

THE DYNAMIC NATURE OF CONFLICT: A LONGITUDINAL STUDY OF INTRAGROUP CONFLICT AND GROUP PERFORMANCE

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In a longitudinal study, we found that higher group performance was associated with a particular pattern of conflict. Teams performing well were characterized by low but increasing levels of process conflict, low levels of relationship conflict, with a rise near project deadlines, and moderate levels of task conflict at the midpoint of group interaction. The members of teams with this ideal conflict profile had similar pre-established value systems, high levels of trust and respect, and open discussion norms around conflict during the middle stages of their interaction.

In response to growing demands for efficiency and flexibility, organizations are shifting to team-based structures (cf. Boyett & Conn, 1991). Teams bring assets—adding knowledge and creativity, increasing the understanding and acceptance of ideas, and improving commitment and motivation (for reviews, see McGrath [1984] and Levine and Moreland [1990]). However, as many organizations have discovered, teams do have liabilities (for reviews, see Maier [1967], Kruglanski and Mackie [1990], and March [1994]). Teams can stifle ideas, result in conformity, and encourage free riding. They can also be hotbeds of conflict, and it is this aspect of teams and the relationship between conflict and performance that is the focus of our research.

Although our focus is conflict in teams, we believe it is necessary to examine patterns of conflict as they shift and change over *time*. Time has been of considerable interest to philosophers, physicists, biologists, and anthropologists, but both psychologists and organizational theorists have been less likely to include temporal aspects in their theory and research (see McGrath and Kelly [1986]; for some exceptions, see Gersick [1988], Mannix and Loewenstein [1993], Mannix, Tinsley, and Bazerman [1995], O'Connor, Gruenfeld, and McGrath [1993], and Schweiger, Sandberg, and Rechner [1989]). In this study, we developed and

tested a dynamic model of group conflict that includes the *timing* of conflict types as critical and specifies the antecedents that encourage productive conflict patterns.

CONCEPTUAL BACKGROUND AND HYPOTHESES

Conflict is an awareness on the part of the parties involved of discrepancies, incompatible wishes, or irreconcilable desires (Boulding, 1963). Drawing on past research (Amason & Sapienza, 1997; Cosier & Rose, 1977; Guetzkow & Gyr, 1954; Jehn, 1992, 1997; Pelled, 1996; Pinkley, 1990; Wall & Nolan, 1986), we propose that conflict in work groups can be categorized into three types—relationship, task, and process conflict.

Relationship conflict, an awareness of interpersonal incompatibilities, includes affective components such as feeling tension and friction. Relationship conflict involves personal issues such as dislike among group members and feelings such as annoyance, frustration, and irritation. This definition is consistent with past categorizations of conflict that distinguish between affective and cognitive conflict (Amason, 1996; Pinkley, 1990).

Task conflict is an awareness of differences in viewpoints and opinions pertaining to a group task. Similar to cognitive conflict, it pertains to conflict about ideas and differences of opinion about the task (Amason & Sapienza, 1997). Task conflicts may coincide with animated discussions and personal excitement but, by definition, are void of the intense interpersonal negative emotions that are

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more commonly associated with relationship conflict.

Recent studies have identified a third unique type of conflict, labeled *process conflict* (Jehn, 1997; Jehn, Northcraft, & Neale, 1999). It is defined as an awareness of controversies about aspects of *how* task accomplishment will proceed. More specifically, process conflict pertains to issues of duty and resource delegation, such as who should do what and how much responsibility different people should get. For example, when group members disagree about whose responsibility it is to complete a specific duty, they are experiencing process conflict.

Cross-sectional studies using one-time measures have shown that relationship, or affective, conflict is detrimental to individual and group performance, member satisfaction, and the likelihood a group will work together in the future (Jehn, 1995; Shah & Jehn, 1993). Research findings indicate that the anxiety produced by interpersonal animosity may inhibit cognitive functioning (Staw, Sandelands, & Dutton, 1981; Roseman, Wiest, & Swartz, 1994) and also distract team members from the task, causing them to work less effectively and produce suboptimal products (Argyris, 1962; Kelley, 1979; Wilson, Butter, Cray, Hickson, & Mallory, 1986).

In contrast, moderate levels of task conflict have been shown to be beneficial to group performance on certain types of tasks (Jehn, 1995; Jehn & Shah, 1997; Shah & Jehn, 1993). When given a complex cognitive task (the type of task that is the focus of this research), teams benefit from differences of opinion about the work being done and about ideas (Bourgeois, 1985; Eisenhardt & Schoonhoven, 1990; Jehn, 1995; Shah & Jehn, 1993). Task conflict improves decision quality because the synthesis that emerges from the conflict is generally superior to the individual perspectives themselves (Mason & Mitroff, 1981; Schweiger & Sandberg, 1989; Schwenk, 1990).

Of the three conflict types, process conflict has been the least examined. In one study, process conflict was associated with a lower level of group morale as well as with decreased productivity (Jehn, 1992). The logic proposed was that when a group argues about who does what, members are dissatisfied with the uncertainty caused by the process conflict and feel a greater desire to leave the group. In addition, Jehn (1997) noted that process conflicts interfere with task content quality and often misdirect focus to irrelevant discussions of member ability. In a more recent study, Jehn, Northcraft, and Neale (1999) found that groups who

continually disagreed about task assignments were unable to effectively perform their work.

