THE DYNAMIC NATURE OF CONFLICT:

A LONGITUDINAL STUDY OF INTRAGROUP CONFLICT AND GROUP PERFORMANCE

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In a longitudinal study we find that higher group performance is associated with a particular pattern of conflict. High-performing teams were characterized by low, but increasing, levels of process conflict, low levels of relationship conflict with a rise near the deadline, and moderate levels of task conflict at the midpoint of the interaction. To create this ideal conflict profile, team members had similar pre-established value systems, high levels of trust and respect, and open discussion norms around conflict during the middle stages of interaction.

In response to growing demands for efficiency and flexibility, organizations are shifting to team-based structures (c.f., 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; Levine & Moreland, 1990). However, as many organizations have discovered, teams do have liabilities (for reviews see, Maier, 1967; Kruglanski & Mackie, 1990; 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 conflict in teams, and the relationship between conflict and performance, that is the focus of our research.

While 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 (McGrath & Kelly, 1986; for some exceptions see Gersick, 1988; Schweiger, Sandberg & Rechner, 1989; Mannix & Loewenstein, 1993; Mannix, Tinsley & Bazerman, 1995; O'Connor, Gruenfeld, & McGrath, 1993). In this paper we will develop and test 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 by the parties involved of discrepancies, incompatible wishes, or irreconcilable desires (Boulding, 1963). Based on past research (Amason & Sapienza, 1997; Crosier & Rose, 1977; Guetzkow & Gyr, 1954; Jehn, 1992, 1997; Pelled, 1996; Pinkley, 1990; Wall & Nolan, 1986) we propose that conflict in work groups may be categorized into three types --

relationship, task, or process conflict.

Relationship conflict is an awareness of interpersonal incompatibilities, which 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, irritation, and dislike. 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 the group's task. It pertains to conflict about ideas and differences of opinion about the task, similar to cognitive conflict (Amason & Sapienza, 1997). Task conflicts may coincide with animated discussions and personal excitement but, by definition, are void of intense interpersonal negative emotions that are more commonly associated with relationship conflict.

Recent studies identify 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 or how much should one 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, show that relationship, or affective conflict is detrimental to individual and group performance, member satisfaction, and the likelihood the 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), as well as distract team members from the task, causing them to work less effectively and produce sub-optimal products (Argyris, 1962; Kelley, 1979; Wilson, et al, 1986).

In contrast, moderate levels of task conflict have been shown to be beneficial to group performance in certain types of tasks (Jehn, 1995; Shah & Jehn, 1993; Jehn & Shah, 1997). 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 over 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 is the least examined. In one study, process conflict was associated with a lower level of group morale, as well as decreased productivity (Jehn, 1992). The logic proposed is 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) notes 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 the 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, the 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 are reviewed and integrated by Tuckman (1965): forming, storming, norming, and performing. Stage models since Tuckman's synthesis are similar (see Hare, 1976; LaCoursiere, 1980; McGrath, 1984).

More recently, Gersick (1988; 1989) has 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 phases necessarily progressing in a hierarchically set order. Others agree that past theories of innate, concrete phases in groups may not be adequate (cf. Bell, 1982; Seeger, 1983; Mintzberg, Raisinghani, & Theoret, 1976). 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 taskforces must begin with a clear and engaging direction. The purpose of the team has been clearly specified, while the means of accomplishing that purpose has been 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 high-performing groups, process conflict at the beginning stages of a group's interaction allows work norms to be agreed upon, accepted, and understood (Tuckman, 1965). Responsibilities and deadlines are decided (Jehn, 1997; Mintzberg, Raisinghani, and Theoret, 1976). In Gersick's (1989) laboratory study, activities of successful groups included process discussions, time-pacing, and resource requirements in the early phases of interaction. 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 the task. Group members who are allowed "voice" during these 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, formatting, and deciding methods of presentation (Gersick, 1988; 1989). Group members need to decide who is most capable of completing various new task assignments such as organizing and presenting the compiled information, decision, or completed product. We propose that high-performing groups will again experience process conflict just prior to the deadline as they manage and organize these new duties.

