed at one's own subgroup, while a deep faultline may mainly induce negative behavior towards another subgroup. Knowing this might help to diagnose, understand and manage group dynamics.

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