The Dynamic Nature of Conflict

Most of the past research reviewed above focuses only on static levels of conflict, ignoring the different patterns of conflict that might occur over time. Consider the following static proposition: "Teams that experience higher levels of process conflict will experience lower levels of group performance." In fact, it may be more relevant to consider how much and *when*, rather than if, process conflict occurs. For example, early discussions regarding task allocation may assist group members in assigning the correct people to the correct task; however, later process conflicts might interfere with smooth, efficient operations and may be used to mask negative relationship issues. We propose that fully understanding the links between the types of conflict and performance involves an examination of the time period in which the conflict occurs and the patterns of conflict types that occur over time.

Some early efforts in the study of groups had an inherently temporal dimension, notably the work on group dynamics and the related study of phases in group problem solving. Many stage models have been proposed, the key features of which were reviewed and integrated by Tuckman (1965), who called the stages "forming," "storming," "norming," and "performing." Stage models that have been put forth since Tuckman's synthesis are similar (see Hare, 1976; LaCoursiere, 1980; McGrath, 1984).

More recently, Gersick (1988, 1989) demonstrated that groups exhibit a "punctuated equilibrium" in which temporal phases emerge as bounded eras within each group, without being composed of identical activities across groups and without the necessarily progressing in a set linear order. Other researchers have agreed that past theories of innate, concrete phases in groups may not be adequate (cf. Bell, 1982; Mintzberg, Raisinghani, & Théorêt, 1976; Seeger, 1983). These recent developments suggest a movement away from attempts to characterize group development as an unvarying sequence of stages or activities. We argue that more insight may be gained from an examination of broader *patterns* of group interaction.

Process conflict over time. Theorists and researchers have demonstrated that successful task forces must begin with a clear and engaging direction. Once the purpose of a team has been clearly specified by an organization's management, a team leader, or a supervisor, the means of accomplishing

that purpose is typically left to the team itself (Hackman, 1987; Wageman, 1996). Thus, during the early stages of their interaction, group members may be allowed, and even encouraged, to focus on the procedural or administrative features of the task.

In groups that are performing well (high-performing groups), process conflict at the beginning stages of their interaction allows work norms to be agreed upon, accepted, and understood (Tuckman, 1965). Responsibilities and deadlines are decided on (Jehn, 1997; Mintzberg, et al., 1976). In Gersick's (1989) laboratory study, activities of successful groups in the early phases of interaction included process discussions, time pacing of tasks, and planning to meet resource requirements. In the field, Gersick (1988) also found that high-performing teams made decisions about milestones, task responsibilities, and deadlines early; this allowed them to then focus on the content of their tasks. Group members who are allowed voice during early stages are likely to understand and be committed to the resulting decisions (Greenberg & Folger, 1983). Given this past research and theorizing, we propose that successful groups will experience moderately high levels of process conflict in the early stages of group formation.

The final stages of the group task also involve formalizing and presenting a specific plan for implementation. Tasks during this completion phase include editing and formatting materials and deciding on methods of presentation (Gersick, 1988, 1989). Group members need to decide who is most capable of completing various new tasks, such as organizing the compiled information and presenting the group's decision or completed product. We propose that high-performing groups will again experience process conflict just prior to their deadlines as they manage and organize these new duties.

Hypothesis 1. High-performing groups will have higher levels of process conflict at the beginning and at the end of their group interaction than low-performing groups; in addition, high-performing groups will have lower levels of process conflict during the middle phases of their interaction than low-performing groups.

Relationship conflict over time. It is unlikely that relationship conflict is beneficial at any point in the life of a group. In the early stages of group interaction, high-performing groups often operate under politeness norms (low levels of relationship conflict) that permit group members to become more familiar with one another (Jehn, 1995; Shah & Jehn, 1993). Theo-

rists have argued that such norms may reduce the social uncertainty and concern with acceptance that can distract from task performance in newly formed groups (Deutsch, 1949; Nemeth, 1986; Schachter, 1959; Schachter & Singer, 1962). In addition, research has shown that increased familiarity tends to result in beneficial information sharing, improved conflict resolution, and better task performance (Gruenfeld, Mannix, Williams, & Neale, 1996; Jehn & Shah, 1997; Shah & Jehn, 1993).

Thus, low levels of relationship conflict can allow group members to develop the familiarity necessary for positive patterns of future interaction. Groups also develop shared patterns of behavior—including how criticism and disagreement are interpreted and handled (Janis, 1982). If storming, in Tuckman's (1965) terms, is not overcome, a negative pattern is likely to continue (Bettenhausen & Murnighan, 1985). Gersick (1988) also noted that groups with early indications of relationship conflict had, in general, more difficulties and increasing amounts of relationship conflict as deadlines approached than did groups with amiable interpersonal relationships. We propose that high-performing groups will have low levels of relationship conflict throughout all phases of group interaction.

Hypothesis 2. High-performing groups will have lower levels of relationship conflict throughout all phases of group interaction than low-performing groups.