Hypothesis 1: High-performing groups will have high levels of process conflict at the beginning and at the end of the group interaction compared to low-performing groups; high-performing groups will have low levels of process conflict during the middle phases of interaction compared to 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 (Shah & Jehn, 1993; Jehn, 1995). Theorists have argued that such norms may reduce the social uncertainty and concern with acceptance that can distract from task performance in newly formed groups (Nemeth, 1986; Schachter & Singer, 1962; Schachter, 1959; Deutsch, 1949). 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 (Bettinghausen & Murnighan, 1985). Gersick (1988) also notes 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 low levels of relationship conflict throughout all phases of group interaction compared to low-performing groups.

Task conflict over time. As discussed above, when conflict is functional it is often task-focused (Jehn, 1995; Brehmer, 1976; Cosier & Rose, 1977). 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, Sandberg, & Rechner, 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, while they made better decisions, there was lower acceptance of final decisions than in consensus--seeking groups (who made worse decisions).

Amason and Schweiger (1994) have identified this paradox and suggest 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 accomplished. We propose that the possible negative effects of task conflict may be related to the timing at which it occurs. For example, early task conflict may interfere with the discussion of important procedural issues, or it may pull the team away from their specified purpose. Task conflict that occurs too late in the interaction may reduce consensus and threaten implementation. Specifically, we argue that the midpoint 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 in 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. Groups that have managed relationship conflict well up to this point are likely to be comfortable with each other, and able to engage in task-related conflict without it turning into personal attacks. Laying the groundwork in the early stages of interaction will allow groups to make this crucial transition, focusing 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, resulting in 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, Sandberg & Rechner, 1989). Mintzberg, Raisinghani, and Theoret (1976) discuss a mid-term 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 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 high levels of task conflict at the middle of the group interaction, relative to the beginning and end of the interaction.

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. The question, however, remains: once we understand the connections between conflict and performance, 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 subsequent atmosphere that result among the group members.

Groups, like organizations, have specific identifiable cultures (Jehn, 1994; McFeat, 1974; Sackman, 1992). One defining aspect of group culture is the similarity of work values among members who enter the group (Enz, 1988; Schein, 1985). We examine the values members bring with them to the group. We define group value consensus as the extent to which the potential members have similar values regarding work, examples of which include; being innovative, being careful, autonomy, adaptability, and informality (O'Reilly, Chatman, & Caldwell, 1991). When group members have similar work values, members tend to agree on norms regarding work, in turn promoting harmony (Nemeth & Staw, 1989), and decreasing interpersonal tension (Schneider, 1983). By 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 workgroups, in that it is likely to reduce relationship conflict, increasing 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 for which 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 required critical inquiry and analysis of assumptions, the conflict gave groups of friends a performance advantage. They were also better able to resolve unnecessary relationship conflicts better than groups of strangers. Gruenfeld, Mannix, Williams, and Neale (1996) showed that groups of friends were better able to share diverse task-related information to solve a complex problem than groups of strangers. This research demonstrates that sometimes colleagues with positive relationships are better at managing conflict than 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 (Newcomb, 1956; Heider, 1958). Research has also shown that members who have similar pre-established work values (e.g., having a detail orientation, working long hours) are more satisfied in their group (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 competitive goal (Amason & Sapienza, 1997; Jehn & Shah, 1997).

Hypothesis 4a: Group value consensus will lead to beneficial patterns of conflict (as described above).

