DIVERSITY, CONFLICT, AND SYSTEMS LEADERSHIP IN PROJECT GROUPS: A LONGITUDINAL STUDY

by

FERIDE PINAR AGAR, B.S., M.B.A.

A DISSERTATION

IN

BUSINESS ADMINISTRATION

Submitted to the Graduate Faculty
of Texas Tech University in
Partial Fulfillment of
the Requirements for
the Degree of

DOCTOR OF PHILOSOPHY

Approved

_____

Chairperson of the Committee

Accepted

Dean of the Graduate School

December, 2002

ACKNOWLEDGEMENTS

I wish to express my deepest appreciation to Dr. James G. Hunt, committee chairman, for his guidance, encouragement, and advice not only on this dissertation but also throughout my doctoral studies. I am also deeply grateful to Dr. James B. Wilcox, whose expert guidance and counsel have helped me clarify methodological issues and whose encouragement has gone a long way toward the completion of this dissertation. Also, I wish to express my sincere thanks to Dr. Kim Boal, Dr. Marvin Washington, and Dr. Robert Giambatista for their valuable comments and suggestions. Finally, I would like to acknowledge the Graduate School of Texas Tech University for providing funding in the form of 2001 Summer Dissertation/Thesis Research Award.

TABLE OF CONTENTS

ABSTRACT

The changing demography of the workforce has made group composition the most actively researched determinant of group effectiveness. The present study examined the effects of a major aspect of group composition, group diversity, on intra-group conflict and group performance. The majority of research on group diversity has considered diversity to be stable and objective. This study proposed a model of diversity that emphasized its perceptual and transient nature. It was postulated that different types of diversity would be salient at different times in a group's life and that these different types of diversity would trigger different group processes. Further, the model proposed in this study incorporated systems leadership, which enabled diverse groups to avoid the unfavorable effects of diversity while reaping its benefits.

Seventy-six student project teams in the capstone Strategic Management class offered in the college of business administration of a large southwestern state university participated in a longitudinal survey study to test specific hypotheses derived from the proposed model. The results indicated that diversity had a transient nature and that the salience of different forms of diversity changed throughout groups' development. Also, it was found that different forms of diversity led to different types of conflict, which in turn influenced group performance. Finally, it was found that systems leadership moderated between diversity and conflict.

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Organizafions are increasingly employing group-based structures to deal with increased competitive pressures from their environments (Campion, Medsker, &. Higgs, 1993; Cohen & Bailey, 1997; Sundstrom, De Meuse, & Futrell, 1990). In a survey study of U.S. companies with 100 or more employees, Gordon (1992) found that 82% had one or more groups; 45% used permanent work groups; 35% had one or more self-managed groups; 30% employed temporary project groups; 18% had permanent cross-fiancfional teams; and 53% of employees in organizations that had groups were group members.

Lawler, Mohrman, and Ledford (1995) in a study of Fortune 1000 companies found that 91% of these companies used employee participation groups and 68% used self-managing work groups. These figures were up fi-om 70% and 28% in 1987 for employee participation groups and self-managing groups respectively. Finally, Devine and his colleagues sought to answer the question whether groups and teams were really ubiquitous in organizations (Devine, Clayton, Philips, Dunford, & Melner, 1999). A random sample drawn fi-om a listing of six million U.S. organizations indicated that 48% of organizations use one or more groups and that ongoing project groups were the most popular type of group employed in these organizations (Devine et al., 1999).

Group effectiveness has the potential to contribute to or hinder organizational performance (Gladstein, 1984; Goodman, Ravlin, & Schminke, 1987; Guzzo & Dickson, 1996). Several models have been proposed to understand group effectiveness (e.g.,

Campion, Medsker, & Higgs, 1993; Gladstein, 1984; Hackman, 1987; McGrath, 1964, 1984; Pearce & Ravlin, 1987; Tannenbaum, Beard, & Salas, 1992). Group composition, "the nature and attributes of group members" (Guzzo & Dickson, 1996, p. 310) is a crifical component in almost all models of group effectiveness.

Goodman, Ravin, and Argote (1986) reviewed eight influential models of group performance as well as empirical evidence since 1979 and found that group composition appeared in most of the models. Similarly, Guzzo (1986) reviewed models of group effectiveness popular at the time to identify properties of groups that facilitate effective decision making and found resources embedded in the composition of a group to be a quintessential determinant of group effectiveness.

Recenfly, Campion and colleagues (1996, 1993) reviewed a wide range of literature and described five common themes of group characteristics that might be related to group performance. They argued that group composition was a recurring theme in all of the existing models of effectiveness. Other characteristics identified by these authors included job design, interdependence, context, and process. Guzzo and Dickson (1996) identified, in their review of the recent research on groups and teams, group composition as one of the most frequently studied group design variables. These authors indicated that group composition had been more actively researched than other determinants of group performance in recent years. Thus, according to the extant research on group effectiveness, group composition is an important determinant of group processes and outcomes.

A major aspect of group composition is the diversity among group members with respect to various attributes such as skills and abilities, values, attitudes, personality characteristics, educational and functional backgrounds, age, gender, and race/ethnicity, among others (Argote «e McGrath, 1993; Guzzo &. Dickson, 1996). Recent changes in the make-up of the workforce have made this dimension of group composition important for organizafions and groups, as well as individuals (Williams & O'Reilly, 1998). Long gone are the days when the workforce consisted mainly of Anglo-Saxon males. Today, more women, minorities, and immigrants are entering the workforce (Johnston & Packer, 1987), increasing its diversity. In addifion to changes at home, worldwide rise in international business activity has increased the interactions among people from different cultural backgrounds eliminating national boundaries to a large extent (Thomas, Ravlin, & Wallace, 1996).

Increased prevalence of diversity in the workplace coupled with increased use of groups in organizations has spurred interest on the effects of diversity on groups and their members. Although scholarly interest in group diversity has increased in recent years (Milliken & Martins, 1996; Williams & O'Reilly, 1998), this area is sfill "fertile soil" (Guzzo & Dickson, 1996). First, existing studies emphasize "objecfive" diversity ignoring "perceived" diversity (Harrison, Price, Gavin, & Florey, 2000). That is, in these studies diversity is defined objectively by the researchers using the coefficient of variation, the standard deviation divided by the mean, (Allison, 1987) or the entropy-based index (Teachman, 1980), which represents the sum of the products of each attribute's proportion in the composition of a group and the natural log of its proportion.

However, it is not clear whether group members in these studies are actually aware of their differences in terms of the types of diversity that are being studied by the researchers. Perceived diversity, which refers to the extent to which individuals perceive members of their group to be different in regards to various attributes, should also be incorporated in models of group diversity.

Second, existing studies also suffer from a lack of attenfion to temporality (Harrison, Price, & Bell, 1998). Extant research does not indicate at which phase of development the groups examined are during the time the studies are conducted. However, diversity is a dynamic construct (Nkomo & Cox, 1996), although it is generally defined "as something a group has in a fixed quantity..." (Arrow, McGrath, & Berdahl, 2000, p. 77). Different types of diversity may be salient at different times. To capture this dynamic nature of diversity perceived diversity should be examined across time. Most extant research, nevertheless, is cross-sectional and treats diversity as a stable construct.

Third, existing research, in general, does not emphasize contextual variables. However, effects of diversity might change depending on the context. That is, currently existing literature cannot explain how effective diverse groups are able to leverage their diversity and overcome its negative consequences. More research is needed to understand when diversity may have positive or negative effects on groups (Nkomo & Cox, 1996; Williams & O'Reilly, 1998).

Finally, the focus of extant research has been predominantly on identifying the direct effects of group diversity on group outcomes without taking into consideration

group processes that mediate this relationship. Hence, this research, in general, does not explain how diversity affects group outcomes (Lawrence, 1997).

The present research is an attempt to fill the gaps in the literature identified above. An attempt is made here to develop a model of diversity that takes into account its multi-faceted, perceptual, and dynamic nature by examining the effects of multiple forms of individual attributes moderated by an important contextual variable, systems leadership (Hunt & Ropo, 1997), on selected group processes and outcomes across time. The objectives of the present research are to:

1. Examine whether different types of diversity are salient at different times in a group's development.
2. Examine how the perceptual and dynamic nature of diversity affects group fimctioning and performance.
3. Propose and discuss a potential lever that can help groups benefit from diversity while avoiding its negative effects.

Literature Review

Before testing the proposed model, it is first necessary to analyze the research streams that underiie this framework. The literature review consists of three sections. First, a review of the group diversity literature is presented and diversity is defined. Then, in the second section, the literature on intra-group conflict is examined. Finally, a brief review of the literature on leadership as it applies to the proposed framework is presented.

Research on Group Diversity

Two theoretical models underlie the research on group diversity. The first of these is Schneider's (1987) attraction-selection-attrition (A-S-A) framework. The A-S-A framework posits that diversity will lead to unfavorable interpersonal relations, low group cohesiveness, and high turnover rates but at the same time to better adaptability and higher innovativeness.

The second one is Pfeffer's (1983) theory on organizational demography. The objective of the field of organizational demography is to identify empirical relationships between individual, group, and/or organizational outcomes and diversity with respect to various demographic variables such as age, functional backgroimd, organizational and group tenure, industry experience, educational specialization, among others. Pfeffer, like Schneider, argues that heterogeneity of organizational composition will lead to low interpersonal attraction; impede communication among members; decrease group cohesiveness; and thereby affect such outcomes as turnover, innovation, and performance.

The organizational demography and A-S-A frameworks led to numerous studies. Several of these studies examined the relationship between group diversity and turnover. Group turnover rates were found to be predicted by diversity in terms of age (Jackson et al., 1991; McCain, O'Reilly, & Pfeffer, 1983; O'Reilly, Caldwell, & Bamett, 1989; Wagner, Pfeffer, & O'Reilly, 1984), tenure (O'Reilly et al., 1989; Wagner et al., 1984), curriculum studied (Jackson et al., 1991), and industry experience (Jackson et al., 1991; McCain etal., 1983).

Effects of group diversity on affective outcomes were also investigated. O'Reilly, and associates (1989) found that diversity in tenure was statistically and negatively related to social integration in 31 Fortune 500 companies. Alagna, Reddy, and Collins (1982) found that mixed-sex groups of medical students experienced higher levels of conflict, interpersonal tension and lower levels of friendliness. Riordan and Shore (1997) foimd that members of work groups mostiy composed of minorities experienced significantiy lower levels of group commitment. Smith and colleagues (1994) found no direct relationship between diversity in functional backgrounds of members of top management teams and social integration and an indirect relationship between diversity in experience with the industry and the company and social integration through informal communication.

Other studies examined diversity's influence on the performance of cognitive tasks and creativity. Hoffman and Maier (1961) showed that mixed-sex groups produced higher quality solutions than did all-male groups. Bantel and Jackson (1989) showed that top management group composition in terms of average age, average education level, heterogeneity of educational specialization, and heterogeneity of functional expertise were significantly related to innovation in banks. However, they found no relationship between diversity in age and innovation. McLeod and Lobel (1992) found groups which were diverse with respect to their members' ethnic backgrounds produced higher quality ideas compared to homogeneous groups.

Finally, some studies investigated communication-related consequences of diversity. Zenger and Lawrence (1989) found that homogeneity in tenure was positively

related to technical communication and homogeneity in age was positively related to communication with outsiders in project groups. Ancona and Caldwell (1992) found project groups that are diverse with respect to functional backgrounds of their members communicated more with external parties. Smith and associates (1994), in a study of 53 top management teams, found that diversity in experience in the industry and with the company was negatively associated with the amount of informal communication within the group.

Most of the studies reviewed above focused on identifying the direct effects of group diversity on group and organizational outcomes without taking into consideration processes that mediated this relationship. In effect, this research, in general, assumed that the subjective concepts that intervened between demographic predictors and outcomes were implied by the directly observable and more reliable demographic variables. Thus, the early research on organizational demography, in general, did not explain how diversity affected group outcomes. (Lawrence, 1997). Although these researchers proposed several subjective concepts such as group cohesiveness to explain the significant associations between demographic variables and outcomes, they usually left these concepts unmeasured and hence created "black box" theories (Lawrence, 1997, p. 2).

More recently scholars started untangling the black box and examining the processes underiying group diversity (e.g., Ancona & Caldwell, 1992; Jehn, Chadwick, & Thatcher, 1997; Jehn, Northcraft, & Neale,1999; Pelled, Eisenhardt, & Xin, 1999; Smith et al., 1994). Ancona and Caldwell (1992) showed that group diversity with respect to

functional background helped groups be better linked to external networks thereby increasing communication with outsiders which in turn led to higher management ratings of innovation. At the same time, group diversity in organizational tenure led to more effective task-related internal processes leading to higher group assessments of performance.

However, although diversity led to favorable outcomes indirectly through increased external communication and improved internal processes, it had counter-balancing negative direct effects on manager ratings of innovation, adherence to budgets and schedules, and group assessment of group performance. Ancona and Caldwell argued that unexpected results could be "… a statistical artifact resulting from a missing mediating variable that negatively links demography and performance. One possibility is ...conflict" (p. 338).

Smith et al. (1994) proposed that demographic diversity of top management teams lead to organizational outcomes through three intervening variables, namely social integration, informality of communication, and communication frequency. Similar to Ancona and Caldwell, these authors also discovered that the process variables they included did not fully explain the effects of diversity and suggested that the mediating effect of conflict should be taken into account.

Three studies examined the mediating role of conflict on the relationship between group diversity and group outcomes. Jehn and colleagues (1997), as a result of a quasi-experimental study of 88 teams consisting of MBA students, found that value congruence (i.e., group homogeneity regarding values) decreased both task and relationship conflict,

homogeneity regarding gender decreased relationship conflict, and heterogeneity regarding education increased task conflict.

Pelled et al. (1999) found in a study of 45 groups from the electronics divisions of three major corporations that functional background diversity was the major driver of task conflict and that diversity in tenure was not related to task conflict. Also, they found that heterogeneity with respect to tenure and race and homogeneity of age had significant positive associations with relationship conflict. Unexpectedly they found no significant effects of diversity in gender on intra-group conflict.

Finally, Jehn, Northcraft, and Neale (1999) found that diversity in college majors, functional area, and position in the firm was positively related to task conflict, diversity in age and gender was positively and significantly related to relationship conflict, and value diversity was positively £md significantly related to task, process, and relationship conflict.

The above review of the diversity literature indicates several gaps. First, too few studies examined the role of a process variable in explaining diversity's effects on group performance. Those studies that incorporated an intervening variable indicated that variables such as external communication and internal task processes (Ancona & Caldwell, 1992), and social integration, informality of communication, and communication frequency (Smith et al., 1994) did not fully explain the effects of diversity on group outcomes (Pelled et al., 1999). On the other hand, studies that assessed the intervening role of task conflict and relationship conflict (Jehn et al., 1997; Pelled et al., 1999; Jehn et al., 1999) found that various forms of diversity had significant

relationships with the two types of conflict variables. As will be discussed later the two types of conflict were also showTi to have significant relationships with various outcome measures.

Second, although promising, the results of this research on group diversity and conflict are inconclusive (Williams & O'Reilly, 1998). For instance whereas Jehn and colleagues (1999) and Jehn and associates (1997) found a positive association between gender diversity and relationship conflict, Pelled and associates (1999) did not find any significant effect of gender diversity. Similarly, whereas Jehn et al. (1999) found that heterogeneity of age was positively related to relationship conflict, Pelled et al. (1999) found homogeneity of age was positively associated with relationship conflict and Jehn et al. (1997) failed to find a significant relationship between age diversity and relationship conflict.

The inconclusive results prevalent in the existing literature can be due to the way diversity is operationalized. Diversity, in these studies, is defined objectively by the researchers using the coefficient of variation or an entropy-based index. It is not clear whether group members in these studies are actually aware of their differences in terms of the types of diversity that are being studied. Individuals have multiple attributes and at a given time not all individual attributes are salient (Arrow et al., 2000; Nkomo & Cox, 1996). That is, different forms of diversity can be noticeable to group members at different times. To overcome this problem, as discussed above, perceived diversity should be included in models of group diversity.

The assertion that different forms of diversity can be salient at different times, also, indicates that diversity is a dynamic construct (Nkomo & Cox, 1996). salient aspects of individuals' identities and group members' perceptions of each other change overtime (Arrow et al., 2000; Nkomo & Cox, 1996). Perceived diversity should be examined across time. However, there is a lack of attention to the developmental process for diversity in workgroups (Harrison et al., 1998).

Another reason for inconsistent results could be overlooked contextual variables. Few studies examine the effects of possible contextual variables on the diversity-outcome relationship. That is, current studies, in general, examine what Nkomo and Cox (1996, p.343) refer to as "unmanaged diversity." That is, situational factors that might overcome the negative effects of diversity or those that might enhance its positive effects are not included in these studies.

Defining Diversity

Group diversity is commonly defined as a group's heterogeneity with respect to individual attributes such as demographic characteristics, personality, and skills and abilities (Ancona & Caldwell. 1992; Jackson, May, & Whitney, 1995; Pelled, 1996; Pelled et al., 1999). Integral to this definition of diversity are the individual attributes. These individual attributes are the source of diversity (Jackson, May, & Whitney, 1995; Milliken & Martins, 1996). In effect, according to Nkomo and Cox (1996, p.339), the construct of diversity is inherently incomplete "because it immediately raises the question: diversity in what?"