Task conflict over time. As discussed above, when conflict is functional, it is often task-focused (Brehmer, 1976; Cosier & Rose, 1977; Jehn, 1995). Task conflict enhances performance through a synthesis of diverse perspectives and an increase in understanding. However, it may also interfere with consensus, distract team members from their goal, and hinder implementation (Amason, 1996; Amason & Schweiger, 1994; Hambrick, Cho, & Chen, 1996; Schweiger, Sandberg, & Ragan, 1986; Schweiger et al., 1989). For example, Schweiger, Sandberg, and Rechner (1989) found that critical evaluation (task conflict) enhanced decision-making performance. They also found that teams engaged in more critical evaluation over time; however, although they made better decisions, there was lower acceptance of final decisions than in consensus-seeking teams (who made worse decisions).

Amason and Schweiger (1994) identified this paradox and suggested that teams need to engage in task conflicts to produce high-quality decisions, but then need to somehow reach consensus without interfering with the quality of the decision. Given the above empirical findings, however, it is difficult to see how both goals can be accom-

plished. We propose that the possibly negative effects of task conflict may be related to the time at which it occurs. For example, early task conflict may interfere with the discussion of important procedural issues, or it may pull a team away from its specified purpose. Task conflict that occurs too late in the team's interaction may reduce consensus and threaten implementation. Specifically, we argue that the midpoint of a group's time together has several features that positively link it to task conflict in high-performing groups.

The importance of the midpoint might best be described by Gersick's (1988, 1989) simple, yet elegant, finding that in high-performing groups, it was not the content of the interaction that mattered as much as the presence of a transition, or "paradigmatic shift," at the midpoint of the group's life. At this midpoint, high performers engage in a concentrated burst of activity and adopt new perspectives. This activity includes discussions of task goals and debate around the various opinions of team members to determine the specific content of the final product or decision. In groups that have managed relationship conflict well up to this point, members are likely to be comfortable with each other and able to engage in task-related conflict without its turning into personal attacks. Laying the groundwork in the early stages of interaction will allow groups to make this crucial transition, in which they focus solely on the task, rather than on procedures or relationships. Therefore, we argue that it is at the midpoint that high-performing groups will air and confront diverse task perspectives and thus experience moderate to high levels of task conflict.

In addition, strategic decision theorists have noted that task discussions, disagreements, and idea generation most often occur during the middle phase of group interaction (Astley et al., 1982; Eisenhardt, 1989; Schweiger et al., 1989). Mintzberg and colleagues (1976) discussed a midterm development phase that consists almost entirely of task conflicts regarding the benefits and detriments of various solutions to the problem identified. Thus, we propose that task conflict during the middle of a group's interaction encourages needed discussions, but we also propose that a lower level of task conflict toward the end of the interaction (coupled with low relationship conflict and moderate process conflict) is necessary for commitment to the team product and its subsequent implementation.

Hypothesis 3. High-performing groups will have higher levels of task conflict in the middle of their interactions than in the beginning and end of the interactions.

Antecedents of Conflict at Each Stage

We have proposed that certain patterns of conflict are more likely to lead to success in team performance and productivity. This question, however, remains: Once the connections between conflict and performance are understood, is it possible to predict which groups will be more likely to exhibit these beneficial patterns of conflict? One answer may lie in the configuration of values and the atmosphere that results among group members.

Groups, like organizations, have specific, identifiable cultures (Jehn, 1994; McFeat, 1974; Sackman, 1992). One defining aspect of group culture is similarity among the work values of the members who enter a group (Enz, 1988; Schein, 1985). We examined the values members brought with them to groups. We defined group value consensus as the extent to which the potential members have similar values regarding work, examples of which include valuing (and demonstrating) innovativeness, carefulness, autonomy, adaptability, and informality (O'Reilly, Chatman, & Caldwell, 1991). When group members have similar work values, they tend to agree on norms regarding work, and this agreement in turn promotes harmony (Nemeth & Staw, 1989) and decreases interpersonal tension (Schneider, 1983). In contrast, when members' core values and beliefs about their everyday work differ, friction and emotional upset may occur (Bar-Tal, 1989; Schein, 1986).

Thus, high value consensus would seem to be beneficial to work groups, in that it is likely to reduce relationship conflict and increase group performance. Group value consensus should also reduce process conflict, as a similarity of work values implies that group members will be more likely to agree on how to interact and how to deal with administrative details. The same is not necessarily true, however, for task conflict.

Value consensus does not necessarily imply homogeneity of task perspectives. In fact, it is possible that high value consensus will provide an atmosphere in which task-related conflicts are more easily expressed. For example, in a longitudinal study of continuing work groups, those with stable membership experienced task conflict more frequently than groups whose membership was characterized by instability and change (Arrow & McGrath, 1993). Shah and Jehn (1993) found that groups composed of friends exhibited greater task conflict while working on a decision task than groups of strangers. Because the task in Shah and Jehn's study required critical inquiry and analysis of assumptions, their higher levels of conflict gave the groups of friends a performance advantage. They were also better able

to resolve unnecessary relationship conflicts than were the groups of strangers. Gruenfeld and colleagues (1996) showed that groups of friends were better able to share diverse task-related information needed to solve a complex problem than were groups of strangers. This research demonstrates that sometimes colleagues with positive relationships are better at managing conflict than are groups of strangers (Valley, Neale, & Mannix, 1995).

As classic social psychological theory has indicated, individuals are attracted to and form friendships with others who are similar to themselves (Heider, 1958; Newcomb, 1956). Research has also shown that members who have similar preestablished work values (such as valuing a detail orientation or valuing working long hours) are more satisfied in their groups (Jehn, 1994). In these groups, members are more likely to trust and respect one another and feel that they are working toward a cooperative rather than a competitive goal (Amason & Sapienza, 1997; Jehn & Shah, 1997).