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

METHOD

Sample

The study utilized fifty-one three-person functioning groups performing comparable organizational tasks over a semester (see procedure for more details). The sample consisted of 153 participants who were primarily full-time employees at various organizations and part-time MBA students at three U.S. business schools. The three business schools have comparable entrance requirements (e.g., GMAT, GPA) and the individual performance distribution in the course across the three schools was similar – t-tests indicated no significant differences across samples. 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 across timeframes 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 and if this was not divisible by three we added the left over week to the first block (and second in the case of the 14-week semester; that is, block one consisted of weeks 1-5, block two consisted of weeks 6-10, and block three consisted of weeks 11-14). According to Gersick (1988) and other temporal group researchers, it is the developmental period in relation to a specific deadline that matters rather than the actual number of weeks. Because this procedure has the potential to create more variance within a block, we believe this is a conservative test of the dynamic model of conflict patterns.

On average, the students were currently working 40.1 hours per week at their jobs. Forty-five percent were employed in financial institutions, 27% in manufacturing, 14% in consulting firms, and 14% in other organizations. Average age was 29.4. Sixty-four percent were male; 18% were not from the U.S. All of the participants were enrolled in the same general management course. While the participants were aware that they were involved in project in which their performance would be measured, they were blind to the hypotheses of the study.

Procedure

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

This project comprised over 50% of the students' grades for this semester course. Teams spent an average of 10.8 hours per week together on the project and 20.6 hours total per week of individual time. 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 samples at the beginning of the first time block (beginning of the first class session) using O'Reilly, Chatman, and Caldwell's Organization Culture Profile (OCP; 1991). The OCP is an instrument that can be used to identify the central values of individuals and to assess how intensely held the values are and the consensus among group members (Chatman, 1989; 1991; Chatman & Jehn, 1994; Jehn, 1994; O'Reilly, Chatman, & Caldwell, 1991). The OCP consists of 54 items sorted by a Q-sort technique into 9 categories ranging from very important to very unimportant. Examples of culture items are: being careful, being innovative, and sharing responsibility. Following Jehn (1994), a group coefficient alpha was computed to assess the consensus among group members on the 54 items. The coefficient alpha used was the Spearman-Brown prophecy formula following past usage of the OCP (Jehn, 1994; O'Reilly, Chatman & Caldwell, 1991) and psychometric consensus assessment (Nunnally, 1967: 211). The group coefficient alphas represent the degree to which group members have similar values, and ranged from .21 to .92.

Intragroup conflict. The type of conflict in the group was measured by the Intragroup Conflict Scale (Jehn, 1995) and process conflict items from Shah and Jehn (1993) at the beginning, middle, and end of each time block and an average score was taken. Adaptations were made to the items to reference the appropriate focal unit; in this case, the workgroup. The confirmatory factor analysis with oblique rotation presented in Table 1 resulted in three factors consistent with past use of this scale (Shah & Jehn, 1993). Factor 1 describes task conflict (e.g., "How much conflict of ideas is there in your work group?," "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 (e.g., "How much relationship tension is there in your work group?", "How often do people get angry while working in your work group?"); and, Factor 3 reflects process conflict (e.g., "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.

----Insert Table 1 & 2 about here----

Group Atmosphere. Scales adapted for this study of trust, respect, cohesiveness (Chatman, 1991), open conflict discussion norms (Jehn, 1995), and liking for fellow group members (Jehn, 1995) were self-report items 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. Confirmatory factor analysis of the items is shown in Table 2. In addition, subjects reported on the level of competition within their group with a one-item measure (i.e., "How much competition was their in your workgroup?").

Outcomes. Performance was measured by ratings of the team final project report. The scale ranged from 1 to 30, with 30 being the highest score. Two independent raters scored the final reports. These reports included: a description of the company or department consulted, 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 appendices (often including the presentation slides shown to the firm) and tables. Points were awarded by the two independent raters for thoroughness of problem identification (0-10 points possible), accurate problem analysis and conclusions (0-10 points possible), and appropriate recommendations to the firm and 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 inter-rater 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 (i.e., there were 21 groups with a performance score 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 do 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 is similar across 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 ε^2, which indicates whether any two people in the same group are more similar than two people who are members of different groups (Florin et al., 1990). Our results, averaging .59, exceeded Georgopoulos's (1986) minimum criteria of .20, indicating that it was appropriate to aggregate the variables into group level variables for the analysis of workgroup performance.