Scholars vary in terms of the range of individual attributes they take into account (Nkomo & Cox, 1996). For example, Pelled (1996) and Pelled et al. (1999) focus only on demographic attributes and define diversity as the degree to which a group is heterogeneous witii respect to demographic attributes. Demographic attributes are "immutable characteristics such as age, gender, and ethnicity; attributes that describe individuals' relationships with organizations, such as organizational tenure or functional area; and attributes that identify individuals' positions within society, such as marital status" (Lawrence, 1997, p. 5).

Others such as Jackson et al. (1995) have a broader approach to diversity. They define diversity as "the presence of differences among members of a social unif (p. 217). These differences include over twenty attributes such as age, gender, race, education, experience, attitudes and values, and behavioral style. While the changes in the demographics of the workforce and organizational structures have made demographic attributes more salient (Jackson, 1992; Pelled, 1996), "the effects of diversity can result from any attribute people use to tell themselves that another person is different" (Williams & O'Reilly, 1998, p. 81).

In effect, the literature on social categorization reveals that people use any attributes that happen to be available to make categorizations, even when these attributes are trivial or explicitly random (Triandis, Kurowski, & Gelfanc, 1994). Hence, adopting a narrow perspective and disregarding the many different types of diversity that can characterize a group can cause organizational problems to be overlooked (Jackson et al., 1995). For these reasons, a broad perspective of defining diversity that takes into account

individual attributes such as personality, attitudes, values, and beliefs in addition to demographic attributes should be adopted.

Previous research suggests three types of diversity, depending on the individual attributes taken into consideration: social category diversity, informational diversity, and value diversity (Jehn et al., 1997; Jehn et al., 1999). Social category diversity refers to diversity in visible, readily detectable attributes such as gender, age, and race. Informational diversity refers to differences in knowledge bases and perspectives. Value diversity refers to differences in values, attitudes, and other attributes such as personality characteristics that are less visible and more difficult to detect.

Finally, diversity is a perceptual and dynamic construct. Previous research on group demography, on the other hand, emphasized objective diversity based on the distribution of members' attributes as assessed by the researcher. However, Arrow et al. (2000, p. 77) argue that "[p]eople tend not to express all aspects of self in a given group or to be aware of all dimensions of other members." In addition, social categorization theory, emphasizes the importance of individuals' perceptions (Tajfel, 1982).

Research on Intra-Group Conflict

Intra-group conflict, defined as the participants' awareness that their views are incompatible (Jehn, 1994), is one of the major organizational variables (Rahim, 1983). Eariy research on conflict viewed it as a single-dimensional construct. Results of this research are inconsistent. For instance, Schweiger, Sandberg, and Rechner (1989) showed that conflict improved decision quality and strategic planning, whereas

Mintzberg and colleagues indicated that conflict obstructed decision making (Mintzberg, Raisinghani, & Theoret, 1976). Amason (1996) indicated that conflict enabled high quality decision making but at the same time impeded consensus and acceptance of the decisions made.

Recenfly, it is suggested that conflict is a multidimensional construct that has two dimensions (Amason, 1996; Amason & Sapeinze, 1997; Jehn, 1994, Pelled, 1996; Priem, 1990), "with one dimension that can have beneficial effect on ...task performance and the other dimension...impeding performance" (Pelled, 1996, p. 619). Here, following Jehn (1995) the beneficial component is labeled task conflict and the destructive component is labeled relationship conflict. Task conflict refers to the disagreement among group members regarding task content and how to accomplish the task (Jehn, 1995; Jehn et al., 1997; Pelled, 1996; Pelled et al., 1999). Relationship conflict refers to disagreements due to personality incompatibilities and interpersonal disliking (Jehn, 1995; Jehn et al., 1997; Pelled, 1996; Pelled et al., 1999).

When conflict is defined as a two-dimensional construct, it can explain both the favorable and unfavorable effects of diversity and therefore have an advantage over other possible mediators (Pelled, 1996). In effect, as stated above, studies of group diversity that incorporate conflict have found that various forms of diversity had significant relationships with the two types of conflict variables which, in turn, had significant relationships with various outcome measures.

In the previously mentioned study, Jehn and colleagues (1997) found that relationship conflict was negatively related to objective and perceived performance as

well as member satisfaction. Task conflict was, also, negatively related to member satisfaction and perceived performance. However, task conflict was not significantiy related to objective performance, contrary to the hypothesized positive association between the two variables. Further analyses confirmed the mediating role of relationship conflict for the relationships between value congruence and perceptual performance and value congruence and satisfaction. The mediating role of task conflict was confirmed for the relationship between education dissimilarity and performance.

Pelled et al. (1999) also examined the association between the two types of conflict and cognitive task performance. Their results indicated that task conflict led to increased performance of cognitive tasks. However, no significant association was found between relationship conflict and cognitive task performance. Finally, Jehn, Northcraft, and Neale (1999) revealed that task conflict mediated between diversity with respect to knowledge bases and perspectives arising from differences in educational background, training, and work experience and actual group performance. They, also, found that relationship conflict mediated between value diversity and worker morale and diversity with respect to visible characteristics such as gender and race and worker morale.

The above review of diversity-conflict literature indicates that relationship conflict that is triggered by social category diversity and value diversity is detrimental to both objective and perceived group performance. On the other hand, task conflict that arises from informational diversity enables objective group performance but at the same time lowers members' satisfaction with their groups and their perceptions of how well their groups performed.

Research on Leadership

The literature on leadership has long argued that leadership systematically affects group processes and performance (Bass, 1990; Yukl, 1998). However, there have been few studies on the effects of leadership on project team internal processes (Ford & Randolph, 1992). Existing research focused on two issues: the division of authority between the group leader and the functional managers (e.g., Katz & Allen, 1985; Larson & Gobeli, 1988) and the characteristics of project managers leading effective cross-functional teams (Ford & Randolph, 1992). This literature does not address the types of behavior the group leader can display to affect group performance.

The recent trends indicate an increased use of self-management in groups (Uhl-Bien & Graen, 1998). In such groups shared leadership is the most effective approach (Barry, 1991). According to this approach, any member of a group can carry out leadership functions. Hence, leadership activities are not performed by a single formally assigned leader, but rather are shared by members of the group (Lussier & Achua, 2001; Yukl, 1998).

In an early research. Bowers and Seashore (1966) demonstrated that leadership behaviors could be performed by members of the group other than the formal leader. In effect, they argued that the effectiveness of a group depended on the quality of overall leadership in a group rather than who actually performed the leadership functions (Yukl, 1998). Similarly, Bradford (1976) proposed a group-centered approach to leading groups. According to this approach the group as a whole should share the leadership

responsibilities. Sharing leadership functions, in turn, would increase group members' satisfaction with the group.

Leadership substitutes theory is another framework that focuses on influences other than the formal leader (Howell, Bowen, Dorfman, Kerr, & Podsakoff, 1990). Specifically, this theory proposes that aspects of the situation might reduce the importance of formal leaders (Yukl, 1998). Two kinds of situational variables are identified, substitutes and neutralizers (Kerr & Jermier, 1978). Substitutes are those features of the situation that make the behavior of a formal leader unnecessary, whereas neutralizers are those aspects that nullify the effects of the leader's behavior or that constrain the leader's behavior. Although substitutes for leadership theory makes an important contribution by emphasizing the importance of the aspects of the situation other than the formal leader that may affect group performance, empirical research that tests its propositions is scarce (Yukl, 1998)

Finally, over the past 25 years, the dyadic approach to leadership has evolved from emphasizing the leader and a follower to creating favorable dyadic relationships with individuals and groups wherever they are located (Hunt & Ropo, 1997; Lussier & Achua, 2001). Despite these changes, in a review of the leadership literature. House and Aditya (1997) note that "current study of leadership continues to focus excessively on superior-subordinate relationships..." (p. 465).

The above review of literature indicates that leadership does not necessarily emanate from one single individual. Rather, it can originate from several group members as well as aspects of the group such as group norms. This form of leadership is called

systems leadership (Hunt & Ropo, 1997). Systems leadership, then, refers to the conditions and processes that influence the behavior of group members toward the attainment of group goals.

Overview of the Present Study

The objective of this study is to assess the perceptual and dynamic nature of group diversity and how it affects group processes and performance. Members of a group have multiple attributes such as gender, race, attitudes, and values. Therefore groups are diverse in multiple ways. However, at a given time not all individual attributes are salient. That is, different forms of diversity can be noticeable to group members at different times.

The essence of the proposed model is that different individual attributes and therefore different types of diversity will be salient at different times in a group's life and that these different types of diversity will trigger different group processes. Specifically, it is proposed that early in the life of a group visible, ascriptive types of diversity such as diversity with respect to gender, race/ethnicity, and age will be salient. As members interact, members' attention is focused away from visible attributes and on task-related and underlying attributes. Thus the salience of visible individual characteristics will diminish and the salience of underlying attributes such as values and task-related attributes such as functional background will increase.

Different forms of diversity will trigger different group processes. The salience of visible, immediately apparent attributes and the resulting perceived social category

diversity in the eariy phases of development tends to lead to relationship conflict, which in turn tends to hinder group performance. However, those groups that develop behaviors that emphasize solidarity and inclusiveness can avoid high levels of relationship conflict due to social category diversity at this stage.

The salience of task-related attributes and the resulting perceived informational diversity in the later stages tends to ti-igger task conflict, whereas the salience of underlying attributes such as personality and attitudes and perceptions of value diversity during the same time tends to trigger relationship conflict. Task conflict is beneficial to group performance, while relationship conflict inhibits it. However, not all groups can benefit from informational diversity. Those groups that develop behaviors that encourage the synthesis and integration of different perspectives of their members can experience higher levels of task conflict. Similarly, those groups that develop behaviors that prevent the development of apathy due to personal differences can experience lower levels of relationship conflict due to value diversity.

Behaviors that encourage solidarity and inclusiveness, those that encourage synthesis and integration of different perspectives, and those that smooth over interpersonal differences result from systems leadership present in a group. Systems leadership, then, enables diverse groups to avoid the unfavorable effects of diversity while reaping its benefits. Thus the model proposed in this study incorporates an important contextual variable, systems leadership. Figure 1.1 depicts the overall model.

The context of the present research is chosen to be the project group because of the unique ways in which these groups differ from workgroups. Project groups bring

together diverse sources of expertise to undertake complex and nonroutine tasks that have a definite life. The task of the project group requires that the requisite variety of knowledge, information, eind skills be represented in group composition. Therefore, project groups are deliberately composed of members diverse with respect to their task-related attributes such as area of expertise. These groups operate outside the organization's hierarchy. Hence, participating in the project group is usually not the only responsibility of group members.

Project groups, also, are temporary. That is, they exist for the duration of the task they are formed to accomplish and they have a life cycle with a recognizable beginning, middle, and end (Mohrman, 1993). The short life span of project groups implies that they need to develop effective internal processes early in their lives (Denison, Kahn, & Hart, 1996). Finally, such groups are becoming increasingly popular (Cohen, 1993; Denison et al., 1996; Ford *8L* Randolph, 1992; Pinto, Pinto, & Prescott, 1993).

Group Diversity

Visible
•Social Category

Invisible
•Value
•Informational

i k "^

Inlra-Group Conflict

•Relationship
•Task

Group
Performance

Systems
Leadership

Figure 1.1. Summary Model

CHAPTER II

THEORETICAL MODEL AND HYPOTHESES

Project groups are formed to bring together a group of individuals with different perspectives and information on an issue. Hence, such groups are usually diverse with respect to their members' functional background, educational specialization, and skills and expertise. However, ftinctional background, educational specialization, and skills and expertise are only some of the attributes that members of project groups bring with them to the group. Members of a project group can, also, be diverse with respect to many other attributes, such as gender, race/ethnicity, age, and personal values and beliefs, among others (Arrow et al., 2000; Nkomo & Cox, 1996). These other forms of diversity will not only affect important processes and outcomes, but they will also affect the project groups' ability to realize their full potential.

The objective of this study is to examine the effects of these multiple forms of diversity on project groups over time incorporating an important mediating process and a contextual variable. This present study proposes a model of diversity, conflict, and leadership in project groups across time. Figure 2.1 illustrates a detailed depiction of the proposed model. This chapter first looks at the diversity-conflict relationship. This section, first, discusses how social category diversity affects relationship conflict and group performance early in group development. Then, the effects of less visible kinds of diversity (i.e., informational and value), that tend to become salient as group members interact to accomplish group tasks, on task conflict and relationship conflict are

discussed. The next section proposes systems leadership as a moderator of diversity-conflict relationship. Finally, the conflict-performance link is discussed.

Diversity-Conflict Relationship

Formal groups in organizations are established by an external agent to carry out a task. Past research on social psychology, on the other hand, indicates that when individuals have the opportunity to interact with others, they are more likely to interact with some people than others. For instance, Gruenfeld, Mannix, Williams, and Neale (1996) identified similarity, proximity, and prior acquaintance as the most common bases for natural group formation. Byrne (1971), also, identified similarity as a basis for interpersonal attraction and group formation. The members of project groups, however, can be dissimilar with respect to several attributes such as gender, race, and age, as well as their fitnctional backgrounds (Arrow et al., 2000).

When individuals interact with dissimilar others, they tend to classify themselves and others into social categories (Nkomo & Cox, 1996; Tajfel, 1982; Turner, 1987). Past research indicates that any characteristic made salient in a given situation may be the basis for categorization. However, attributes that are more readily detectable such as race, sex, and age are more likely to be used than less salient attributes such as education and personality characteristics (Williams & O'Reilly, 1998).

In the case of project groups, members' attributes that are more readily detectable such as race, sex, and age will be used to form social categories. These highly visible attributes such as sex, race, and age will be salient because they are immediately apparent

and therefore more available for social categorization purposes. Jackson, Stone, and Alvarez (1993) indicate that individuals form early social cognitions about others using their easily detected, visible attributes. Similarly, Harrison and associates (1998) argue that group members base their initial categorizations of other group members on their visible characteristics. Their cross-sectional study of two samples, one from 39 units of a private hospital and the other from the deli-bakery section of 32 grocery stores, found support for their hypotheses that earlier in the life of a group, visible, easily detectable attributes of group members had stronger effects on group cohesiveness.

Finally, Tsui, Egan, and Porter (1994) found that supervisors categorized their subordinates as either in- or out-group members early in relationships based on the subordinates' physical, observable characteristics. Thus, when a project group is newly formed, visible, readily detectable attributes of group members such as gender and race are more likely to be perceived by group members compared to other attributes that are less visible and more difficult to detect such as task-related skills and abilities and values, beliefs, and attitudes.

> Proposition 1: Readily detectable attributes of group members will be more salient in newly formed project groups.

Social categorization based on visible individual attributes creates in-groups and out-groups, prejudices, stereotypes, and hostility and anxiety toward members of out-groups (Jehn et al., 1997; Nkomo & Cox, 1996; Pelled, 1996). These negative feelings and the intergroup bias caused by social categorization processes, in turn, tend to trigger relationship conflict (Jehn et al., 1997, 1999; Pelled, 1996; Pelled et al, 1999). Studies

by Jehn and colleagues (1997), Pelled and associates (1999), and Jehn, Northcraft, and Neale (1999), as discussed in the previous chapter, provide some support for this argument.

> Proposition 2: Newly formed project groups that are characterized by high levels of social category diversity will experience higher levels of relationship conflict.

The task of a project group requires that all organizational units that are affected from and that have information and expertise relevant to a common issue be included in the group. In effect, care should be taken that the group is complete to ensure requisite variety of knowledge, information, and skills needed to accomplish the group task and to command the commitment of every unit that will be involved in the implementation phase. When individuals from different parts of the organization with different educational specializations, functional backgrounds and experience are brought together, it is highly likely that such individuals will also bring different task-relevant knowledge, perspectives, abilities and skills to bear on the group task. In addition, members of a project group will also differ in terms of their personal attributes such as their personaUties, attitudes, values, and beliefs.

As the group works out its interpersonal issues and develops a pattern of interaction that allows for collaboration and joint decision making, increased interpersonal contact and familiarity tend to make visible attributes less salient and the boundaries of the in-group and the out-group can change (Pelled, 1996; Pelled et al., 1999) so that the group members can start to view their teammates as part of the in-

group. This is in line with social category theory which states that an individual's identity is not fixed. Rather, it varies over time and across situations (Kramer, 1991).

The extended interaction among group members will enable them to gather information about each other's less observable characteristics such as task-relevant skills and abilities, as well as attitudes, beliefs, and values (Harrison et al., 1998, Pelled, 1996; Pelled et al., 1999). Thus over time, group members' less visible and more difficult to detect attributes will be more salient compared to their visible and readily detectable attributes. The previously mentioned study by Harrison et al. (1998), for instance, found that imderlying attributes such as work-related attitudes became more salient and exerted greater influence on group processes as group longevity increased. However, this study was cross-sectional and did not follow group diversity and the dependent variables over time.

> Proposition 3a: Over time, group members' underlying attributes such as their values and personality will become more salient.
>
> Proposition 3b: Over time, group members' task-related attributes will become more salient.