Hypothesis 4a. Group value consensus will lead to beneficial patterns of conflict (as described in previous hypotheses).

Hypothesis 4b. The effects of group value consensus on patterns of conflict will be mediated by a positive group atmosphere (high levels of trust, respect, open conflict norms, cohesiveness, and liking and low levels of competition).

METHODS

Sample and Procedures

The study utilized 51 three-person functioning groups performing comparable organizational tasks over a semester. The sample consisted of 153 students at three U.S. business schools all taking the same general management course; they were primarily full-time employees at various organizations and were part-time master of business administration (M.B.A.) students at the three schools. The three business schools had comparable entrance requirements, and the individual performance distribution in the course across the schools was similar, with *t*-tests indicating no significant differences between subsamples. One of the business schools had 10-week semesters, one had 12-week semesters, and the other had 14-week semesters. The same instructor taught all participating students at all three schools. We standardized the time frames and developed three time blocks—early, middle, and late—for examining patterns over time in groups. We divided the number of weeks in the

semester by three if possible or added the leftover week to the first block (and to the second, in the case of the 14-week semester; that is, block 1 consisted of weeks 1–5; block 2, of weeks 6–10; and block 3, of weeks 11–14). According to Gersick (1988) and other researchers who have examined time in groups, it is the developmental period in relation to a specific deadline that matters rather than the actual number of weeks a group meets. Because this procedure had the potential to create more variance within a block, we believe it provided a conservative test of the dynamic model of conflict patterns.

On the average, the students were currently working 40.1 hours per week at their jobs. Forty-five percent were employed in financial institutions, 27 percent in manufacturing, 14 percent in consulting firms, and 14 percent in other organizations. The average age was 29.4 years. Sixty-four percent were male, and 18 percent were not originally from the United States. Although the participants were aware that they were involved in a project in which their performance would be measured, they were blind to the hypotheses of the study.

Prior to group formation, the participants' work values were assessed with the Organizational Culture Profile (OCP; O'Reilly et al., 1991), as part of an introductory exercise. The following week, groups with three members were randomly formed. The groups worked as consulting teams for the entire semester on projects involving strategy formation and implementation in actual firms. For example, one team helped a locally run coffee shop establish and implement a marketing strategy to compete with the national chains in a city. Another team worked with a *Fortune* 500 company to analyze its managerial information system.

This project comprised over 50 percent of the students' grades for this one-semester course. Teams spent an average of 10.8 hours per week together on the project, and individuals spent an average 20.6 hours total per week on it. The task included problem identification, information collection and analysis, and making recommendations and implementation suggestions. It also included attending organizational meetings and conducting interviews with employees and managers. The participants reported weekly on their group meetings by completing individual questionnaires and group worksheets.

Measures

Group value consensus. Group value consensus was measured in all subsamples at the beginning of

the first time block (the beginning of the first class session) with the OCP, an instrument that can be used to identify the central values of individuals and to assess how intensely held the values are and the degree of consensus that exists among group members (Chatman, 1989, 1991; Chatman & Jehn, 1994; Jehn, 1994; O'Reilly et al., 1991). The OCP consists of 54 items sorted by a Q-sort technique into nine categories ranging from "very important" to "very unimportant." Examples of culture items are "being careful," "being innovative," and "sharing responsibility." Following Jehn (1994), we computed a group coefficient alpha to assess the consensus among group members on the 54 items. We used the Spearman-Brown prophecy formula, following past use of the OCP (Jehn, 1994; O'Reilly et al., 1991) and psychometric consensus assessment (Nunnally, 1967: 211). The group coefficient alphas, which represented the degree to which group members had similar values, ranged from .21 to .92.

Intragroup conflict. The type of conflict in the group was measured with the Intragroup Conflict Scale (Jehn, 1995) and with process conflict items from Shah and Jehn (1993) at the beginning, middle, and end of each time block, and an average score was taken. We adapted items to reference the appropriate focal unit, the work group. The confirmatory factor analysis with oblique rotation present in Table 1 resulted in three factors consistent with past use of this scale (Shah & Jehn, 1993). Factor 1 describes task conflict (for instance, "How much conflict of ideas is there in your work group?" and "How frequently do you have disagreements within your work group about the task of the project you are working on?"). Factor 2 contains items related to relationship conflict (for instance, "How much relationship tension is there in

your work group?" and "How often do people get angry while working in your work group?"). Factor 3 reflects process conflict (for instance, "How often are there disagreements about who should do what in your work group?"). The Cronbach alphas for relationship, task, and process conflict were .94, .94, and .93, respectively.

Group atmosphere. Scales adapted for this study measuring trust, respect, cohesiveness (Chatman, 1991), open conflict discussion norms (Jehn, 1995), and liking for fellow group members (Jehn, 1995) consisted of self-report items rated on seven-point Likert scales ranging from 1, "not at all," to 7, "a lot." Measures were taken at the beginning, middle, and end of each time block (at the same time as the conflict measures), and an average score was calculated. The Cronbach alphas for these scales were .82, .73, .94 and .92, respectively. The results of a confirmatory factor analysis of the items are shown in Table 2. In addition, the participants reported on the level of competition within their groups with a one-item measure, "How much competition was there in your workgroup?"