To test hypotheses H1-H3 regarding the temporal effects of conflict types on group performance, we first conducted repeated measures MANOVA on conflict type and time block. Results were significant for the interaction of conflict type and time ($\underline{F} = 9.18$, $\underline{p} < .01$) . We then tested each hypothesis separately by conducting ANOVAs on conflict comparing the high and low performers. We discuss specific t-tests and results below.

To test hypotheses H4a and 4b, that group value consensus influences the temporal conflict 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 become non-significant, we can conclude that the effect of group value consensus on the patterns of conflict is 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 predicts that taking a static view of conflict does not give an accurate representation of conflict in groups; therefore, we test our dynamic hypotheses looking at conflict over time in the sections below.

---- Insert Tables 3 & 4 about here ----

Process conflict. Hypothesis 1 predicted that high performance groups would 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 ($\underline{F} = 8.71$, $\underline{p} < .001$). Specifically, we hypothesized that high-performing groups would have high levels of process conflict at the beginning and at the end of the group interaction compared to 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 ($\underline{M} = 2.17$, $\underline{SD} = 1.41$) than during the middle time block ($\underline{M} = 1.54$, $\underline{SD} = .65$; $\underline{t} = 2.84$, $\underline{p} < .001$; See Table 4). However, contradictory to our hypothesis, process conflict was lower in the early block ($\underline{M} = 1.14$, $\underline{SD} = .39$) when compared with the middle block for high performers ($\underline{t} = 4.59$, $\underline{p} < .001$). The results depicted in Figure 1 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 ($\underline{M} = 1.78$, $\underline{SD} = .67$; $\underline{t} = 2.35$, $\underline{p} < .001$) and at the end of the interaction ($\underline{M} = 3.07$, $\underline{SD} = 1.30$; $\underline{t} = 8.01$, $\underline{p} < .001$) compared to the middle ($\underline{M} = 1.36$, $\underline{SD} = .89$), resulting in a U-shaped function. **Relationship conflict.** Hypothesis 2 predicted that high-performing groups would experience low levels of relationship conflict throughout the 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 performing groups have low, monotonic levels of relationship conflict in the early and middle time blocks (t=1.12, ns). However, contrary to our prediction, relationship conflict rises significantly in the late block for high performers (M = 2.57, SD = .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 predicted that high performers would 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, rising 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 (M = 2.33, SD = .56) when compared to the early time block (M = 1.70, SD = 1.27; t = 2.04, p < .05), and when compared to the late time block (M = 1.63, SD = .41; t = 1.89, p < .001). T-tests also indicate that high performers experienced significantly higher levels of task conflict at the middle block (t = 2.68, p < .006) compared to low performers. For low performers task conflict was similar during the early and middle blocks (t=1.13, n.s.) and rose significantly higher at the end of the interaction (M = 3.39, SD = 2.15; t = 3.20, p < .001).

Antecedents of Conflict

Hypothesis 4a predicted that group value consensus among members would 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 ($r = .52$, $p < .0001$), 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, pre-formation measures of group value consensus predicted task, 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.