The salience of individual differences in regards to experience, perspectives, abilities and skills tend to trigger disagreements about the nature of the group task and how to accomplish it and, these disagreements about the task, in turn, tend to lead to task conflict (Ancona & Caldwell, 1992; Jehn et al., 1997; Pelled et al., 1999). The previously mentioned quasi-experimental study by Jehn, Chadwick, and Thatcher (1997) fotmd that heterogeneity regarding education increased task conflict. Similarly, Pelled et

al. (1999) found diversity in functional background led to task conflict. Finally, Jehn, Nortiicraft, and Neale (1999) found that diversity in college majors, functional area, and position in the firm was positively related to task conflict.

> Proposition 4: Longer-term project groups that are characterized by high levels of informational diversity will experience higher levels of task conflict.

As discussed above, later in the life of a group, as a resuU of prolonged interaction among the group members, underlying attributes such as personality characteristics, attitudes, values, and beliefs of group members tend to become salient (Harrison et al., 1998). Harrison and colleagues state that such attributes tend to become more salient later in the group's development because they require group members to interact with each other for longer periods of time and gather more information compared to visible attributes which are easily and objectively detectable with only brief encounters.

There have been few studies conducted on the effects of diversity with respect to such attributes, although social psychological studies have long argued that attitude similarity was the strongest predictor of interpersonal attraction (Harrison et al., 1998). Interacting with others who share similar attitudes and values enables the validation of important beliefs and values and thereby is positively reinforcing, whereas dissimilarity in such attributes is seen as punishment (Byrne, 1971). From an exchange theory perspective (Thibaut & Kelley, 1958), interacting with dissimilar others requires large amounts of time and effort and exposes the individual to uncertainty with regards to appropriate behavior norms. Hence, interactions with individuals dissimilar with respect

to underiying attributes will be seen as costly and unrewarding. Both similarity-attraction and social exchange perspectives indicate that dissimilarity with respect to underiying attributes tend to trigger negative affects such as dislike and annoyance. Such negative emotions are associated with relationship conflict. Hence, value diversity tends to generate relationship conflict.

> Proposition 5: Longer-term project groups that are characterized by high levels of value diversity will experience higher levels of relationship conflict.

Systems Leadership: A Moderator of the Diversity-Conflict Relationship

Project groups bring together bring together a diverse group of people. When individuals interact with dissimilar others, they engage in social categorization processes, which in turn cause relationship conflict and prevent the group from realizing its potential. Thus, when members of a project group identify more strongly with social categories such as gender and race than they do with the group, their ability to work with other group members and the group's performance are hindered (Nkomo & Cox, 1996). However, these sub-group identities are not the only basis for categorization.

Individuals may also see themselves and other group members as part of an inclusive grouping such as the total organization or the project group (Nkomo & Cox, 1996; Thatcher & Jehn, 1998; Williams & O'Reilly, 1998). When individual group members see themselves as project group members or as organizational members, they will include all the other group members in the in-group (Thatcher & Jehn, 1998). Under

these conditions, the positive association between perceived social category diversity and relationship conflict will be low, leading to higher performance.

In addition, it is highly likely that project groups are also composed of individuals with diverse values, atthudes, and beliefs. Both exchange theory (Thibaut & Kelley, 1958) and similarity-attraction paradigm (Byrne, 1971) indicate that diversity in values, attitudes, and beliefs is a potential source of negative affect and relationship conflict, leading to lower performance. However, group maintenance functions aimed at reducing tension and hostility due to interpersonal differences and fostering mutual acceptance and respect among group members can weaken this positive association between value diversity and relationship conflict (Yukl, 1998).

Finally, tasks that are assigned to project groups, such as new product development, carmot be attained successfiilly by a single individual or by a group representing only one specialty (Dougherty, 1992; Pinto et al., 1993). Hence, project groups are usually composed of individuals who are diverse with respect to such attributes as educational specialization, functional background, and industry experience, as well as information, perspectives, and skills. By doing so organizational designers assume that group members will be able to integrate and synthesize their different perspectives and information and come up with a high quality solution to their group's task. However, existing research indicates that groups may not be able to combine unique, specialized knowledge of their members (e.g., Dougherty, 1992; Stasser, 1992).

Stasser (1992) indicated that when members of a group knew different facts, they had difficulty in identifying and combining their unique knowledge. In fact, he showed

tiiat groups have a tendency to emphasize common knowledge that all members share and overtook unique information that only one member has. During group discussions, the probability that a certain piece of information will be mentioned as well as its influence on the outcome if it is mentioned increases with the number of group members who are already aware of it. Thus, group decisions are dominated by information that is common to most members. At the same time, specialized information that only one or a few members are aware of is not brought up and does not have much influence on group decisions.

Dougherty (1992) observed that organizations had difficulty in irmovating because individuals from different departments were not able to gather and connect their diverse insights. Such problems persisted even after structural solutions such as putting members from different departments together in a group were implemented. Her study showed that the problem of synthesizing and integrating the different perspectives of departments could be attributed to their different thought worlds. These different thought worlds, in turn, cause individuals with different functional backgrounds to selectively filter information, pay attention to certain issues while ignoring others, identify different issues as relevant, and reach different conclusions. As a result, the differences in thought worlds cause interpretive barriers to communication and developing a comprehensive appreciation of the task. Hence, project groups may not realize their full potential due to these interpretive barriers between different specializations within the organization.

One factor that determines whether members of a project group will engage in an inclusive form of categorization, whether they will be able to resolve interpersonal differences constructively, and whether they will be able to identify and integrate each others' different perspectives is leadership. Systems leadership refers to the conditions and processes that influence the behavior of group members toward the attainment of group goals (Hunt & Ropo, 1997). Systems leadership can arise from three different sources: the group leader, group members, and aspects of the group. Hence, behaviors such as encouraging all group members to participate and discouraging stereotypes can be performed by the group's leader, several different group members and/or can be dictated by group feattires such as norms. It should be noted that the emphasis here is not on the source of leadership behaviors, but rather whether certain behaviors are enacted within the group or not.

Systems leadership is a three-dimensional construct. Each dimension exerts influence at a different point in the proposed model of diversity and at a different point in the group's development. It can inhibit the positive association between social category diversity and relationship conflict; enhance the positive association between informational diversity and task conflict; and decrease the positive association between value diversity and relationship conflict.

The leadership behaviors that encourage solidarity include discouraging group members from engaging in personal attacks and insults, establishing a common group identity, and discouraging stereotyping, among others. This set of behaviors is labeled "solidarity behaviors." The leadership behaviors that enable the integration and synthesis

of disperse perspectives, knowledge, and information include encouraging all group members to contribute their ideas, bringing the unique information possessed by team members to bear on task, and making sure that all group members understand each other's points of view, among others. These behaviors are labeled "task-oriented behaviors." Finally, the leadership behaviors that inhibit the positive association between value diversity and relationship conflict include such behaviors as emphasizing similarities among group members, and encouraging group members to reconcile their differences in a constructive manner. This set of behaviors is called "maintenance behaviors." Hence, a different set of behaviors is required to cope with the negative effects of diversity or enhance its positive effects. Since different forms of diversity are salient at different stages of group development, each set of behavior will be useful at a different stage (Greiner, 1972).

Because visible attributes are more salient in newly-formed project groups, systems leadership behaviors that involve creating a common identity, establishing superordinate goals (Sherif & Sherif, 1953), and dovraplaying differences but highlighting similarities among group members will be more important in such groups. Such behaviors, in turn, tend to encourage group members to form inclusive groupings and reduce the positive relationship between social category diversity and relationship conflict. Lower relationship conflict, in turn, tends to lead to higher group performance.

> Proposition 6: Solidarity behaviors will weaken the positive relationship between social category diversity and relationship conflict and such behaviors will be more important in newly-formed project groups.

Over time as the salience of visible attributes fades and as group members become increasingly familiar with each other, they begin to know each other as individuals and thus their non-visible attributes-task-related and underlying attributes-become salient. Hence, leadership behaviors that enable the synthesis of different perspectives and those that inhibit the positive association between value diversity and relationship conflict should be more important for project groups that have been working together for some time.

> Proposition 7: Task-oriented behaviors will strengthen the positive relationship between informational diversity and task conflict and such behaviors will be more important in longer-term project groups.
>
> Proposition 8: Maintenance behaviors will weaken the positive relationship between value diversity and relationship conflict and such behaviors will be more important in longer-term project groups.

Conflict-Performance Relationship

Both Hackman (1987) and Goodman et al. (1987) argue that group performance should be assessed from the perspective of different constituents. In the present research group performance will be evaluated from the perspectives of those who review the group's work as well as the perspectives of group members. Following Jehn and associates (1997), three group outcomes will be studied: objective performance as evaluated by groups' supervisors, members' perceptions of performance, and members' satisfaction with their groups.

Relationship conflict is characterized by high levels of negative affect such as frustration, anxiety, dislike, anger, and distrust among others (Jehn, 1997, 1995; Pelled, 1995). Newcomb (1947) showed that people had a tendency to avoid those interactions that they expected to lead to unpleasant feelings in them. Hence, the intense negative emotions associated with relationship conflict tend to lead to various forms of withdrawal on the part of group members, such as not participating in group interactions, not collaborating and communicating with other members. Therefore, such project groups tend to have lower levels of objective performance and perceived performance. In addition, negative emotions associated with relationship conflict can lower members' satisfaction with their groups.

Proposition 9: Project groups that are characterized by high levels of relationship conflict will have low levels of objective performance.

Proposition 10: Project groups that are characterized by high levels of relationship conflict will have low levels of perceived performance.

Proposition 11: Project groups that are characterized by high levels of relationship conflict will have low levels of member satisfaction.

Research on conflict has shown that task conflict is beneficial for groups (Jehn, 1997). Pelled (1996) argues that task conflict enhances group performance by enabling group members to take into account more information and to discuss task issues more thoroughly. Previously discussed studies by Pelled and her colleagues (1999) and Jehn and associates (1999, 1997) found a positive association between task conflict and objective performance of groups. However, although task conflict can improve the output

of a group's work as evaluated by outsiders, Jehn and colleagues (1997) argue that frequent arguments and disagreements may cause group members to think they have performed at a lower level than more harmonious groups and be less satisfied with their groups. Similarly, harmonious groups may believe that they perform at a high level although they do not discuss issues thoroughly.

Proposition 12: Project groups that are characterized by high levels of task conflict will have high levels of objective performance.

Proposition 13: Project groups that are characterized by high levels of task conflict will have low levels of perceived performance.

Proposition 14: Project groups that are characterized by high levels of task conflict will have low levels of member satisfaction.

Finally, studies show that task and relationship conflict tend to occur together. Sttidies by Jehn, Northcraft, and Neale (1997) and Pelled, Eisenhardt, and Xin (1999) found substantial correlation among the two types of conflict. In effect, some researchers have suggested that these two types of conflict might be influencing each other (Pelled, 1996; Pelled et al., 1999). The co-existence of relationship conflict with task conflict implies that it may impair the favorable effects of task conflict on objective performance and at the same time accentuate its negative effects on perceived performance and satisfaction.

Proposition 15: Relationship conflict will diminish the positive relationship between task conflict and project group performance.

Proposition 16: Relationship conflict will enhance the negative relationship between task conflict and perceived performance.

Proposition 17: Relationship conflict will enhance the negative relationship between task conflict and member satisfaction.

These propositions will be converted into specific hypotheses in the next chapter. In addition to providing a list of hypotheses that were tested in the present research, the next chapter, also, discusses the sample, the data collection method, and the operationalization of the constructs used.

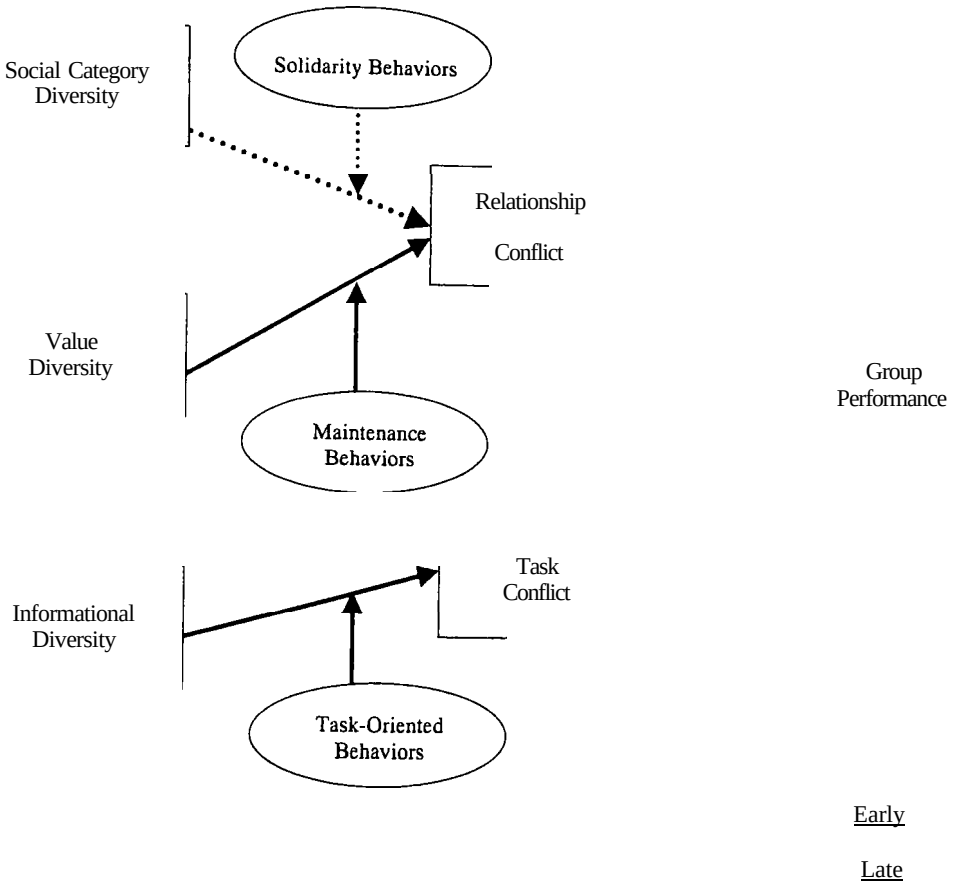

Figure 2.1. Effects of Diversity and Systems Leadership on Intra-group Conflict and Performance

CHAPTER III

RESEARCH METHODOLOGY

Sample

The participants of tiiis study are approximately 348 graduating seniors enrolled in the capstone Strategic Management class of the college of business administration of a large southwestern university. To fulfill the requirements of this class, mdependent of the present study, students were put into project teams. A total of 85 such teams were formed.

This one-semester course is taught in two parts - lectures and labs. All lectures are taught by the same instructor, who also designed the course syllabus and determined the grading criteria. The labs are taught by four doctoral students and one professor who has a Ph.D. in Management. The course is designed by the lecture instructor and all lab sections follow the same course syllabus and grading criteria developed by the lecture instructor.

The Sfrategic Management class is chosen as the setting of the present research for several reasons. First, Strategic Management is the capstone course and for that reason it contains all graduating seniors of the business school. Hence, all the majors offered in the college are represented in this class, making it possible for the researcher to observe tiie effects of informational diversity such as educational specialization in addition to other forms of diversity. Second, group assignments make up a key part of

sttidents' grades in this class and students need to get an overall letter grade of C or above to graduate, making the consequences of group work significant for them.

Third, students submit assignments throughout the semester making it possible to make observations longitudinally. Fourtii, groups in this class analyze the strategic environment of an actually existing organization, determine opportunities and threats, assess the organization's resources and capabilities, develop and evaluate alternative sfrategies, and make recommendations. Hence, the tasks that are performed in this class are comparable to the tasks performed by project groups in organizations. Finally, the student project groups in this class are amenable to observation throughout their lives, starting with their inception and ending with their disintegration.

The statistics collected by the university indicate that the student body in the business school is diverse with respect to visible attributes and majors. About 30% of the students are female; 85% Caucasian, 2% Asian-American, 2% Afiican-American, 9% Hispanic, 1% Native American, and 1% foreign nationality. About 9% of the students are Accounting majors, 22% Business Administration, 20% Finance, 19% MIS, 8% Management, 21%o Marketing, and less than 1% Pefroleum and Land Management.

Unit of Analysis

The tmit of analysis for this study is the project group. All the variables included in this study were measured at the group level by aggregating individual responses. The purpose of tills study is to examine performance at the project group level. To achieve this end, all the variables-namely diversity, infra-group conflict, and systems

leadership-will be measured by aggregating the individuals' responses about their perceptions of the level of each variable in their project groups. In addition, the various performance variables will also be measured at the group level.

There is enough justification to aggregate individual responses to the group level. First, infra-group conflict is a group-level construct that is only meaningful in the context of a group. Furthermore, other constructs such as systems leadership and diversity will be conceptualized and operationalized as shared views of group members. Second, the meaning of variables studied does not change from the individual to the group perspective. Third, this study gathered data by using questiormaires that use project group in the phrasing of most of its items. Any referral to the individual was in the context of group membership. Finally, James, Demaree, and Wolf (1984) within-group agreement index for each variable was calculated to check on agreement among individual group members within a project group.

Procedure

Group Size

The students in the capstone Sfrategic Management class were randomly assigned to groups. The researcher desired to keep group size stable at four. After students added and dropped courses, some teams had five members. All tiie students remained in tiie same group throughout the semester.