Outcomes. Performance was measured by ratings of the teams' final project reports. The scale ranged from 1 to 30. Two independent raters scored the final reports. Each report included a description of the company or department advised, the problem the consulting team would investigate and how it was identified, the methods of analysis used, results and interpretation of the data collected, and the final recommendations made to the company on problem resolution and strategy. Reports were limited to 15 double-spaced pages plus appendixes (often including the presentation slides shown to the firm) and tables. Points were awarded by the two independent raters for the thoroughness of

TABLE 1
Results of Confirmatory Factor Analysis of Conflict Items

Item	Task Conflict	Relationship Conflict	Process Conflict
1. How much relationship tension is there in your work group?	.01	.90	-.21
2. How often do people get angry while working in your group?	-.02	.91	.08
3. How much emotional conflict is there in your work group?	-.08	.61	.39
4. How much conflict of ideas is there in your work group?	.91	.14	-.16
5. How frequently do you have disagreements within your work group about the task of the project you are working on?	.85	-.11	.19
6. How often do people in your work group have conflicting opinions about the project you are working on?	.90	.18	-.17
7. How often are there disagreements about who should do what in your work group?	.06	-.06	.97
8. How much conflict is there in your group about task responsibilities?	-.06	-.03	.83
9. How often do you disagree about resource allocation in your work group?	.23	-.15	.60
Variance explained by each factor. ^a	6.79	6.86	6.35

^a With other factors controlled.

TABLE 2
Results of Confirmatory Factor Analysis of Atmosphere Items

Item	Trust	Respect	Liking	Open Discussion	Cohesiveness
1. How much do you trust your fellow group members?	.87	.15	-.12	.15	.31
2. How comfortable do you feel delegating to your group members?	.73	.41	.28	.27	.04
3. Were your group members truthful and honest?	.60	.19	.09	.07	.31
4. How much do you respect your fellow group members?	.26	.95	.08	.13	.25
5. How much do you respect the ideas of the people in your group?	.29	.86	.09	.25	.04
6. How much do you like your group members?	.41	.15	.89	.12	.26
7. To what degree would you consider these people your friends?	.39	.26	.87	.08	.21
8. How much open discussion of issues was there in your group?	.13	.08	.10	.98	.10
9. To what degree was communication in your group open?	.02	.01	-.06	.92	.07
10. To what degree was conflict dealt with openly in your work group?	.10	.03	.01	.73	-.00
11. To what extent is your group cohesive?	.08	.01	.05	.04	.94
12. How much do you feel like your team has group spirit?	.05	.23	.39	.06	.78
13. To what degree would you talk up this group to your friends as a great group to work in?	.11	.11	.04	.40	.69
Variance explained by each factor. ^a	6.79	6.86	6.35	3.01	2.11

^a With other factors controlled.

problem identification (0–10 points possible), the accuracy of problem analysis and conclusions (0–10 points possible), and the appropriateness of the recommendations made to the firm and of the actual firm presentation (0–10 points possible). Students were aware of the point breakdown prior to completing the task. The two expert raters (who were blind to the hypotheses of the study) had an interrater reliability of .93.

Analyses

To examine the dynamic nature of conflict, we began by graphing the means of the three types of conflict over time, aggregated over groups. We then dichotomized the groups into high and low performers to examine whether there were differences in conflict patterns across the two groups. The group performance distribution was bimodal, which made discriminating between the high and low performers obvious—that is, there were 21 groups with performance scores between 1 and 12, 4 with scores between 12 and 14, 3 with scores between 15 and 18, and 23 with scores over 18). High performers were considered to be those with scores of 15 and above ($n = 26$). High and low performers did not differ on times met ($t = 1.71$, n.s.) or hours worked ($t = 2.01$, n.s.). In other words, the time spent working as a group was similar for the high and low performers.

Utilizing a procedure for cross-level analysis (Rousseau, 1985), we averaged individual responses on each of the independent variables for each work group to create a group-level measure for the analysis of our group-level dependent variable, group performance. The average intragroup interrater agreement for each variable aggregated was between .79 and .92. In addition, we calculated the eta-square statistic, which indicates whether any two people in the same group are more similar than two people who are members of different groups (Florin, Giamartino, Kenny, & Wandersman, 1990). Our results, averaging .59, exceeded Georgopoulos's (1986) minimum criterion of .20, indicating that it was appropriate to aggregate the variables to a group level for the analysis of work group performance.

To test Hypotheses 1–3, regarding the temporal effects of conflict types on group performance, we first conducted a repeated-measures multivariate analysis of variance (MANOVA) on conflict type and time block. Results were significant for the interaction of conflict type and time block ($F = 9.18$, $p < .01$). We then tested each hypothesis separately by conducting analyses of variance (ANOVAs) on conflict, comparing the high and low performers. We discuss specific t -tests and results below.

To test Hypotheses 4a and 4b, stating that group value consensus influences a group's temporal con-

flict profile and that the effect is mediated by group atmosphere, we conducted two hierarchical regression analyses predicting each type of conflict in each time block. The first analysis puts group value consensus in step 1 of the hierarchical regression. This analysis examines the direct effect of group value consensus on the patterns of conflict. The second analysis puts the group atmosphere variables in step 1 and group value consensus in step 2. If the significant effects of group value consensus on conflict became nonsignificant, we could conclude that the effect of group value consensus on the patterns of conflict was mediated by group atmosphere.