---Insert Table 5 about here---

Hypothesis 4b predicted that the effects of group value consensus would 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 ($B = .05$), relationship conflict ($B = .03$), and task conflict ($B = .03$) meaning that group value consensus accounts for the variation in these outcome variables through the group atmosphere variables. Thus, group atmosphere mediates between group value consensus and intragroup conflict which 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 ($B = .04$), relationship conflict ($B = -.01$), and task conflict ($B = .02$). 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 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 reiterate that conflict must be examined as a dynamic process, rather than as a static event, echoing back to early conflict theorists (Coser, 1970; Deutsch, 1969). The pattern of 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 the task (Gersick, 1988; 1989). This allows groups to adopt new perspectives, leveraging the synergy provided by moderately high, but not overly high levels of task conflict. To reach high performance, groups must then follow-through with consensus and implementation of the task goals, which may be represented in our findings by a decrease in task conflict after the midpoint. This helps verify some of the propositions of strategic decision theorists who have suggested that while task debates are necessary for high quality ideas, consensus (or at least less task conflict) assists in implementation (Amason & Schweiger, 1994; Schweiger, Sandberg & Rechner, 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 it 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 (Deutsch, 1969; Brehmer, 1976; Amason, 1996). If this occurs 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 compared to low performing groups, with the exception of task conflict during the middle time periods. While high performing groups did have lower overall levels of process conflict, they also experienced a mild rise over time. This rise toward the end probably represents debate over responsibility and deadlines on the presentation and completion of the project. In addition, high performers also reported a rise in relationship conflict during the final phases of the project. 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, 1997), as may occur under the pressure of a deadline.

One major strength of this study is its ability to examine 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 spike upward dramatically during the final week of the project. 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 in most previous research, it would have been in the form of a post-project 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, while high performing groups had moderate amounts of conflict with little differences between the levels of task, relationship or process. Our temporal findings suggest a dynamic process and we encourage more research on conflict over time.

Implications for Research

A rich area for research, and one which we attempted to examine in this study, is the complex relationship between group atmosphere, group processes such as conflict, and group performance. While some organizational theories suggest links between diversity, member attitudes and conflict (Pelled, 1996), this study provides an empirical examination of some previous theoretical dilemmas (i.e., 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 workgroups, 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 project, group value consensus was negatively associated with all three types of conflict.

This is contrary to our prediction, and presents a dilemma -- how to compose groups that will have moderately high levels of task conflict, as well as low levels of relationship conflict?

One answer may be found in the results for the other group atmosphere variables which 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 which favor the open discussion of conflict. This is consistent with past theorizing on positive conflict norms by Tjsovold (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 them personally (relationship conflict).

Implications for Practice

By 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 which enhances both members' attitudes and the 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 members 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 limiting the generalizability of the study. Another critical concept when examining teams over time is the effect of 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" (i.e., instructor), but teams may have received different messages from the clients they were working with that was not captured in this design. In addition, while our study is 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 skill level of members, task type, and member interaction. Hopefully, the richness of the real projects the teams were involved in adds to the worth of the study and its generalizability that some of these other limitations detract from.

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Table 1

Confirmatory Factor Analysis of Conflict Items*

Item	Task Conflict	Relationship Conflict	Process Conflict
1. How much relationship tension is there in your work group?	.011	**.897**	-.211
2. How often do people get angry while working in your group?	-.024	**.906**	.079
3. How much emotional conflict is there in your work group?	-.075	**.608**	.392
4. How much conflict of ideas is there in your work group?	**.912**	.138	-.162
5. How frequently do you have disagreements within your work group about the task of the project you are working on?	**.854**	-.101	.191
6. How often do people in your work group have conflicting opinions about the project you are working on?	**.902**	.179	-.169
7. How often are there disagreements about who should do what in your work group?	.059	-.063	**.966**
8. How much conflict is there in your group about task responsibilties?	-.058	-.028	**.825**
9. How often do you disagree about resource allocation in your work group?	.225	-.149	**.602**