Tasks

Data was gathered on three group tasks over a 14-week semester. The number of weeks into the semester for each task was as follows: task 1, five; task 2, eight; and task 3, eleven. The first and second tasks involved applying the course concepts to the business situation of an actual company. The first task required the groups to analyze the general and industry environments of the company they were studying. The second task required the groups to perform an assessment of the internal envirormient of their company. The final task involved analyzing an article written after August 2001 that dealt with at least two course topics. All three tasks required students to apply course concepts to a situation, a company or an article. All three required creativity to the same degree.

All groups received the same set of written instructions. All members of a group received the same grade for each task. The grades on the three assignments constituted about 35% of the course grade, making tiie tasks critical for success in tiie course.

Survey Procedure

Surveys were administered to all group members immediately after the completion of each of the tiiree group assignments before tiie groups received any feedback on their performance. These surveys inquired about group members' perceptions of how diverse their groups were, the level of infra-group conflict, and tiie level of systems leadership as well as members' perceptions of tiieir groups'

performance. In addition, as the instructors evaluated the group assignments, grades were collected.

All the students were assured that their responses to the surveys would be completely confidential and that these responses would not have any effect on the grades they would receive on their group assignments. Group members were asked to respond to the items in each survey from the perspective of their observations in their groups for the period during which they had performed the task (Watson, Kumar, &. Michaelsen, 1993). Responses given by each group member were averaged to produce the relevant measures for each group. To ensure anonymity, students were asked not to write their names on the surveys. Instead each student was asked to provide his/her birthday, section number, and team number. The combination of these three numbers was used as the unique identification number for each student.

Each questionnaire was distributed during lab hours by the lab instructors. Lab instructors allowed students to complete the questionnaires during class time. Sealable envelopes addressed to the researcher were provided to the lab instructors each time questionnaires were administered. Students returned the questionnaire to the lab instructors who sent tiiem to the researcher. Finally, the course instructor gave exfra-credit to participants per each survey filled.

In each admirusfration questionnaires were distributed to all students. A total of 332 students from 85 teams responded to tiie first adminisfration. A total of 324 students from 85 teams responded to the second administration. Finally, a total of 321 students

from 83 teams responded to the third adminisfration. The response rates were 95%, 93%, and 92% for the first, second, and tiiird adminisfrations, respectively.

Sample size changed as a result of data editing. First, stiadents who left complete sections of the questionnaires blank were removed from the study, whereas questiormaires containing only isolated instances of item non-response were retained as suggested by Churchill (1987). There were a total of nine such respondents in the first adminisfration, five in the second adminisfration, and four in the final administration. Respondents who gave the same response (e.g., all 3's, all 5's, etc.) to each question in the surveys also were removed from the study. There were four such respondents in the third admiiustration and none in the first two administrations.

Then careless respondents—"those respondents who respond in a like fashion irrespective of the wording [of the items]" (Wilcox, lecture notes)-were identified and excluded from the study. Careless respondents give inconsistent responses to items that are phrased inconsistently with the rest of the items in a questionnaire (Schmitt & Stults, 1985). For instance, such respondents may not notice that some of the items in a survey are negatively phrased and provide responses of similar magnitude to those for positively phrased items. Schmitt and Stiilts (1985) suggest tiiat careless respondents should be removed from the study.

To identify careless respondents, two kinds of variances were calculated. First, the variance of respondents' answers for scales that contained negatively phrased items were calculated with reversing the codes for negatively phrased items. Then, tiie variance of answers was calculated without reversing the negatively phrased items. For

careless respondents the variance with reverse coding should be higher than the variance writhout reverse coding. Hence, this method identified those respondents whose answers were more consistent before reverse coding than after (Wilcox, lecture notes). The number of careless respondents is 105, 100, and 147 in the first, second, and third admiiusfrations respectively.

Further, one respondent who fumed in all the three questiormaires on the same day was excluded from the study. Finally, it was required that only the teams whose members responded to all three adminisfrations were included in the study, which further decreased the number of respondents to 195, 207, and 209 for the first, second, and third adminisfrations, respectively. After data editing, a total of 76 teams remained in the study.

Measures

Group Diversity

Diversity in the present study is defined as a perceptual, multi-dimensional, and dynamic constmct. Therefore, the present research focused on diversity as perceived by group members. For tiiat reason, rather than using measures such as the coefficient of variation or an enfropy-based index, a scale developed by Harrison and his colleagues (1998), that asked group members to reveal how different tiiey perceived their teammates to be was used.

Diversity is also a multidimensional constinict. Previous research and tiieory guided tiie choice of dimensions of diversity that were exammed in this sUidy (Jackson,

May, & Whitiiey, 1995; Jehn, Northcraft, & Neale, 1999; Milliken & Martins, 1996). The types of diversity that were studied included social category diversity, informational diversity, and value diversity.

Social category diversity refers to differences in age, gender, and race/ethnicity/nationality (Caucasian, African-American, Asian American, Hispanic, Native American, Pacific Islander, or foreign nationality). Informational diversity includes differences in major (Accovmting, Business Adminisfration, Finance, Information Systems/quantitative Sciences, Management, Marketing, and Petroleum and Land Management), task-related perspectives, knowledge, expertise, and skills and abilities. Value diversity refers to differences in personality characteristics, attitudes, and values.

The group members were asked to rate their project groups in terms of how similar they thought their group was with respect to such dimensions of diversity as gender, race/ethnicity/nationality, personality characteristics, attitudes, and values. A 5-point rating scale anchored by 1 = "Very similar" and 5 = "Very different" was used. A sample item is "How similar, do you tiiink, are members of your project group witii respect to personal values?" The complete survey items are included in Appendix A.

Then, responses to relevant dimensions were averaged to form composite measures of each type of diversity. Social category diversity was calculated by averaging responses for items on gender, race, and age. Similarly, informational diversity was calculated by averaging the responses to items on major, task-related perspectives.

knowledge, expertise, and skills and abilities. Finally, value diversity was calculated by averaging the responses to items on personality characteristics, attitudes, and values.

To capture the dynamic nature of diversity, group members were asked to evaluate their group's diversity throughout the semester. Each questionnaire contained the above-described items. However, in each questioimaire group members were asked to give their perceptions based on their observations for the period during which they completed each one of the tasks. This approach is different than that of Harrison and colleagues who also argued that the effects of social category diversity would weaken over time whereas those of value diversity would sfrengthen.

The study by Harrison et al. (1998) was cross-sectional. Groups with different levels of longevity were examined to see whether visible attributes or imderlying attributes were better predictors of group cohesiveness. The study by Harrison and colleagues (2000) used a four-wave research design in which the variables measured varied at each time. The present study, however, is longitudinal in the sense that repeated measurements of tiie same variables were taken over time. By taking repeated measures of the same variables this study aims to give a more complete picture of changes in these variables that was not possible in the previous research.

Relationship and Task Conflict

Infragroup conflict is defined as tiie participants' perceptions tiiat tiieir views are incompatible (Jehn, 1995). To operationalize relationship conflict and task conflict, the Infragroup Conflict Scale developed by Jehn (1995) was tailored for the present research.

The pilot study conducted in sfrategic management class during the summer semester revealed that students were very sensitive to conflict items, when the Infragroup Conflict Scale was presented separately utilizing a 5-point scale anchored by 1 = "None" and 5 = "A lot" as suggested by Jehn (1995). Also the 5-point anchors suggested by Jehn confused some students since some of the items in this scale asked "how much?," whereas others asked "how often?" Therefore, the items of the Infragroup Conflict Scale were rewritten so that 5-point scale anchors where 1 = "Sfrongly Disagree" and 5 = "Sfrongly Agree" could be used and these items could be blended with other survey items. A sample item is "There is a lot of relationship tension in my team." The complete survey items are presented in Appendix A.

Systems Leadership

A scale assessing systems leadership has not been developed prior to the present research. However, Yukl (1998) and Williams and O'Reilly (1998) provided ideas of some relevant items. To develop a scale measuring systems leadership, literature on group diversity and leadership was reviewed to identify the possible behaviors that can be enacted within a group. Yukl (1998) provided an idea of some relevant items. Because systems leadership refers to leadership tiiat emanates from the group leader, or any one of the group members, or feattires of tiie group, the items in tiiis scale use "my team" in their wording. A sample item from this scale is "My team discourages team members from engaging in personal attacks and insults." A 5-point scale anchored by 1 =

"Sfrongly Disagree" and 5 = "Sfrongly Agree" was used. The complete scale is provided in Appendix A.

Group Performance

Evaluations from both group members and instructors were used to assess group performance. Three different group outcomes were used to assess the performance of project teams. Objective performance was operationalized as grades received from each project. To encourage objective evaluation of performance by various lab instmctors, five predetermined criteria were used. These are: (l)how well the group applies the appropriate conceptual materials offered in the readings and lectures, (2) how well the group utilizes evidence to develop its analyses, to make appropriate inferences, and to support its arguments, (3) how well the group integrates theory and data to forge a coherent/integrated analysis and assessment, (4) how well the group franslates its analysis into an action plan and how well it addresses implementation issues, and (5) how clear and organized is the presentation of the material.

Perceived performance was measured using a performance scale developed by Henderson and Lee (1992). The items ask respondents to compare tiieir project group in this class to other groups they have served on or observed on such criteria as the quality of the work the group produces, the efficiency of group's operations, and the degree to which projects were completed on a timely fashion. A 5-point scale anchored by 1 ^ "Exfremely low" and 5 = "Extremely high" was used. However, tiiose items that were not

relevant for student project teams were not used in the present sttidy. For instance, items about whether team met its budget goals were excluded.

Satisfaction was operationalized using the Kunin faces scales (1955). Kunin faces scale is a single-item scale that asks for a summary rating of members' satisfaction with their groups. Altiiough the reliability of a single-item scale might be questioned. Smith, Kendall, and Hulin (1969) used the faces scale on several different types of samples and foimd that it had good discriminant and convergent validity and was easy to administer. The perceived performance scale and the Kunin faces are provided in Appendix A.

Hypotheses

In this section, the propositions presented in the previous chapter are converted into specific hypotheses. These hypotheses are summarized in Table 3.1.

Hypothesis 1: The salience of readily detectable attributes of group members will decrease from time 1 to time 3

Hypothesis 2: The association between social category diversity and relationship conflict wall become weaker from time 1 to time 3.

Hypothesis 3a: The salience of group members' underlying attributes such as their values and personality will increase from time 1 to time 3.

Hypothesis 3b: The salience of group members' task-related attiibutes will increase from time 1 to time 3.

Hypothesis 4: The association between informational diversity and task conflict will become sfronger from time 1 to time 3.

Hypothesis 5: The association between value diversity and relationship conflict will become sfronger from time 1 to time 3.

Hypothesis 6: Solidarity behaviors will weaken the positive relationship between social category diversity and relationship conflict and the importance of such behaviors will decrease from time 1 to time 3.

Hypothesis 7: Task-oriented behaviors will strengthen the positive relationship between informational diversity and task conflict and the importance of such behaviors will increase from time 1 to time 3.

Hypothesis 8: Maintenance behaviors will weaken the positive relationship between value diversity and relationship conflict and the importance of such behaviors will increase from time 1 to time 3.

Hypothesis 9: Project groups that are characterized by high levels of relationship conflict will have low levels of objective performance.

Hypothesis 10: Project groups that are characterized by high levels of relationship conflict wall have low levels of perceived performance.

Hypothesis 11: Project groups that are characterized by high levels of relationship conflict will have low levels of member satisfaction.

Hypothesis 12: Project groups that are characterized by high levels of task conflict will have high levels of objective performance.

Hypothesis 13: Project groups tiiat are characterized by high levels of task conflict will have low levels of perceived performance.

Hypothesis 14: Project groups that are characterized by high levels of task conflict will have low levels of member satisfaction.

Hypothesis 15: Relationship conflict will diminish the positive relationship between task conflict and project group performance.

Hypothesis 16: Relationship conflict will enhance the negative relationship between task conflict and perceived performance.

Hypothesis 17: Relationship conflict will enhance the negative relationship between task conflict and member satisfaction.

Table 3.1: Summary of Hypotheses

	Relationship Examined	Time Period	Strength of Relationship
1.	**salience of readily detectable attributes**	**tl to t2**	**+++**
		t2 to t3	++
		tl tot3	+
	social category diversity and relationship conflict	tl to t2	+++
		t2tot3	++
		tltot3	+
3a	**salience of values**	tl to t2	+
		t2tot3	++
		tl to t3	+++
3b	**salience of task-related attributes**	tltot2	+
		t2tot3	++
		tltot3	+++
	informational diversity and task conflict	tl to t2	+
		t2tot3	++
		tltot3	+++
	value diversity and relationship conflict	tl tot2	+
		t2tot3	++
		tl tot3	+++
	solidarity behaviors moderating social category diversity and relationship conflict	tl to t2	+++
		t2tot3	++
		tl tot3	+
	task-oriented behaviors moderating informational diversity and task conflict	tl to t2	+
		t2tot3	++
		tl tot3	+++
	maintenance behaviors moderating value diversity and relationship conflict	tltot2	+
		t2tot3	++
		tltot3	+++
	relationship conflict and objective performance	**throughout**	

Table 3.1 Continued

#	Relationship Examined	Time Period	Strength of Relationship
10	relationship conflict and perceived performance	throughout	-
11	relationship conflict and satisfaction	throughout	-
12	task conflict and objective performance	throughout	+
13	task conflict and perceived performance	throughout	-
14	task conflict and satisfaction	throughout	-
15	relationship conflict moderating task conflict and objective performance	throughout	-
16	relationship conflict moderating task conflict and perceived performance	throughout	+
17	relationship conflict moderating task conflict and satisfaction	throughout	+

CHAPTER IV

DATA ANALYSIS AND RESULTS

This chapter presents the results of two separate analyses. The first analysis concerns the testing of the measurement model using confirmatory factor analysis. The second analysis concerns testing the hypotheses developed earlier using the data collected.

Confirmatory Factor Analyses

After the constructs were operationalized, confirmatory factor analyses (CFA) were performed using LISREL for all the scales used in the instrument. The CFA used the maximum likelihood estimation procedure and oblique rotation. After initial CFA, changes were made to achieve a better fit between the data and the model (Bagozzi & Yi, 1988; Schumacker & Lomax, 1996). These steps were performed for each scale for each of the three time periods.

The initial CFA for the conflict scale aimed to assess the discriminant validity of relationship conflict and task conflict. Appendix B shows tiie results of tiiis analysis. This analysis produced a chi-square of 19.567 with 8 degrees of freedom and witii a p-value of 0.0121. Non-significant chi square values are desirable (Schumacker & Lomax, 1996). Since tiiis model produced a significant chi-square, modification indices needed to be examined to identify where tiie model was losing fit (Bagozzi & Yi, 1988).

Analysis of the modification indices indicated that eliminating item v67 would significantiy improve the model. Item v67 stated:

_____We always have disagreements within my team about the task of the project we are working on.

CFA was performed again after item v67 was deleted. This new model revealed a chi-square value of 4.319 with 4 degrees of freedom and ap-value of 0.365. Hence, this time the chi-square value was non-significant as desired. The new model had an adjusted goodness-of-fit index (AGFI) of 0.968 indicating a satisfactory fit and good discriminant validity. Another measure ofmodel fit to the data is the root mean square residual. Low values are desfrable (Schumacker & Lomax, 1996). The root mean square residual (RMR) for the new conflict scale was 0.017 again pointing toward a good fit. Finally, I looked at the root mean square error of approximation (RMSEA). Values less than 0.05 indicate a good model fit (Schumacker & Lomax, 1996). RMSEA for this model was 0.02.

The initial CFA for the leadership scale examined the acceptability of maintaining three dimensions, which were solidarity behaviors, maintenance behaviors, and task-oriented behaviors. Appendix B shows the results of this analysis. This analysis produced a chi-square of 182.833 with 74 degrees of freedom and with a p-value of 0.00. Again, non-significant chi-square values were desirable. Analysis of the modification indices showed that fit of the model could be improved by allowing the error covariances between v48 and v49 and v50 and v51 to correlate. However, the new model did not reveal a satisfactory chi-square. Chi-square for the new model was 124.088 with 72

degrees of freedom and a p-value of 0.0001, still significant. Analyzing modification indices once again indicated that eliminating item v53 would significantly improve the model. Item v53 stated:

_____My team rallies team members around collective (team) objectives and goals.

In addition, the analysis of modification indices showed that there was no discriminant validity between solidarity behaviors and maintenance behaviors. Therefore, these two dimensions were allowed to load together. The new dimension is called solidarity and maintenance behaviors. Some examples to solidarity behaviors include:

_____My team has a common group identity.

_____My team emphasizes similarities among team members.

_____My team discourages stereotyping.

Sample items for maintenance behaviors include:

_____My team discourages team members from engaging in personal attacks and insults.

_____My team encourages team members to reconcile tiiefr differences in a constructive maimer.

My team promotes imderstanding of different values, beliefs, and traditions.