RESULTS

The Impact of Conflict on Performance

Table 3 provides correlations between the variables in the model for all groups and periods combined, as would be done in a cross-sectional study, as well as means and standard deviations for each variable in each time block. The correlation table indicates that increases in all types of conflict are associated (some more weakly than others; significant correlations range from $-.11$ to $-.27$) with lower levels of group performance. Our hypothesized model implies that a static view does not accurately represent conflict in groups; therefore, we report tests of our dynamic hypotheses looking at conflict over time in the sections below.

Process conflict. Hypothesis 1 predicts that high-performing groups will experience process conflict differently than low-performing groups. Results indicate that the pattern of process conflict is significantly different in high- and low-performing groups ($F = 8.71, p < .001$). Specifically, we hypothesized that high-performing groups would have higher levels of process conflict at the beginning and at the end of the group interaction than low-performing groups and that high-performing groups would have low levels of process conflict during the middle phases of interaction compared to low-performing groups.

In partial support of Hypothesis 1, process conflict in the high-performing groups was significantly higher during the late time block ($\bar{x} = 2.17, s.d. = 1.41$) than during the middle time block ($\bar{x} = 1.54, s.d. = 0.65; t = 2.84, p < .001$; see Table 4). However, contradictory to our hypothesis, process conflict was lower in the early block ($\bar{x} = 1.14, s.d. = 0.39$) when compared with the middle block for high performers ($t = 4.59, p < .001$). The results show that process conflict for high-performing groups increases significantly from the early to the middle to the late time block, rather than resulting in the U-shaped function we hypothesized.

For the low performers, process conflict was significantly higher at the beginning ($\bar{x} = 1.78, s.d. = 0.67; t = 2.35, p < .001$) and at the end of the interaction ($\bar{x} = 3.07, s.d. = 1.30; t = 8.01, p < .001$)

TABLE 3
Means, Standard Deviations, and Correlations for All Time Periods^a

Variable	1	2	3	4	5	6	7	8	9	10
1. Group value consensus										
2. Trust	.52									
3. Respect	.56	.73								
4. Liking	.42	.66	.59							
5. Open conflict norms	.23	.29	.25	.27						
6. Cohesiveness	.43	.48	.52	.49	.20					
7. Relationship conflict	-.19	-.17	-.19	-.04	.01	-.19				
8. Task conflict	-.28	-.22	-.21	-.12	.05	-.24	.55			
9. Process conflict	-.17	-.19	-.21	-.07	-.00	-.19	.63	.48		
10. Competition	-.09	-.12	-.14	-.03	-.07	-.18	.27	.24	.33	
11. Group performance	.44	.32	.40	.32	.26	.37	-.10	-.16	-.12	-.08
Time block 1										
Mean	0.68	5.78	6.10	5.04	4.87	5.46	1.31	1.89	1.41	1.37
s.d.	0.23	1.31	0.90	1.56	1.99	1.39	0.57	0.92	1.02	0.84
Time block 2										
Mean		5.92	6.11	4.99	4.71	5.53	1.61	2.16	1.44	1.38
s.d.		1.29	0.88	1.21	1.41	1.59	0.93	1.16	0.81	0.95
Time block 3										
Mean		5.92	6.10	5.21	5.39	5.63	2.62	3.00	2.58	1.51
s.d.		1.18	0.92	0.91	1.70	1.26	2.03	1.68	1.98	0.95
										19.51
										4.46

^a $n = 151$; all correlations above .10 are significant at $p < .05$.

TABLE 4
Conflict Types and Levels for High- and Low-Performing Groups over Time

Conflict Type	Early		Middle		Late	
	High	Low	High	Low	High	Low
Process	1.14	1.78	1.54	1.36	3.07	3.07
Relationship	1.39	1.39	1.63	1.72	2.57	3.06
Task	1.70	2.21	2.33	2.10	1.63	3.39

compared to the middle ($\bar{x} = 1.36$, $s.d. = 0.89$), resulting in a U-shaped function.

Relationship conflict. Hypothesis 2 predicts that high-performing groups will experience low levels of relationship conflict throughout their interaction, compared to low-performing groups. We found a significant difference in patterns of relationship conflict between the high and low performers ($F = 5.97$, $p < .01$). Consistent with our hypothesis, high performers have low, monotonic levels of relationship conflict in the early and middle time blocks ($t = 1.12$, $n.s.$). However, contrary to our prediction, relationship conflict rises significantly in the late block for high performers ($\bar{x} = 2.57$, $s.d. = 0.98$; $t = 3.23$, $p < .001$). By contrast, in the low-performing groups, relationship conflict starts out low, rising until the final week, when it increases dramatically ($t = 6.08$, $p < .001$; see Table 4).

Task conflict. Hypothesis 3 predicts that high performers will experience moderately high levels of task conflict at the middle of the group interaction, relative to the beginning and end. We found significant differences in patterns of task conflict between the high and low performers ($F = 6.49$, $p < .01$). In high-performing groups, task conflict starts out moderately, rises during the middle weeks, and tapers off during the final push to completion. In support of Hypothesis 3, t -tests indicate that for high performers, task conflict was significantly higher during the middle of the interaction ($\bar{x} = 2.33$, $s.d. = 0.56$) than during the early time block ($\bar{x} = 1.70$, $s.d. = 1.27$; $t = 2.04$, $p < .05$) and the late time block ($\bar{x} = 1.63$, $s.d. = 0.41$; $t = 1.89$, $p < .001$). T -tests also indicate that higher performers experienced significantly higher levels of task conflict during the middle block ($t = 2.68$, $p < .006$) than low performers. For the low performers, task conflict was similar during the early and middle blocks ($t = 1.13$, $n.s.$) and rose to a significantly higher level at the end of the interaction ($\bar{x} = 3.39$, $s.d. = 2.15$; $t = 3.20$, $p < .001$).