Variance explained by each factor ignoring the other factors.	6.79	6.86	6.35

Table 2

Confirmatory Factor Analysis of Atmosphere Items *

Item	Trust	Respect	Liking	Open Discussion	Cohesiveness
1. How much do you trust your fellow group members?	**.870**	.152	-.122	.148	.310
2. How comfortable do you feel delegating to your group members?	**.730**	.411	.276	.270	.036
3. Were your group members truthful and honest?	**.596**	.194	.094	.065	.312
4. How much do you respect your fellow group members?	.256	**.953**	.080	.126	.247
5. How much do you respect the ideas of the people in your group?	.294	**.860**	.085	.250	.038
6. How much do you like your group members?	.408	.146	**.892**	.121	.259
7. To what degree would you consider these people your friends?	.392	.259	**.868**	.075	.209
8. How much open discussion of issues was there in your group?	.127	.075	.098	**.984**	.098
9. To what degree was communication in your group open?	.019	.006	-.062	**.919**	.072
10. To what degree was conflict dealt with openly in your work group?	.103	.030	.007	**.728**	-.001
11. To what extent is your group cohesive?	.082	.009	.050	.043	**.944**
12. How much do you feel like your team has group spirit?	.049	.234	.387	.057	**.777**
13. To what degree would you talk up this group to your friends as a great group to work in?	.107	.112	.043	.398	**.689**
Variance explained by each factor ignoring the other factors.	6.79	6.86	6.35	3.01	2.11

Table 3

Means, Standard Deviations, and Intercorrelations - All Time Periods*

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	.68	5.78	6.10	5.04	4.87	5.46	1.31	1.89	1.41	1.37	.--
s.d.	.23	1.31	.90	1.56	1.99	1.39	.57	.92	1.02	.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	.88	1.21	1.41	1.59	.93	1.16	.81	.95	.--
Time Block 3											
Mean	.--	5.92	6.10	5.21	5.39	5.63	2.62	3.00	2.58	1.51	19.51
s.d.	.--	1.18	.92	.91	1.70	1.26	2.03	1.68	1.98	.95	4.46

* N=151; all correlations above .10 are significant at $p<.05$.

Table 4

Conflict Types and Levels of High and Low Performing Groups over Time

	Early		Middle		Late	
	High	Low	High	Low	High	Low
Process (H1)	1.14	1.78	1.54	1.36	3.07	3.07
Relationship (H2)	1.39	1.39	1.63	1.72	2.57	3.06
Task (H3)	1.70	2.21	2.33	2.10	1.63	3.39

Table 5

Hierarchical Regression Analyses for Group Processes and Conflict (N=51)

	Early	Middle	Late
A. Process Conflict			
Step 1. Group Value Consensus	-.13[1]	-.44***	-.17**
R^2	.021	.192	.030
F	1.16	34.42***	3.87***
Step 2. Group Value Consensus			
Controlled for Group Atmosphere	.07	.05	.04
Change in R^2	.221	.199	.139
F Change	5.62***	4.61***	2.69***
R^2	.241	.391	.169
Adjusted R^2	.187	.337	.118
F	2.01*	9.64***	3.72***

	Early	Middle	Late
B. Relationship Conflict			
Step 1. Group Value Consensus	-.10	-.25***	-.18*
R^2	.003	.291	.036
F	.86	61.64***	4.66*
Step 2. Group Value Consensus			
Controlled for Group Atmosphere	.06	.03	-.01
Change in R^2	.291	.033	.100
F Change	6.49***	.79	2.00***
R^2	.297	.398	.222
Adjusted R^2	.188	.308	.171
F	3.84***	8.56***	4.96**

	Early	Middle	Late
C. Task Conflict			
Step 1.			
Group Value Consensus	-.14	-.59***	-.35***
R^2	.006	.365	.122
F	.74	84.00***	6.73***
Step 2. Group Value Consensus			
Controlled for Group Atmosphere	.01	.03	.02
Change in R^2	.409	.072	.091
F Change	18.22***	.99***	1.64**
R^2	.412	.363	.127

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[1] Standardized betas; ***p<.001, **p<.01, *p<.05.

Adjusted R^2	.366	.313	.116
F	6.26***	8.71***	2.75*

[1] Standardized betas; ***p<.001, **p<.01, *p<.05.

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