The resulting model had a chi-square of 92.979 witii 62 degrees of freedom and a p-value of 0.00662. Altiiough the chi-square value was still significant, tiie new model had acceptable levels of other goodness-of-fit indices. Because chi-square is sensitive to sample size, these goodness-of-fit criteria are considered to be better indicators ofmodel fit (J. B. Wilcox, personal communication, April 15,2002). The new model had an AGFI

of 0.899 indicating a satisfactory fit and good discriminant validity. The root mean square residual for the new scale was 0.052 again pointing toward a good fit. Finally, RMSEA was 0.0507, very close to the desired level of 0.05, indicating good fit.

Finally, CFA was performed to assess the fit of the perceived performance scale to the data. Appendix B shows the results of this analysis. This analysis produced a chi-square of 15.775 with 9 degrees of freedom and with a p-value of 0.072. Although the model produced a non-significant chi-square value as desired, the goodness-of-fit measures indicated that fit of the model could be improved. Specifically, this model had an AGFI of 0.939, RMR of 0.042, and RMSEA of 0.062. Examining tiie modification indices indicated that eliminating item v94 could significantly improve model fit. Item v94 stated:

_____The team could have done its work faster with the same level of quality.

This item was phrased differently than all the other items in the scale and might have caused respondents to provide inconsistent responses. Eliminating this item from the scale improved the fit of the model. The new model had a chi-square of 5.047 with 5 degrees of freedom and a p-value of 0.41. AGFI was 0.97, RMR was 0.026, and RMSEA was 0.007.

Although confirmatory factor analyses were performed for each scale for each of the three time periods, the resuUs of those for the first adminisfration are reported here. During the first adminisfration, the participants saw tiie questions for the first time. The results of CFA for this adminisfration are viewed to be more original and accurate, because having been exposed to the same questions more tiian one occasion may have

sensitized participants to the variables of interest in this study and may have biased the measurement in the later adminisfrations. The results of the analyses for the other two adminisfrations are slightly different, but not very far away from those of the first adminisfration. As a result of the confirmatory factor analyses the proposed model was changed as depicted in Figure 4.1.

Analysis of Variance to Examine Instructor Effects

To examine if there were any significant differences in grades project teams received due to instructors, analyses of variance were conducted on grades for each time period. The results of this analyses indicated that there were no significant differences in grades in the first time period (F value =2.25, p =0.0724). However, there were significant differences in grades received among instructors in time 2 (F value = 13.72, p <.0001) and time 3 (F value = 7.30, p <.0001).

Further analysis revealed significant differences among instructor 2 and instructors 1, 3, and 5; and instiiictor 3 and instiiictors 4 and 5 in time 2. There were significant differences between instructor 2 and instiiictors 3 and 5 and instiiictor 1 and instructors 3 and 5 in time 3. Although tiiis analysis identified some statistical difference among some instinctors in time 2 and time 3, an examination of means indicated that tiiis difference was not substantive enough to cause sttidents to react differentiy. As Table 4.1 shows, all tiie mean grades are witiiin 1 point of "A" range. In effect, tius restiiction in tiie range of grades may be one reason tiiat some hypotheses of tiie present sttidy were

not supported, a point that will be discussed later. The results of the analyses of variance may be seen in Appendix C.

Data Analysis Methods

I tested the hypotheses of the study using seemingly unrelated regression (SUR). SUR is a repeated measures regression technique that allows for the error terms for repeated measures on the same subject (e.g., group) to correlate. It is appropriate to use this technique in the present study because observations are expected to be correlated within groups. Further, SUR is appropriate for longitudinal studies and mediational tests (HoIIenbeck, Ilgen, &. Sego, 1994). Structural equation modeling can also be used for repeated measures. However, it was not possible to use stmctural equation modeling in the present study due to small sample size.

When evaluating the significance of predicted effects, I used one-tailed tests, which were suitable for directional hypotheses. Table 4.2 shows the means and standard deviations of variables for each time of the tiiree time periods. Table 4.3 shows the correlations among all the variables.

Results

I performed six SUR analyses to test the hypotheses of the present study. Each analysis pertamed to a specific part of Figure 4.1. The fu-st SUR analysis regressed relationship conflict on social category diversity and tiie interaction between social category diversity and solidarity and maintenance behaviors. The second SUR analysis regressed relationship conflict on value diversity and the interaction between social

category diversity and solidarity and maintenance behaviors. The third SUR analysis regressed task conflict on informational diversity and the interaction between informational diversity and task-oriented behaviors. The fourth analysis involved regressing grade on relationship conflict, task conflict, and the interaction between relationship conflict and task conflict. In the fifth analysis, perceived performance was regressed on relationship conflict, task conflict, and the interaction between relationship conflict and task conflict. Finally, satisfaction was regressed on relationship conflict, task conflict, and the interaction between relationship conflict and task conflict. Hence, in the discussion that follows the results of hypotheses testing will be presented in a different order than the order in which they were presented in the previous chapters. The SAS output for these analyses is presented in Appendix D.

Social Category Diversity, Solidarity/Maintenance Behaviors, and Relationship Conflict

The fu-st SUR analysis examined the impact of social category diversity moderated by solidarity and maintenance behaviors on relationship conflict. Thus, relationship conflict was regressed on social category diversity and tiie interaction between social category diversity and solidarity and maintenance behaviors, tiiereby testing hypotheses 1,2, and 6.

Hypotiiesis 1 stated that the salience of readily detectable attiibutes of group members would decrease from time 1 to time 3. Hypotiiesis 2 stated that the association between social category diversity and relationship conflict would become weaker from time 1 to time 3. Hence, taken togetiier tiiese two hypotheses suggest tiiat tiie sfrengtii of

tiie positive relationship between social category diversity and relationship conflict should decrease over time. Hypothesis 6 stated that solidarity and maintenance behaviors weakened the positive relationship between social category diversity and relationship conflict and the importance of such behaviors would decrease from time 1 to time 3.

The results of SUR analysis indicated that in line with hypothesis 2 social category diversity was a significant predictor of relationship conflict in time 1. However, contrary to hypothesis 2, social category diversity continued to be a significant predictor of relationship conflict in times 2 and 3. Further, confrasting the beta coefficient for social category diversity across time showed that the effect of social category diversity on relationship conflict increased significantly across time. Specifically, the regression coefficient for social category diversity increased significantly from time 1 to time 2 and from time 1 to 3 at the 0.05 significance level. Hence, social category diversity became more salient over time and became a sfronger, not weaker, predictor of relationship conflict in conti-ast to hypothesis 1. In sum, hypothesis 1 was not supported, whereas hypothesis 2 was supported.

In partial support of hypotiiesis 6, tiie results showed tiiat the regression coefficient for the interaction between social category diversity and solidarity and maintenance behaviors was significant in time 1. However, tiiis variable also continued to be a significant predictor of relationship conflict tiiroughout tiie groups' lives. Confrasting the regression coefficients of the interaction term revealed that tiie effect of the interaction term on relationship conflict increased significantly from time 1 to time 2 at tiie 0.05 significance level and from time 1 to time 3 at tiie 0.1 significance level. Thus,

tiie interaction term also became a sfronger predictor of relationship conflict over time. Table 4.4 summarizes tiie results of the first SUR analysis.

Value Diversity, Solidarity/Maintenance Behaviors, and Relationship Conflict

The second SUR analysis examined the impact of value diversity moderated by solidarity and maintenance behaviors on relationship conflict. Thus, relationship conflict was regressed on value diversity and the interaction between value diversity and solidarity and maintenance behaviors, testing hypotheses 3a, 5, and 8. Hypothesis 3a suggested that the salience of group members' imderlying attributes such as their values and personality would increase from time 1 to time 3. Hypothesis 5 stated that the association between value diversity and relationship conflict would become sfronger from time 1 to time 3. Hence, these two hypotheses indicate that value diversity should be a sfronger predictor of relationship conflict over time. Hypothesis 8 stated that solidarity and maintenance behaviors weakened the positive relationship between value diversity and relationship conflict and that the importance of such behaviors would increase from time 1 to time 3.

The results of SUR analysis supported hypotheses 3a and 5 and partially supported hypothesis 8. Both value diversity and the interaction between value diversity and solidarity and maintenance behaviors were significant predictors of relationship conflict with increasing regression coefficients in all three time periods. In addition, confrasting the regression coefficients for value diversity indicated that its effects increased significantiy from time 1 to time 2 at the 0.05 significance level and from time 1 to time 3 at the 0.1 significance level. The effects of interaction between value diversity

and solidarity and maintenance behaviors on relationship conflict did not increase significantiy. Table 4.5 summarizes the results of the second SUR analysis.

Informational Diversity, Task-Oriented Behaviors, and Task Conflict

The third SUR analysis examined the impact of informational diversity moderated by task-oriented behaviors on task conflict. Thus, task conflict was regressed on informational diversity and the interaction between informational diversity and task-oriented behaviors, thereby testing hypotheses 3b, 4, and 7. Hypothesis 3b indicated that the salience of group members' task-related attributes would increase from time 1 to time 3. Hypothesis 4 stated that the association between informational diversity and task conflict would become stronger from time 1 to time 3. Thus, taken together, both hypotheses suggest that the sfrengtii of the positive association between informational diversity and task conflict should increase over time. Hypothesis 7 proposed that task-oriented behaviors enhanced tiie positive relationship between informational diversity and task conflict and the importance of such behaviors will increase from time 1 to time 3.

The results of SUR analysis supported hypothesis 4. friformational diversity was a significant predictor of task conflict at all tiiree time periods witii increasing regression coefficients. However, confrasting its regression coefficient across time indicated tiiat tiiis increase was not significant. The interaction between informational diversity and task-oriented behaviors was also a significant predictor of task conflict. However, instead of enhancing the positive association between informational diversity and task conflict, the interaction tenn acttially weakened this relationship. Confrastmg tiie regression

coefficients for the interaction term indicated tiiat its effects changed significantly from time 1 to time 3 at tiie 0.1 significance level and from time 2 to time 3 at the 0.05 significance level. Thus, SUR analysis provided support for hypothesis 4. It did not provide support for hypotiieses 3b and 7. Table 4.6 summarizes the results of the thfrd SUR analysis.

Although the results of SUR analysis indicated that the relationship between informational diversity and task conflict did not change significantly over time, this might not necessarily mean that perceptions of task diversity did not change. Thus, to determine if there was a change in the mean levels of perceived informational diversity across time, I also performed a repeated measures ANOVA. The results indicated that, as suggested by hypothesis 3b, the perceptions of informational diversity increased from time 1 to time 2, time 2 to 3, and time 1 to time 3. Hence hypothesis 3b, which suggested that perceptions of task diversity would increase over time, was supported as a result of repeated measures ANOVA. The results of this analysis are presented in Appendix E.

Infra-Group Conflict and Group Performance

Then, I performed 3 sets of SUR analyses to examine the effects of relationship conflict, task conflict, and the interaction between relationship and task conflicts on performance measures of grade, perceived performance, and satisfaction. First, grade was regressed on relationship conflict, task conflict, and tiie interaction between relationship conflict and task conflict to test hypotheses 9,12, and 15. Hypotiiesis 9 indicated that high levels of relationship conflict would lead to low levels of grade.

Hypotiiesis 12 stated tiiat high levels of task conflict would lead to high levels of grade. Finally, hypotiiesis 15 stated tiiat relationship conflict would diminish tiie positive relationship between task conflict and grade.

The results showed that relationship conflict was a significant predictor of grade at time 2 and the interaction between the two types of conflict was a significant predictor of grade at time 3. However, there was no other significant predictor at any other time period. Thus tiie results of SUR analysis did not support any of the hypotheses (9, 12, or 15). These results are summarized in Table 4.7.

In addition to conducting seemingly unrelated regression, I also conducted 3 ordinary least squares regressions for each time period regressing grade on relationship conflict, task conflict, and the interaction between the two to identify the amount of variance in grade explained by these variables. The results of this analysis showed that the three predictor variables explained about 4% of the variance in grade in timel, 6% in time 2, and 4% in time 3. The coefficients for the three predictor variables were nonsignificant at time 1 and time 3, and the coefficients for relationship conflict and the interaction between the two types of conflict were significant at the 0.05 significance level at time 2. However, the coefficient for the interaction term had a positive sign, confrary to what was expected. The results of this analysis are presented in Appendix F.

Then perceived performance was regressed on relationship conflict, task conflict, and the interaction between relationship conflict and task conflict using the SUR technique to test hypotiieses 10,13, and 16. Hypotiiesis 10 suggested tiiat high levels of relationship conflict would lead to low levels of perceived performance. Hypothesis 13

stated that high levels of task conflict would lead to low levels of perceived performance. Finally, hypotiiesis 16 suggested tiiat relationship conflict will amplify the negative relationship between task conflict and perceived performance.

The resuhs showed that relationship conflict was a significant predictor of perceived performance at times 2 and 3 at the 0.05 significance level. Task conflict was a significant predictor of perceived performance at the 0.1 significance level in time 1 and 2 and at the 0.01 significance level in time 3. As predicted, both relationship conflict and task conflict were negatively related to perceived performance. That is, increased levels of task conflict and relationship conflict decreased perceived performance. The coefficient for the interaction between the two types of conflict was significant only in time 3 at the 0.1 level of significance. These results are summarized in Table 4.8.

Finally, satisfaction was regressed on relationship conflict, task conflict, and their interaction to test hypotheses 11, 14, and 17. Hypothesis 11 stated that high levels of relationship conflict would lead to low levels of member satisfaction. Hypothesis 14 asserted that high levels of task conflict would lead to low levels of member satisfaction. Hypothesis 17 stated that relationship conflict would amplify the negative relationship between task conflict and member satisfaction.

The results showed that relationship conflict was a significant predictor of satisfaction at times 2 ($p<0.05$) and 3 ($p<0.01$); task conflict and the interaction between the two types of conflict were significant predictors of satisfaction at time 3 ($p<0.05$). As predicted both relationship conflict and task conflict were negatively related to satisfaction. That is, increased levels of task conflict and relationship conflict decreased

satisfaction. The interaction term enhanced this negative relationship. The results for this SUR analysis are summarized in Table 4.8. Table 4.10 contrasts the Beta coefficients of each equation across time and presents the resulting F values with their associated p values. Table 4.11 provides a summary of the findings presented in this section.

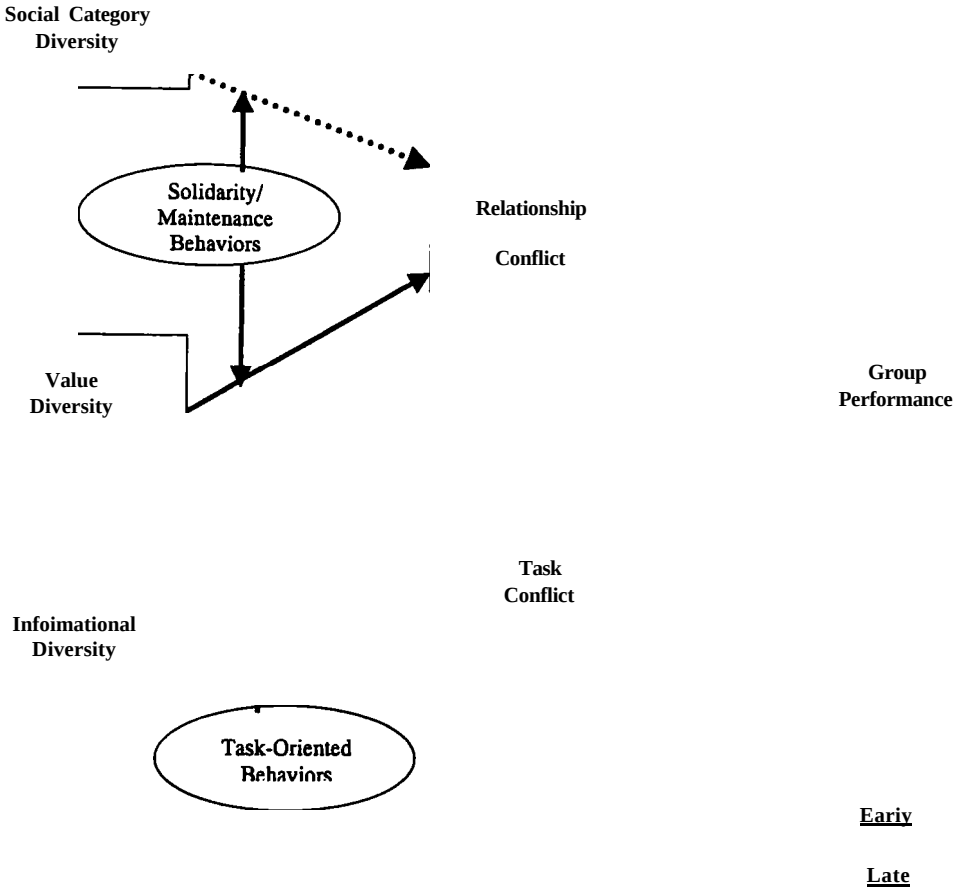

Figure 4.1. Modified Model: Effects of Diversity and Systems Leadership on Intra-group Conflict and Performance

Table 4.1: Mean Level of Grades Given by Each Instmctor

	Instructor				
	1	2	3	4	5
Time 1					
N	13	14	26	7	16
Mean	91.0	90.6	88.5	92.9	90.3
Standard Deviation	4.3	1.6	2.4	4.3	6.1
Time 2					
N	13	14	26	7	16
Mean	90.7	96.9	89.3	93.7	92.6
Standard Deviation	3.2	1.9	3.1	5.0	3.6
Time 3					
N	13	14	26	7	16
Mean	94.6	96.1	90.0	91.1	88.8
Standard Deviation	2.5	3.5	5.2	6.4	4.2

Table 4.2: Means and Standard Deviations (N = 76)

	Timel		Time 2		Time 3	
Variables	Means	SD	Means	SD	Means	SD
Diversity Types:						
Social Category	2.3	0.6	2.3	0.6	2.4	0.6
Value	2.5	0.5	2.4	0.6	2.3	0.6
Informational	3.0	0.5	2.8	0.6	2.7	0.6
Systems Leadership:						
Task-Oriented	4.0	0.5	4.0	0.5	4.0	0.4
Solidarity/ Maintenance	3.6	0.4	3.8	0.5	3.4	0.4
Conflict Types:						
Relationship	1.6	0.7	1.7	0.7	1.8	0.7
Task	2.0	0.5	2.2	0.6	2.2	0.6
Perceived Performance	3.8	0.4	3.8	0.7	3.9	0.6
Satisfaction	5.2	0.6	4.9	1.0	4.9	1.0
Grade	90.1	4.0	92.0	4.2	91.8	5.2

[illegible]	[illegible]	[illegible]	-.10	[illegible]	[illegible]	[illegible]	-.20	[illegible]
	[illegible]	-.56	-.50	.44	.43	-.65	-.61	-.13
		-.48	-.4	.29	.26	-.55	-.44	-.06
			.67	-.58	-.52	.57	.54	.10
				-.49	-.39	.48	[illegible]	[illegible]
					.65	-.44	-.54	-.08
						-.43	-.47	-.07
							[illegible]	[illegible]
								[illegible]

Table 4.4: Model 1 SUR Results -Social Category Diversity, Solidarity/ Maintenance Behaviors, and Relationship Conflict

Predictors	Relationship Conflict
Timel:	
SC	0.7**
SC *S&MB	-0.2***
Time 2:	
SC	15****
SC *S&MB	.0.4****
Time 3:	
SC	Ij****
SC *S&MB	.0,3****

Note. SC = social category diversity; S&MB = solidarity and maintenance behaviors.