Antecedents of Conflict

Hypothesis 4a predicts that group value consensus among members will lead to beneficial patterns of conflict. Work values were measured *prior* to group formation, and groups were formed randomly. Thus, group value consensus indicates a serendipitous similarity among group members regarding work values. As shown in Table 3, group value consensus resulted in significantly higher levels of trust ($r = .52$, $p < .001$), respect ($r = .56$, $p < .0001$), open conflict discussion norms ($r = .23$, $p < .001$), cohesiveness ($r = .43$, $p < .0001$), liking ($r = .42$, $p < .0001$), and (marginally) less competition ($r = -.09$, $p < .06$).

In partial support of Hypothesis 4a, preformation measures of group value consensus predicted tasks, process, and relationship conflict at the middle and late phases of group interaction; there were no significant relations between group value consensus and conflict in the early phase. Table 5 gives the results of regression analyses.

Hypothesis 4b predicts that the effects of group value consensus will be mediated by group atmosphere. In the early time block, group value consensus was not related to conflict; therefore, this hypothesis is not supported for this time period. In the middle time block, group value consensus became nonsignificant when the group atmosphere variables were included in the regression analysis for process conflict ($\beta = .05$), relationship conflict ($\beta = .03$), and task conflict ($\beta = .03$), meaning that group value consensus accounts for the variation in these outcome variables through the group atmosphere variables. Thus, group atmosphere mediates the relationship between group value consensus and intergroup conflict that occurs during the middle time block. In the late time block, group value consensus became nonsignificant when the group atmosphere variables were included in the regression analysis for process conflict ($\beta = .04$), relationship conflict ($\beta = -.01$), and task conflict ($\beta = .02$). Thus, group atmosphere mediates the relationship between group value consensus and intragroup conflict during the late time block.

Looking at the individual variables that comprised group atmosphere, we found that high levels of competitiveness created a detrimental pattern of conflict by significantly increasing all three types of conflict in the early and late time periods. During the middle time period, low levels of group cohesiveness and respect significantly increased process and relationship conflict, also reflecting a detrimental pattern of conflict. By contrast, during the middle time period, a beneficial pattern of conflict was created

TABLE 5
Results of Hierarchical Regression Analyses for
Group Processes and Conflict^a

Variable	Early	Middle	Late
Process conflict			
Step 1: Group value consensus	-.13	-.44***	-.17**
R^2	.02	.19	.03
F	1.16	34.42***	3.87***
Step 2: Group value consensus, group atmosphere controlled	.07	.05	.04
ΔR^2	.22	.20	.14
ΔF	5.62***	4.61***	2.69***
R^2	.24	.39	.18
Adjusted R^2	.19	.34	.12
F	2.01*	9.64***	3.72***
Relationship conflict			
Step 1: Group value consensus	-.10	-.25***	-.18*
R^2	.00	.29	.04
F	0.86	61.64***	4.66*
Step 2: Group value consensus, group atmosphere controlled	.06	.03	-.01
ΔR^2	.29	.03	.10
ΔF	6.49***	0.79	2.00***
R^2	.30	.40	.22
Adjusted R^2	.19	.31	.17
F	3.84***	8.56***	4.96**
Task conflict			
Step 1: Group value consensus	-.14	-.59***	-.35***
R^2	.01	.37	.12
F	0.74	84.00***	6.73***
Step 2: Group value consensus, group atmosphere controlled	.01	.03	.02
ΔR^2	.41	.07	.09
ΔF	18.22***	0.99***	1.64**
R^2	.41	.36	.13
Adjusted R^2	.37	.31	.12
F	6.26***	8.71***	2.75*

^a $n = 51$. Standardized regression coefficients are shown.

* $p < .05$

** $p < .01$

*** $p < .001$

as open conflict discussion norms significantly increased task conflict.

DISCUSSION

Our main goal in this study was to identify patterns of group conflict over time, their antecedents, and the links of specific patterns to group performance. Our predictions received mixed support. Our findings reinforce the view that conflict must be

examined as a dynamic process, rather than as a static event, echoing early conflict theorists (Coser, 1970; Deutsch, 1969). The interaction pattern observed in our high-performing groups is consistent with the theory that the midpoint is a crucial time for groups to engage in concentrated debate and discussion of their tasks (Gersick, 1988, 1989). This midpoint activity allows groups to adopt new perspectives, leveraging the synergy provided by moderately high levels of task conflict. To perform well, groups must then follow through with consensus and with implementation of task goals, which may be represented in our findings by a decrease in task conflict after the midpoint. These observations help verify some of the propositions of strategic decision theorists who have suggested that although task debates are necessary for high-quality ideas, consensus (or at least, less task conflict) assists implementation (Amason & Schweiger, 1994; Schweiger et al., 1989).