*E<.1 **p.<.05. ***2.<.001. ****p.<.000L

Table 4.5: Model 2 SUR Results -Value Diversity, Solidarity/Maintenance Behaviors, and Relationship Conflict

Predictors	Relationship Conflict
Timel:	
VD	0.8***
VD *S&MB	-0.2***
Time 2:	
VD	J,4****
VD *S&MB	-0.3****
Time 3:	
VD	1,3****
VD *S&MB	-0.3****

Note. VD = value diversity; S&MB = solidarity and maintenance behaviors.

*^<.L **E.<.05. ***EL<.001. **** p.< .0001.

Table 4.6: Model 3 SUR Results -Informational Diversity, Task-Oriented Behaviors, and Task Conflict

Predictors	Task Conflict
Timel:	
ID	0.9****
ID *TB	-0.2****
Time 2:	
TT-J	0 0 * * * *
ID *TB	-0.2****
Time 3:	
ID	1.2****
ID *TB	-0.3****

Note. ID = informational diversity; TB = task-oriented behaviors.

* e < . l **E.<.05. *E.<.00L **£.<.0001.

Table 4.7: Model 6 SUR Results -Relationship Conflict, Task Conflict, and Grade

Predictors	Grade
Time 1:	
RC	-0.3
TC	0.5
RC*TC	-0.3
Time 2:	
RC	-3.2*
TC	-1.0
RC*TC	-0.9
Time 3:	
RC	3.2
TC	0.8
RC*TC	-1.3*

Note. RC = relationship conflict; TC = task conflict.

* 2 < .l **E.<.05. *p.<.001. **p.<.0001.

Table 4.8: Model 4 SUR Results -Relationship Conflict, Task Conflict, and Perceived Performance

Predictors	Perceived Performance
Time 1:	
RC	0.1
TC	-0.3*
RC*TC	0.0
Time 2:	
RC	-0.5**
TC	-0.2*
RC*TC	0.0
Time 3:	
RC	-0-6**
TC	-0.6**
RC*TC	0.2

Note. RC = relationship conflict; TC = task conflict.

*E<.1 **p_<.05. *e.<.001. **E.<.0001.

Table 4.9: Model 5 SUR Results -Relationship Conflict, Task Conflict, and Satisfaction

Predictors	Satisfaction
Time 1:	
RC	0.2
TC	-0.4
RC*TC	-0.1
Time 2:	
RC	-0.7**
TC	-0.2
RC*TC	0.0
Time 3:	
RC	-1-5***
XC	-0.9**
RC*TC	0.4**

Note. RC = relationship conflict; TC = task conflict.

* p < .l **p_<.05. *p.<.001. **p.<.0001.

Table 4.10: Results of Conti-asting Beta Coefficients

Equations	Timel-Time2	Time2-Time3	Timel-Time3
Equation 1			
SC	5.3**	1.6	2.7**
SC*S&MB	4.0**	0.8	2.0*
Equation 2			
VD	4.3**	0.5	2.2*
VD*S&MB	0.8	0.0	0.6
Equation 3			
ID	0.1	1.0	0.9
ID*TB	**0.2**	**3.0**	**2.2***

Note SC = social category diversity; S&MB = solidarity and maintenance behaviors; VD = value diversity; ID = informational diversity; TB = task-oriented behaviors.

*e<.l **p_<.05. ***£.< .001. **** p.< .0001.

Table 4.11: Summary of Results

#	Relationship Examined	Time Period	Strength of Relationsliip	Results
1.	salience of readily detectable attributes	tl to t2 t2tot3 tltot3	+++ ++ +	NS
2	social category diversity and relationship conflict	tl to t2 t2 to t3 tltot3	+++ ++ +	
3a	salience of values	tl to t2 t2tot3 tltot3	+ ++ +++	
3b	salience of task-related attributes	tl tot2 t2tot3 tl tot3	+ ++ +++	
4	informational diversity and task conflict	tl to 12 t2tot3 tl to t3	+ ++ +++	
5	value diversity and relationship conflict	tl to t2 t2tot3 tl to t3	+ ++ +++	
6	solidarity behaviors moderating social category diversity and relationship conflict	tltot2 t2tot3 tltot3	+++ ++ +	PS
7	task-oriented behaviors moderating informational diversity and task conflict	tltot2 t2 to t3 tltot3	+ ++ +++	
8	maintenance behaviors moderating value diversity and relationship conflict	tl to t2 t2tot3 tltotS	+ ++ +++	PS

Table 4.11 Continued

#	Relationship Examined	Time Period	Strength of Relationship	Res
9	relationship conflict and objective performance	throughout	-	NS
10	relationship conflict and perceived performance	throughout	-	PS
11	relationship conflict and satisfaction	throughout		PS
12	task conflict and objective performance	throughout	+	NS
13	task conflict and perceived performance	throughout	-	S
14	task conflict and satisfaction	throughout	-	PS
15	relationship conflict moderating task conflict and objective performance	throughout	-	NS
16	relationship conflict moderating task conflict and perceived performance	throughout	+	PS
17	relationship conflict moderating task conflict and satisfaction	throughout	+	PS

Note. S = supported; PS = partially supported; NS = not supported.

CHAPTER V

CONCLUSIONS

This chapter, first, presents a discussion of contributions and managerial implications. Then, limitations of the present research are discussed. Finally, suggestions for future research are offered.

Contributions and Managerial Implications

The purpose of tiiis study was to explore tiie temporal impact of different types of diversity (social category diversity, informational diversity, and value diversity) and systems leadership on two types of conflict (relationship conflict and task conflict) and group performance. The majority of past research ignored the processes that underlay group diversity and contextual influences that might change its effects, as well as its temporal nature. As a result, the literature on group diversity is replete with inconsistent findings.

The present research was successful in demonstrating that group diversity had a dynamic nature. Previous research by Harrison and colleagues (1998) showed that diversity in visible, readily-detectable attributes had a stronger impact on social integration for groups with less tenure and that diversity in less visible, underlying attributes had a greater impact on social integration for longer-tenured groups. The present research took the additional step of examining how the salience of dififerent types of diversity changed over time and how different types of diversity triggered different forms of conflict throughout a group's life.

This stiidy showed tiiat informational diversity and value diversity became more salient as groups worked togetiier. Hence as group members interacted they noticed each others' task-related attiibutes, attitudes, values, and personality. An unexpected finding of this study, however, was that salience of social category diversity also increased over time. Hence, despite existing literature which argues that as time passes individuals start paying less attention to each other's physical, visible characteristics, this study showed that group members actually became more attuned to such attiibutes with the passage of time.

This study also showed that the impact of different forms of diversity on relationship conflict changed over time. Specifically, the impact of value diversity on relationship conflict increased throughout the semester consistent with the study's hypotheses. However, again unexpectedly, this study found that the influence of social category diversity on relationship conflict also increased over time. Thus social category diversity led to relationship conflict early in group development. But the strength of this relationship increased rather than decreased over time. Also it was found that informational diversity affected task conflict throughout the groups' life and the sti-ength of this influence did not increase through time as expected.

Further, the present research introduced a contextual variable, systems leadership, which has the potential to explain how diverse groups can overcome negative effects of social category diversity and value diversity at the same time enhancing the positive effects of informational diversity. Systems leadership was originally conceptualized as a

tiiree dimensional variable. However, the results of confirmatory factor analysis indicated that it had two dimensions, as used here.

The results of the study showed that the two dimensions, labeled solidarity/maintenance behaviors and task-oriented behaviors, moderated between diversity and conflict. Specifically, solidarity and maintenance behaviors moderated between social category diversity and relationship conflict and value diversity and relationship conflict whereas task-oriented behaviors moderated between informational diversity and task conflict. Besides, the prominence of these behaviors changed over time. Solidarity and maintenance behaviors were more important over time in moderating the relationship between social category diversity and relationship conflict. Task-oriented behaviors became more important over time in moderating the relationship between informational diversity and task conflict.

Another unexpected finding was that task-oriented behaviors weakened the relationship between informational diversity and task conflict, rather than enhancing it. That is, groups which enacted task-oriented behaviors such as making sure that quieter members get a chance to express tiieir ideas and integrating tiie dififerent perspectives of team members experienced lower levels of task conflict due to informational diversity. Although task-oriented behavior increased the debate among group members and led to an open discussion of task-related issues, such behaviors might have made groups more participatory and democratic and members of such groups might have not associated such behaviors witii conflict, which they might have perceived as sometiiing more hostile and undesirable.

The present study found that task conflict negatively influenced members' perceptions of how well their groups performed all through their groups' development. It also negatively affected members' satisfaction with their group at the very end of their groups' lives. This study also identified that relationship conflict had a lagged effect on perceived performance and satisfaction. Specifically, relationship conflict significantly affected members' perceptions of group performance and their satisfaction with their groups in times 2 and 3. As members' perceptions of social category diversity and value diversity increased, relationship conflict experienced within the groups might have increased, in tum reducing perceptions of performance and satisfaction.

Altiiough relationship conflict, task conflict, and their interaction were sigruficant predictors of perceived performance and satisfaction, they were not good predictors of objective performance - grade. This finding is similar to Gladstein's (1984) finding that variables such as intra-group processes and leadership explained much of the variance in members' perceptions of group performance. However, little of the variance in sales revenue (i.e., objective performance) was explained by group member interactions or stiiicttire. Ratiier, sales revenue was predicted mostly by market growtii and organizational tenure. Similarly, in tiiis case grade might be predicted by some other variables tiiat are excluded fi-om tiiis stiidy. Anotiier reason for tiiis finding could be tiie restiicted range of grades. All project groups received grades that ranged from the lower 80s to tiie higher 90s throughout tiie semester. In samples in which tiiere is a greater variety of grades, the hypothesized relations may be observed.

An important contiibution of tiie present research is that it examined the effects of perceived diversity, tiie extent to which individuals perceived members of their group to be different in regards to vaiious attributes. The majority of past research, on the other hand, examined objective diversity operationalized as the coefficient of variation or the entropy-based index. The problem witii defining diversity objectively is that group members may not be aware of the types of diversity that are being examined. The types of diversity that are being perceived by group members may be different than those examined by researchers. By studying perceived diversity, the present research considered the differences that are important to group members and that actually affected intra-group conflict and performance.

Finally, this study had a developmental approach. Most of the extant research, on the other hand, focused only on static levels of group diversity, ignoring that the type of diversity perceived by group members might change over time. However, the present study suggested that to fully imderstand the effects of group diversity, the types of diversity that stood out in the eyes of the group members and the stage of development their groups were at should be considered.

The present research found that as groups matured the unfavorable effects of group diversity, if unmanaged, got stronger. In time 1, those groups with high social category diversity and those with high value diversity experienced high relationship conflict. As the groups matured, the associations between social category diversity and relationship conflict and value diversity and relationship conflict got even sti-onger. Solidarity and maintenance behaviors weakened these unfavorable effects.

The favorable effects of diversity, on the otiier hand, did not change across time. Those groups witii high informational diversity experienced higher levels of task conflict tiiroughout the tiiree time periods. Task-oriented behaviors weakened the positive association informational diversity and task conflict.

At the early stages, task conflict experienced was negatively associated with perceived performance, whereas relationship conflict was not related to group outcomes. For mature groups both task conflict and relationship conflict were negatively related to perceived performance and satisfaction.

The results of the present research have several implications for managers of diverse project groups and their members. First, the findings suggest that tiie negative consequences of social category diversity will not diminish on their own through the passage of time. In effect, these negative consequences might intensify over time. Therefore, solidarity and maintenance behaviors such as discouraging group members from engaging in personal attacks and insults, establishing a common group identity, and encouraging group members to reconcile their differences in a constructive maimer need to be performed regularly within project groups diverse in regards to social category attributes.

Further, past research overlooked the importance of value diversity in groups (Harrison et al., 1998; Jehn et al., 1997). However, results of the present study indicate that this type of diversity is not only associated with higher levels of relationship conflict, this relationship also intensifies over time, again indicating the importance of solidarity and maintenance behaviors for diverse groups. Relationship conflict, triggered by social

category diversity and value diversity, in tum leads to lower member perceptions of performance and lower satisfaction witii the group. Finally, managers of diverse groups and their members need to be cautioned about the lagged effect of relationship conflict as well as the negative effects of task conflict on performance outcomes.

Limitations

The present study also has some limitations that need to be acknowledged. One way this research is limited is through generalizability of the findings. The sample of this study consisted of student project groups rather than employee workgroups in organizations, limiting the generalizability of findings. Student groups are different than employee groups in several ways. First, the reward for doing a good job in a class is a grade and it may not carry the same effects as a reward in an organizational setting. Second, the groups in this study lasted only for 14 weeks. Hence, the intensity of members' involvement in the group might have been much less than that for members of "real" project groups. Finally, although student groups in the capstone Strategic Management class performed tasks that had a great deal in common with tasks in organizational settings, they were performed in an artificial setting, the academic environment.

Another limitation of this study is the common metiiod bias. Although objective performance (i.e., grades) of groups were gatiiered from sources other than individual perceptions, all the other remaining variables were gathered from surveys. Smce perceived diversity, intra-group conflict, systems leadership, perceived performance, and

satisfaction measures were collected from the same subjects at the same time, there may be a common method bias at the individual level.

Common method bias at the individual level was assessed using principal components analysis. When the first component was treated as the common method bias, this procedure led to shared variance among items of 23.5% in time 1, 31% in time 2, and 35.5% in time 3. However, using this method it is not clear how much of this shared variance is really due to common method bias and how much of it is due to functional relationships among the variables. Also, it should be recalled that the level of analysis in the present research was the group and therefore all measures were aggregated at the group level. This aggregation at the group level might have affected the extent of the effect of common method bias on the relationships examined in this study (J. B. Wilcox, personal communication, July 1, 2002). Further, Crampton and Wagner (1994) indicate that common method bias does not affect all domains of organizational research equally and that percept-percept inflation due to common metiiod bias is more likely in some instances than others. There are no domain specific studies on the extent of common metiiod bias in the area of group diversity. However, because the shared variances identified through principal component analysis are quite high, the results of this study should be interpreted cautiously.

The present stiidy also tested the individual hypotheses ratiier than the entire model. Therefore, main effects of systems leadership were not assessed. A crude estimate of the main effects of solidarity/maintenance behaviors and task-oriented behaviors on relationship conflict and task conflict can be calculated by squaring the tiieir

intercorrelations. Using this metiiod tiie estimate of main effect of solidarity/maintenance behaviors on relationship conflict is 0.24, the estimate of main effect of solidarity/maintenance behaviors on task conflict is 0.15, the estimate of main effect of task-oriented behaviors on relationship conflict is 0.34, and the estimate of main effect of task-oriented behaviors on task conflict is 0.27. It should be noted that these values are not fme-grained estimates and that some of these shared variances will overlap when interactions and other predictors are included in the regression equation. Nevertheless, the magiutude of the squared correlations suggests that direct effects of systems leadership on conflict warrant further attention.

Finally, although the present research was longitudinal, it was not possible to make any causal assertions. First, this study was nonexperimental. A nonexperimental research design was preferred because the large number of treatment conditions caused the number of teams per condition to be small. Second, the data analysis method (i.e., regression analysis) was not appropriate to establish causal relations. Structural equation modeling was not used in this study because of the small sample size. Third, the proposed model did not include any feedback loops to keep this research manageable.

Directions for Future Research

The area of group diversity is rapidly grov^dng. This study suggests further directions to move the field of group diversity ahead. First, the model proposed in the present study assumed linear relationships between diversity and conflict and conflict and performance. There was no curvilinearity within the range of the data analyzed in tiiis

study. However, Williams and O'Reilly (1998) suggest that diversity's effects may be curvilinear. For instance, informational diversity may have diminishing effects on task conflict such that task conflict first increases as informational diversity increases and then it drops off for higher levels of informational diversity. Social category diversity and value diversity may also have nonlinear relationships with conflict. Such types of diversity may have an exponential effect on relationship conflict such that as these types of diversity in a group increase, the relationship conflict experienced by group members may increase more rapidly (Williams & O'Reilly, 1998).

Similarly, the relationship between conflict and performance may be nonlinear, as well. In effect, Jehn (1997) suggested moderate levels of task conflict were beneficial for group performance, whereas very low levels of task conflict might not enhance performance and very high levels might actually impede it. Relationship conflict may have an exponential effect on performance such that as relationship conflict increase, performance may deteriorate more rapidly. The literature tiiat examines group diversity's effects on intra-group conflict and performance assumes linear relationships between these variables. Future research should take curvilinearity into account.

This study examined diversity's effects on performance of tasks that involved, solving problems, making decisions, and crafting business sti:ategies. Altiiough diversity's effects on performance of cognitive tasks constitiite a significant research sfream within the area of group diversity (Pelled et al., 1999), another important group outcome tiiat should be examined in fiiture research is creativity. In her review of empirical research on tiie relationship between group diversity and group performance.

Jackson (1992) indicated tiiat diverse groups performed tasks that involved decision making as well as creative idea generation better than homogenous groups. Further, this finding held for a variety of individual attributes including personality, type of training, and attitudes, values and opinions. Jackson argued that these advantages arose because of the differences in perspectives that dissimilar people brought to bear on task. Differing perspectives were resources available for use on the task at hand. Hence, a fruitful direction for future research is testing the model proposed here with performance on creative tasks as the group outcome.

Another avenue for future research is to expand the current model to include other moderators between diversity and conflict in addition to systems leadership. Williams and O'Reilly (1998) suggested that task design, group norms, and organizational culture could help diverse groups capitalize on their diversity. Also, variables that moderate between conflict and performance can be included. Systems leadership can moderate between conflict and performance in addition to moderating the link between diversity and conflict. Other mediators such as social integration can also be added to the model proposed here. As indicated in the previous section, future research should also examine the main effects of systems leadership and include feedback loops. Performance in an earlier time period might affect level of infra-group conflict in the later periods. The purpose of the present research was deliberately circumscribed and a restricted model was tested to keep the study more manageable.

Future research should also examine the possibility that value diversity may affect task conflict in addition to affecting relationship conflict. Personality characteristics.

attitiides, values, and beliefs may influence group members' perception of what tiie group's task is and how to perform it. Jehn et al. (1997, 1999) found that value diversity, defined as differences in fimdamental beliefs regarding desirable behavioral choices, was associated witii higher levels of task conflict. A more broadly defined value diversity, as utilized in the present study, may also be associated witii task conflict.

An important contiibution of the present research is that it examined tiie effects of perceived diversity. A fruitful direction for future research involves considering the differences between perceived diversity and relevant diversity, which refers to those perceived dififerences that have a bearing upon group functioning. That is, not all perceived differences may affect group functioning. In that case, future research should investigate the conditions that make perceived differences relevant and how relevant diversity changes as a group develops. Hence, future research should explore the possibility that not all perceived differences are relevant to the way a group functions.

The proposed model should also be tested on other samples of groups. Specifically, samples of work groups from real organizations should be tested. In addition, the model should be tested on groups performing different kinds of tasks. Characteristics of group task such as routineness and interdependence might affect perceptions of diversity and infra-group conflict experienced within the group. Also samples of groups with a greater variety of objective performance should be studied to better understand the effects of perceived diversity, conflict, and systems leadership on such measures of group effectiveness.

REFERENCES

Alagna, S., Reddy, D., & Collins, D. (1982). Perceptions of fimctioning in mixed-sex and male medical training groups. Journal of Medical Education. 57 801-803.

Allison, P. D. (1987). Measures of inequality. American Sociological Review. 43, 865-880.

Amason, A. C. (1996). Distinguishing tiie effects of functional and dysfunctional conflict on sfrategic decision making: Resolving a paradox for top management teams. Academv of Management Journal. 39.123-148.

Amason, A. C, & Sapienza, H. J. (1997). The effects of top management team size and interaction norms on cognitive and affective conflict. Joumal of Management. 23,495-516.

Ancona, D. G. & Caldwell, D. F. 1992. Demography and design: Predictors of new product team performance. Organization Science, l^ 321 -341.

Argote, L. & McGrath, J. E. 1993. Group processes in organizations: Continuity and change. In C.L. Cooper & I.T. Robertson (Eds.), International Review of Industrial and Organizational Psvchology, Volume 8. New York: John Wiley & Sons.

Arrow, H., McGrath, J.E., & Berdahl, J.L. (2000). Small groups as complex systems. Thousand Oaks: Sage.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. Joumal of the Academv of Marketing Science, 16, 74-94.

Bantel, K. A. & Jackson, S. E. (1989). Top management and irmovations in banking: Does the composition of the top team make a difference? Strategic Management Joumal, 10, 107-124.

Barry, D. (1991). Managing the bossless team: Lessons in distributed leadership. Organizational Dynamics, Summer, 31 -47.

Bass, B.M. (1990). Bass and Stogdill's Handbook of leadership: Theory, research and managerial applications. New York: Free Press.

Bowers, D. G., & Seashore, S. E. (1966). Predicting organizational effectiveness with a four-factor theory of leadership. Administrative Science Quarterly, 11, 238-263.

Bradford, L. P. (1976). Making meetings work. La Jolla, CA: University Associates.

Byrne, D. (1971). The atfraction paradigm. New York: Academic Press.

Campion, M.A., Medsker, G.J., & Higgs, CA. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. Persormel Psychology, 46, 823-850.

Campion, M.A., Paper, E.M., & Medsker, G..J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. Persormel Psychology, 49, 429-452.

Churchill, G. A., Jr. (1987). Marketing Research: Methodological foundations. Chicago: The Dry den Press.

Cohen, S. G. (1993). New Approaches to Teams and Teamwork. In J. R. Galbraith, E. E. Lawler III and Associates (Eds.), Organizing for the Future, <pp. 194-226). San Francisco: Jossey-Bass.

Cohen, S. G. & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to tiie executive suit. Joumal of Management, 23,239-290.

Crampton, S. M. & Wagner, J. A. III. (1994). Percept-percept inflation in microorganizational research: An investigation of prevalence and effect. Joumal of Applied Psychology, 79, 67-76.

Denison, D. R., Hart, S. L,. & Kahn, J. A. (1996). From chimneys to cross-ftinctional teams: Developing and validating a diagnostic model. Academy of Management Joumal, 39, 1005-1023.

Devine, D. J., Clayton, L.D., Philips, J.L., Dunford, B.B., & Mehier, S. B. (1999). Teams in organizations: Prevalence, characteristics, and effectiveness. Small Group Research. 30^ 678-711.

Dougherty, D. (1992). Interpretive barriers to successfiil product innovation in large firms. Organization Science, 3,179-202.

Ford, R. C. & Randolph, W. A. (1992). Cross-Functional Stmcttires: A Review and Integration of Mafrix Organization and Project Management. Joumal of Management. 18, 267-294.

Gladstein, D. L. (1984). Groups in Context: A Model of Task Group Effectiveness. Adminisfrative Science Ouarteriv, 29,499-517.

Goodman, P. S. Ravlin, E. C. & Argote, L. (1986). Current Thinking About Groups: Setting the Stage for New Ideas. In P.S. Goodman and Associates (Eds.), Designing Effective Work Groups (pp. 1-33). San Francisco: Jossey-Bass.

Goodman, P. S., Ravlm, E., & Schminke, M. (1987). Understanding groups in organizations. B. M. Staw & L. L. Cummings (Eds.), Research in Organizational Behavior: Volume 9. (pp. 121-173). Greenv^ch, CT: JAl Press.

Gordon, J. (1992). Work teams: How far have they come? Trairung, October, 59-65.

Grreiner, L. E. (1972). Evolution and Revolution as organizations grow. Harvard Business Review, July-August, 37-46.

Gmenfeld, D. H., Mannix, E. A., Williams, K. Y., & Neale, M. A. (1996). Group composition and decision making: How member familiarity and information distribution affect process and performance. Organizational Behavior and Human Decision Processes. 67,1-15.

Guzzo, R. A. (1995). Introduction: At the intersection of team effectiveness and decision making. In R. A. Guzzo and E. Salas (Eds.), Team Effectiveness and Decision Making In Organizations: 1-8. San Francisco: Jossey-Bass.

Guzzo, R. A. & Dickson, M. W. (1996). Teams in Organizations: Recent Research on Performance Effectiveness. Armual Review of Psychology, 47, 307-338.

Hackman, J. R. (1987). The Design of Work Teams. In J.W. Lorsch (ed.). Handbook of Organizational Behavior (pp. 314-342). Englewood Cliffs, NJ: Prentice-Hall.

Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: Time and the effects of surface- and deep-level diversity on work group cohesion. Academv of Management Joumal, 41, 96-107.

Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2000). Time, teams, and task performance: A longitudinal study of the changing effects of diversity on group fimctioning. Paper presented at the 2000 Academy of Management Meetings, Toronto, Canada.

Henderson, J. C, & Lee, S. (1992). Managing I/S design teams: A control tiieories perspective. Management Science. 38, 757-777.

Hof&nan, L., & Maier, N. (1961). Quality and acceptance of problem solutions by members of homogeneous and heterogeneous groups. Joumal of Abnormal and Social Psychology. 62,401-407.

HoIIenbeck, J. R., Ilgen, D. R., & Sego, D. J. (1994). Repeated measures regression and mediational tests: Enhancing the power of leadership research. The Leadership Ouarteriv. 5, 3-24.

House, R. J., & Aditya, R. N. (1997). The social scientific stiidy of leadership: Quovadis? Joumal of Management, 23.409-473.

Howell, J. P., Bowen, D. E., Dorfrnan, P. W., Kerr, S., & Podsakoff, P. M. (1990). Substitutes for leadership: Effective alternatives to ineffective leadership. Organizational Dynamics. 19, 21-38.

Hunt, J. G & Ropo, A. (1997). Leadership and Faculty Motivation. In J.L. Bess (Ed.), Teaching well and liking it. Baltimore: Johns Hopkins Uiuversify Press.

Jackson, S. E. (1992). Team composition in organizational settings: Issues in managing an increasingly diverse workforce. In S. Worchel, W. Wood, and J. A. Simpson (Eds.), Group Process and Productivity (pp. 138-173). Newbury Park:, CA Sage.

Jackson, S. E., Brett, J. F., Sessa, V. I., Cooper, D. M., Julin, J. A., & Peyronnin, K. (1991). Some differences do make a difference: Individual dissimilarity and group homogeneity as correlates of recruitment, promotion, and turnovers. Joumal of Applied Psychology, 75, 675-689.

Jackson, S. E., May, K., & Whitney, K. (1995). Diversity in decision-making teams. In R. A. Guzzo and E. Salas (Eds.), Team Effectiveness and Decision Making In Organizations (pp. 204-261). San Francisco: Jossey-Bass.

Jackson, S. E., Stone, V. K., & Alvarez, E. B. (1993). Socialization amidst diversity: Impact of demographics on work team oldtimers and newcomers. In L. L. Cummings & B. M. Staw (Eds.), Research in organizational behaviors, vol. 15, (pp. 45-109). Greenv^ch, CT: JAI Press.

James, L. R., & Brett, J. M. (1984). Mediators, moderators, and tests for mediation. Joumal of Applied Psychology. 69 307-391

Jehn, K. A. (1995). A multimethod examination of the benefits and detriments of infragroup conflict. Administrative Science Ouarteriv. 40, 256-282.

Jehn, K. A. (1997). A qualitative analysis of conflict types and dimensions in organizational groups. Administrative Science Ouarteriv. 42, 530-557.

Jehn, K. A, Chadwick, C, & Thatcher, S. M. B. (1997). To agree or not to agree: The effects of value congmence, individual demographic dissimilarity, and conflict on workgroup outcomes. The International Joumal of Conflict Management. 8,287-305.

Jehn, K. A., Nortiicraft, G. B.& Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. Administrative Science Ouarteriv. 44, 741-763.

Johnston, W. B., & Packer, A. H. 1987. Workforce 2000: Work and workers for the 21^'century. Indianapolis: Hudson Institute.

Katz, R. & Allen, T. J. (1985). Project performance and the locus of influence in the R&D matrix. Academy of Management Joumal. 28, 67-87.

Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. Organizational Behavior and Human Performance, 22. 375-403.

Larson, E. W. & Gobeli, D. H. (1988). Organizing for Product Development Projects. Joumal of Product Innovation Management, 5, 180-190.

Lawler, E. E. Ill, Mohrman, S. A., & Ledford, G. E., Jr. (1995). Creating high performance organizations: Practices and results of employee involvement and total quality management in Fortune 1000 companies. San Francisco: Jossey-Bass.

Lawrence, B. S. (1997). The black box of organizational demography. Organization Science, 8, 1-22.

Lussier, R. N. & Achua, C. E. (2001). Leadership: Theory, Application. Skill Development. Cinciimati: South-Western College Publishing.

McCain, B. E., O'Reilly, C. A. & Pfeffer, J. (1983). The effects of departmental demography on turnover: The case of a university. Administrative Science Quarterly. 26.626-641.

McGrath, J. E.(1964). Social Psychology: A Brief Introduction. New York: Holt, Rinehart and Winston.

McGrath, J. E. (1984). Groups: Interaction and Performance. Englewood Cliffs, NJ: Prentice-Hall.

McLeod, P., & Lobel, S. (1992). The effects of ethnic diversity on idea generation in small groups. Paper presented at the Academy of Management Meetings, Las Vegas, NV.

Milliken, F. J. & Martins, L. L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. Academy of Management Review. 21, 402-433.

Mintzberg, H., Raisinghani, D., & Theoret, A. (1976). The stmcture of unstmctured decision process. Administrative Science Quarterly, 21, 192-205.

Mohrman, S. A. (1993). Integrating Roles and Stmcture in the Lateral Organization. In J.R. Galbraith, E.E. Lawler III and Associates (Eds.), Organizing for the Future (pp. 194-226). San Francisco, CA: Jossey-Bass.

Newcomb, T.M. (1947). Autistic hostilityand social reality. Human Relations, 1, 69-86.

Nkomo, S. M. & Cox, T., Jr. (1996). Diverse identities in organizations. In S. R. Clegg, C. Hardy, and W. R. Nord (Eds.), Handbook of Organization Studies (pp. 338-356). Thousand Oaks, CA: Sage.

O'Reilly, C. A. Ill, Caldwell, D. F., & Bamett, W. P. (1989). Work group demography, social integration, and turnover. Administrative Science Quarterly, 34,21-37.

Pearce, J. H. II, & Ravlm, E. C. (1987). The design and activation of self-regulating work groups. Human Relations, 40,751-782.

Pelled, L. H. (1996). Demographic diversity, conflict, and work group outcomes: An intervening process theory. Organization Science, 7,615-631.

Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. (1999). Exploring the black box: An analysis of work group diversity, conflict, and performance. Adminisfrative Science Quarterly, 44,1-28.

Pfeffer, J. (1983). Organizational demography. In L. L. Cummings & B.M. Staw (Eds.), Research in Organizational Behavior: vol. 5. (pp. 299-357). Greenwich: JAI Press.

Pinto, M. B., Pinto, J. K., & Prescott, J. E. (1993). Antecedents and consequences of project team cross-functional cooperation. Management Science. 39, 1281-1297.

Priem, R. L. (1990). Dimensions of conflict frame: Disputant Interpretations of Conflict. Joumal of Applied Psychology, 75,117-126

Rahim, M. A. (1983). Measurement of organizational conflict. Joumal of General Psychology. 109.189-199.

Riordan, C. M. & Shore, L. M. (1997). Demographic diversity an employee attitudes: An empirical examination of relational demography within work units. Joumal of Applied Psychology. 82, 342-358.

Schmitt, N., & Sttilts, D. M. (1985). Factors defined by negatively keyed items: The resuh of careless respondents? Applied Psychological Measurement, 9, 367-373.

Schneider, B. (1987). The people make tiie place. Personnel Psychology, 40, 437-453.

Schumacker, R. E., & Lomax, R. G. (1996). A beginner's guide to stiiicttiral equation modelmg. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Schweiger, D. M., Sandberg, W. R., & Rechner, P. L. (1989). Experimental effects of dialectical inquiry, devil's advocacy, and consensus approaches to sfrategic decision making. Academy of Management Joumal. 32, 745-772.

Sherif, M.& Sherif, C. (1953). Groups in harmony and tension. New York: Harper & Row.