Low-performing groups, by contrast, actually experienced a dip in task conflict during the middle time block. In addition, they experienced low levels of task conflict early on, followed by a high degree of task conflict right before the project deadline, when conflict is likely to be more destructive than helpful (Jehn, 1997). The same low-performing groups also exhibited this escalating pattern for relationship conflict. This dual rise may reflect the negative cycle that can develop between task and relationship conflict. In these groups, task conflict may have been misperceived as personal criticism and interpreted as relationship conflict (Amason, 1996; Brehmer, 1976; Deutsch, 1969). If these perceptions persist over time, the result may be a steady rise in both task and relationship conflict and a performance loss rather than gain.

Generally, all types of conflict were lower in high-performing groups than in low-performing groups, with the exception of task conflict during the middle time periods. Although high-performing groups did have lower overall levels of process conflict, they also experienced a mild rise in such conflict over time. This rise toward the end probably represents debate over responsibility and deadlines on the presentation and completion of projects. In addition, high performers also reported a rise in relationship conflict during the final phases of projects. This pattern is consistent with research on task interdependence that indicates that all interactions, including relationship conflict, intensify when members feel interdependent (Jehn, 1995; Wageman, 1996), as may occur under the pressure of a deadline.

One major strength of this study is its examination of conflict during different phases of a group's

life. If we had used a one-time measure of conflict, the results and their interpretation would have been very different. Consider that in the final weeks of the project, the high-performing groups experienced mild upturns for process conflict and relationship conflict and slight downturns for task conflict. By contrast, in the low-performing groups, all three types of conflict spiked upward dramatically during the final weeks of the projects. This pattern may reflect a crisis in groups that were not performing well at the deadline. It is interesting to observe that if this study had measured conflict statically, as has most previous research, it would have been in the form of a postproject questionnaire. If subjects answered the questionnaire like they did during the last week of the project, the interpretation may have been that low-performing groups had very high levels of all types of conflict throughout the group process, and high-performing groups had moderate amounts of conflict, with little difference between the levels of task, relationship, and process types. Our temporal findings suggest a dynamic process, and we encourage more research on conflict over time.

Implications for Research and for Practice

A rich area for research, and one that we attempted to examine in this study, is the complex relationship between group atmosphere, group processes such as conflict, and group performance. Some organizational theories suggest links between diversity, member attitudes, and conflict (e.g., Pelled, 1996), but this study provides an empirical examination of some previously theoretical dilemmas, such as whether diversity within a group is productive or destructive. We concentrated in this study on one type of within-group similarity—group value consensus. Group value consensus presents an interesting paradox. The homogeneity it implies seems to be beneficial to work groups, in that it is likely to reduce relationship and process conflict; however, it may be detrimental by causing a decrease in task conflict or an increase in “groupthink” (Janis, 1971). Our results showed that during the middle and later weeks of the group projects, group value consensus was negatively associated with all three types of conflict. This finding is contrary to our prediction and presents a dilemma: how can groups that will have moderately high levels of task conflict and low levels of relationship conflict be composed?

One answer may be seen in the results for the other group atmosphere variables that were found to mediate the relationship between group value consensus and conflict. We found that during the

middle time blocks, both relationship and process conflict were predicted by low levels of respect and cohesiveness. By contrast, task conflict was positively associated with open discussion norms. Thus, in groups with high value consensus, it may be possible to enhance task conflict through norms favoring the open discussion of conflict. This idea is consistent with past theorizing on positive conflict norms by Tjosvold (1991) and others (Brett, 1984; Jehn, 1995, 1997). In addition, developing respect and cohesiveness among the group members may aid in the reduction of relationship and process conflict. This suggests that it may only be possible to harness the benefits of task conflict (and even process conflict) if members are not taking these conflicts personally and do not engage in relationship conflict.

After investigating the antecedents of productive and destructive conflict, we propose that to develop high-performing groups, managers must encourage open discussion norms, high levels of respect among members, and a cohesive and supportive team environment. In addition, the conflict training that managers or leaders conduct should be done in the early stages of group formation, given that our results suggest that group processes in the early developmental stages influence performance throughout the entire group life. Managers are key in setting open communication norms and a cohesive and friendly environment that enhances both members' attitudes and a group's overall performance. Our findings suggest that teams will be more successful to the extent that their leaders can promote constructive debate concerning the task at hand, especially at the midpoint of the interaction, while minimizing the potential for relationship and process conflict.

Limitations

There are a number of limitations of the study. First, since participants completed just one problem-solving, cognitive task, we do not know if these results transfer to other types of tasks, such as routine manufacturing tasks, or to groups that have longer lives and multiple projects. Thus, generalizability is limited. Another critical concept when examining teams over time is the effect of the feedback that the teams receive from a supervisor, manager, or one another. We were able to control for this in that all teams had the same “supervisor” (that is, the instructor), but the teams may have received different messages from the clients they were working with that were not captured in this design. In addition, although our study was longitudinal, the feedback loops that can occur among

members about performance and conflict limit what we can infer about causality. However, given that this is one of the first studies of group conflict over multiple periods, we believe there is value in proposing causal effects over time. Ideally, future research will measure the effects of feedback, as well as more directly controlling for the skill level of members, for task type, and for member interaction. We hope (and assert) that the richness of the real projects the teams were involved in adds to the worth of the study and its generalizability, redressing some of its limitations.

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