Smith, P. C, Kendall, L. M., & Hulin, C. L. (1969). The measurement of ' satisfaction in work and retirement: A sfrategy for the stiidy of attitiides. Chicago: Rand McNally & Company.

Smitii, K., Smitii, K., Qlian, J., Sims, H., O'Bannon, D., & Scully, J. (1994). Top management team demography and process: The role of social integration and communication. Adminisfrative Science Quarterly. 39,412-438.

Sundsfrom, E., De Meuse, K. P., & Fufrell, D. (1990). Work teams: Applications and effectiveness. American Psychologist, 45.120-133.

Tajfel, H. (1982). Human groups and social categories: Studies in social psychology. Cambridge, England: Cambridge University Press.

Tannenbaum, S. I., Beard, R. L., & Salas, E. (1992). Team building and its influence on team effectiveness: An examination of conceptual and empirical developments. In K. Kelley (Ed.), Issues, Theory, and Research in Industiial Organizational Psychology (pp. 117-153). New York City, NY:Elsevier Science Publishers B. V.

Teachman, J. D. (1980). Analysis of population diversity. Sociological Methods and Research. 8, 39-44.

Thatcher, S. M. B., & Jehn, K. A. (1998). A model of group diversity profiles and categorization processes in bicultural organizational teams. In D. G. Ancona (Ed.), Research on Managing Groups and Teams, vol. 1, (pp. 1-20). Greenwich, CT: JAI Press.

Thibaut, J. W. & Kelley, H. H. (1959). The Social Psychology of Groups. New York: Wiley

Thomas, D. C, Ravlin, E. C, & Wallace, A. W. (1996). Effect of cultiiral diversity in work groups. In S. Back (Ed.), Research in the Sociology of Organizations, 14,1-33.

Triandis, H., Kurowski, L., & Gelfanc, M. (1994). Workplace diversity. InH. Triandis, M. Dunnette, & L. Hough (Eds.), Handbook of industiial and organizational psychology. Vol. 4, (pp. 769-827). Palo Alto, CA: Consulting Psychologists Press.

Tsui, A. S., Egan, T. D., & Porter, L. W. (1994). Performance implications of relational demography in vertical dyads. Paper presented at the meeting of Academy of Management, Dallas, TX.

Tumer,J. C. (1987). Rediscovering the social group: A self-categorization theory. New York: Basil Blackwell.

Uhl-Bien, M., & Graen, G. B. (1998). Individual self-management: Analysis of professionals' self-managing activities in fimctional and cross-functional work teams. Academy of Management Joumal, *4*_, 340-350.

Wagner, W. G., Pfeffer, J., & O'Reilly, C. A. (1984). Organizational demography and turnover in top-management groups. Administrative Science Quarterly. 29, 74-92.

Watson, W.E., Kumar, K., & Michaelson, L.K. (1993). Cultural diversity's impact on interaction process and performance: Comparing homogeneous and diverse task groups. Academy of Management Joumal. 36, 590-602.

Wilcox, J. B., April 15, 2002. Personal communication. Area of Marketing, Texas Tech University, Lubbock, TX.

Wilcox, J. B., July 1, 2002. Personal communication. Area of Marketing, Texas Tech University, Lubbock, TX.

Williams, K. Y. & O'Reilly, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. In B. M. Staw and L. L. Cummings (Eds.), Research in Organizational Behavior: vol. 20. (pp. 77-140). Greenwich, CT: JAI Press.

Yukl, G. (1998). Leadership in organizations. Upper Saddle River, NJ: Prentice Hall.

Zenger, T. R. & Lawrence, B. R. (1989). Organizational demography: The differential effects of age and tenure distributions on technical communication. Academv of Management Joumal, 32, 353-376.

APPENDIX A

SURVEY ITEMS

Perceived Diversity Scale

In this section of the questiormaire race/ethnicity refers to common heritage (e.g., Asian American, Hispanic). Nationality refers to the countty of origin (e.g., France). Major refers to the disciplines College of Business Administration students can specialize in (e.g.. Finance, Marketing).

Now that you have completed three team assignments with your teammates, your perceptions of them might have changed. **While you were working on Current Events project,** how similar, did you think, were members of your project team with respect to each of the following atfributes? Please rate from 1 = Very Similar to 5 = Very Different.

	Very Similar	Moderately Similar		Very Different	
Personal values		2	3	**4**	5
Gender		2	3	**4**	5
Importance placed on team goals		2	3		
Years of work experience		2	3	**4**	5
Major		2	3	**4**	5
Attitudes toward School		2	3		
Race/ethnicity/ Nationality		2	3		
Preference for teamwork		2	3	**4**	5
Age		2	3	**4**	5
Personality		2	3	**4**	5

Skills & Abilities 1

Task-Related
Knowledge 1

Relationship Conflict Scale

1	-2		. 4 - - -	- - 5
Sfrongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

There is a lot of relationship tension in my team.

In my team people get angry with each other all the time

There is a lot of emotional conflict in my team.

Task Confliict Scale

1	2	3	4	5
Sfrongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Sfrongly Agree

There is a lot of conflict of ideas in my team.

People in my team never have conflicting opinions about the project we are working on.

We always have disagreements within my team about the task of the project we are working on.

Systems Leadership Scale

1	-2		. 4 - - -	
Sfrongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

_My team discourages team members from engaging in personal attacks and insults.

My team encourages team members to reconcile their differences in a constmctive manner.

_ My team has a common group identity.

_ My team emphasizes similarities among team members.

_ My team discourages stereotyping.

_ My team rallies team members around collective (team) objectives and goals.

_ My team promotes tolerance for differences.

_ My team discourages prejudiced comments.

_ My team encourages all team members to contribute their ideas.

My team makes sure that quieter members get a chance to express their ideas.

My team integrates the different perspectives of team members.

My team promotes understanding of different values, beliefs, and traditions.

My team brings the unique information possessed by team members to bear on task.

My team makes sure that all team members understand each other's points of view.

Perceived Group Perfontnance Scale

The following questions ask you to compare your project team in this class to other teams. In relations to other project teams you have served on or observed, how does this team rate on each one of the following?

1 2	3	4 5
Exfremely Low	Moderately High	Extremely High

1. The efficiency of team operations.

2. The amount ofwork the team produces.

3. The team's adherence to schedules.

4. The quality of the work the team produces._____

5. The team could have done its work faster with the same level of quality._____

6. The team met the goals as quickly as possible._____

Satisfaction Scale

Please cfrcle the face that most adequately portrays how you feel about working in this team.

APPENDIX B

RESULTS OF CONFIRMATORY FACTOR

ANALYSES (CFA)

Initial CFA for Intra-Group Conflict Scale

The following lines were read from file Untitled:

Factor analysis with correlation matrix input for conflict first adminisfration
observed variables: v62-v67
correlation matrix:
1
0.693014268 1
0.695956191 0.856561728 1
0.594986062 0.703894363 0.759264007 1
-0.347701828 -0.332501799 -0.380208771 -0.446157988 1
0.527545772 0.565208093 0.598957733 0.566322798 -0.467334017 1
sample size: 195
Latent variables: relcon taskcon
relationships:
v62 - v64 = relcon
v65 - v67 = taskcon
print residuals
number of decimals = 3
end of problem

Sample Size = 195

Factor analysis v^ith correlation matrix input for conflict first administration

CORRELATION MATRIX TO BE ANALYZED

	v62	v63	v64	v65	v66	v67
v62	1.000					
v63	0.693	1.000				
v64	0.696	0.857	1.000			
v65	0.595	0.704	0.759	1.000		
v66	-0.348	-0.333	-0.380	-0.446	1.000	
v67	0.528	0.565	0.599	0.566	-0.467	1.000

Factor analysis witii correlation mafrix input for conflict first administration
Number of Iterations = 7

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

v62 = 0.751 *relcon, Errorvar.^ 0.437 , R^ = 0 563
(0.0622) (0.0484)
12.066 9.024

v63 = 0.904*relcon, Errorvar.= 0.183 , R^ = 0.817
(0.0564) (0.0282)
16.014 6.499

v64 = 0.945*relcon, Errorvar.= 0.106 , R^ = 0.894
(0.0547) (0.0250)
17.282 4.244

v65 = 0.864*taskcon, Errorvar.= 0.254 , R^ = 0.746
(0.0618) (0.0490)
13.983 5.193

v66= -0.499*taskcon,Errorvar.= 0.751 ,R2 = 0.249
(0.0712) (0.0798)
-7.006 9.413

v67 = 0.692*taskcon, Errorvar.= 0.521 , R^ = 0.479
(0.0661) (0.0606)
10.469 8.597

CORRELATION MATRIX OF INDEPENDENT VARIABLES

	relcon	taskcon
relcon	1.000	
taskcon	0.910	1.000
	(0.030)	
	30.644	

GOODNESS-OF-FIT STATISTICS

CHI-SQUARE WITH 8 DEGREES OF FREEDOM = 19.567 (P = 0.0121)
ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 11.567
90 PERCENT CONFIDENCE INTERVAL FOR NCP = (2.233 ; 28.560)

MINIMUM FIT FUNCTION VALUE = 0.101
POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.0596
90 PERCENT CONFIDENCE INTERVAL FOR FO = (0.0115 ; 0.147)
ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0863
90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0379 ; 0.136)
P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.0966

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.235
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.187 ; 0.322)
ECVI FOR SATURATED MODEL = 0.216
ECVI FOR INDEPENDENCE MODEL = 3.856

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 15 DEGREES OF FREEDOM = 735.980
INDEPENDENCE AIC = 747.980
MODEL AIC = 45.567
SATURATED AIC = 42.000
INDEPENDENCE CAIC = 773.618
MODEL CAIC = 101.116
SATURATED CAIC = 131.733

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0368
STANDARDIZED RMR = 0.0368
GOODNESS-OF-FIT INDEX (GFI) = 0.968
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.916
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.369

NORMED FIT INDEX (NFI) = 0.973
NON-NORMED FIT INDEX (NNFI) = 0.970
PARSIMONY NORMED FIT INDEX (PNFI) = 0.519
COMPARATIVE FIT INDEX (CFI) = 0.984
INCREMENTAL FIT INDEX (IFI) = 0.984
RELATIVE FIT INDEX (RFI) = 0.950

CRITICAL N (CN) = 200.203

Factor analysis witii correlation matrix input for conflict first administration

FITTED CO VARIANCE MATRIX

	v62	v63	v64	v65	v66	v67
v62	1.000					
v63	0.678	1.000				
v64	0.710	0.855	1.000			
v65	0.590	0.710	0.743	1.000		
v66	-0.341	-0.410	-0.429	-0.431	1.000	
v67	0.473	0.570	0.596	0.598	-0.345	1.000

FITTED RESIDUALS

	v62	v63	v64	v65	v66	v67
v62	0.000					
v63	0.015	0.000				
v64	-0.014	0.002	0.000			
v65	0.005	-0.007	0.016	0.000		
v66	-0.007	0.078	0.049	-0.015	0.000	
v67	0.054	-0.004	0.003	-0.032	-0.122	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.122
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.078

STEMLEAF PLOT
-1|2
-0|
-0|32111000000000
0|112
0|558

STANDARDIZED RESIDUALS

	v62	v63	v64	v65	v66	v67
v62	0.000					
v63	1.046	0.000				
v64	-1.730	0.861	0.000			
v65	0.194	-0.544	2.263	0.000		

v66	-0.164	2.784	2.202	-0.730	0.000	
v67	1.567	-0.226	0.223	-2.956	-3.011	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -3.011
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 2.784

STEMLEAF PLOT
-2|00
- 0177522000000
0122906
2|238
LARGEST NEGATIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v67 AND v65 -2.956
RESIDUAL FOR v67AND v66 -3.011
LARGEST POSITIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v66AND v63 2.784

THE MODIFICATION INDICES SUGGEST TO ADD THE

PATH TO	FROM	DECREASE IN CHI-SQUARE	NEW ESTIMATE
v65	relcon	9.1	1.99
v66	relcon	8.7	0.84

THE MODIFICATION INDICES SUGGEST TO ADD AN ERROR COVAIUANCE

BETWEEN	AND	DECREASE IN CHI-SQUARE	NEW ESTIMATE
y67	v65	8.7	-0.19
v67	v66	9.1	-0.15

<u>CFA for the Modified Intra-Group Conflict Scales</u>

The following lines were read from file Untitled:

Factor analysis for conflict scale without item 67 ql
observed variables: v62-v66
correlation matrix:
1.000
0.693 1.000
0.696 0.857 1.000
0.595 0.704 0.759 1.000
0.348 0.333 0.380 0.446 1.000
sample size: 195
Latent variables: relcon taskcon
relationships:

```
v62   v64 = relcon
v65 - v66 = taskcon
print residuals
number of decimals = 3
end of problem
```

Sample Size = 195

Factor analysis for conflict scale without item 67 ql

CORRELATION MATRIX TO BE ANALYZED

	v62	v63	v64	v65	v66
v62	1.000				
v63	0.693	1.000			
v64	0.696	0.857	1.000		
v65	0.595	0.704	0.759	1.000	
y66	0.348	0.333	0.380	0.446	1.000

Factor analysis for conflict scale without item 67 ql
Number of Iterations = 6

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

```
y62 = 0.747*relcon, Errorvar.= 0.443  , R^ = 0.557
    (0.0624)              (0.0490)
     11.974                9.036

v63 = 0.905*relcon, Errorvar.= 0.181  , R^ = 0.819
    (0.0565)              (0.0286)
     16.015                6.344

v64 = 0.947*relcon, Errorvar.= 0.104  , R^ = 0.896
    (0.0548)              (0.0257)
     17.292                4.036

v65 = 0.945*taskcon, Erroryar.= 0.107  , R^ = 0.893
    (0.0740)              (0.0973)
     12.773                1.102

v66 = 0.472*taskcon, Errorvar.= 0.777  , R^ = 0.223
```

	(0.0723)	(0.0825)
	6.525	9.418

CORRELATION MATRIX OF INDEPENDENT VARIABLES

	relcon	taskcon
relcon	1.000	
taskcon	0.840	1.000
	(0.051)	
	16.336	

GOODNESS-OF-FIT STATISTICS

CHI-SQUARE WITH 4 DEGREES OF FREEDOM = 4.319 (P = 0.365)
ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 0.319
90 PERCENT CONFIDENCE INTERVAL FOR NCP = (0.0 ; 9.738)

MINIMUM FIT FUNCTION VALUE = 0.0223
POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.00164
90 PERCENT CONFIDENCE flsTTERVAL FOR FO = (0.0 ; 0.0502)
ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0203
90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0 ; 0.112)
P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.589

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.136
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.134 ; 0.184)
ECVI FOR SATURATED MODEL = 0.155
ECVI FOR INDEPENDENCE MODEL = 3.244

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 10 DEGREES OF FREEDOM = 619.323
INDEPENDENCE AIC = 629.323
MODEL AIC = 26.319
SATURATED AIC = 30.000
INDEPENDENCE CAIC = 650.688
MODEL CAIC = 73.322
SATURATED CAIC = 94.095

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0165

STANDARDIZED RMR = 0.0165
GOODNESS-OF-FIT INDEX (GFI) = 0 992
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0 968
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.264

NORMED FIT INDEX (NFI) = 0.993
NON-NORMED FIT INDEX (NNFI) = 0.999
PARSIMONY NORMED FIT INDEX (PNFI) = 0.397
COMPARATIVE FIT INDEX (CFI) = 0.999
INCREMENTAL FIT INDEX (IFI) = 0.999
RELATIVE FIT INDEX (RFI) = 0.983

CRITICAL N (CN) = 597.423

FITTED CO VARIANCE MATRIX

	y62	v63	v64	v65	v66
v62	1.000				
v63	0.676	1.000			
y64	0.707	0.857	1.000		
v65	0.593	0.718	0.752	1.000	
v66	0.296	0.359	0.375	0.446	1.000

FITTED RESIDUALS

	v62	v63	v64	v65	v66
v62	0.000				
v63	0.017	0.000			
v64	-0.011	0.000	0.000		
v65	0.002	-0.014	0.007	0.000	
y66	0.052	-0.026	0.005	0.000	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.026
MEDL\N FITTED RESD3UAL = 0.000
LARGEST FITTED RESIDUAL = 0.052

STEMLEAF PLOT
-2|6
- 01410000000

0|2577
2|
4|2

STANDARDIZED RESIDUALS

	v62	v63	v64	v65	v66
v62	0.000				
v63	1.288	0.000			
v64	-1.445	0.222	0.000		
v65	0.088	-1.316	1.264	0.000	
v66	1.250	-1.142	0.347	0.000	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESDDUALS
SMALLEST STANDARDIZED RESIDUAL = -1.445
MEDL\N STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 1.288

STEMLEAF PLOT
-1|431
- 01000000
0|123
1|233

Initial CFA for Systems Leadership Scale

The following lines were read from file C:\L1SREL8W\UNTITLED:

factor analysis with correlation matrix input for leadership ql
observed variables: v48 v49 y50 v51 v52 v53 v54 v55 v56 v57 v58 v59 v60 v61
correlation matrix:
1.000
0.533 1.000
0.102 0.199 1.000
0.155 0.189 0.523 1.000
0.3910.477 0.130 0.312 1.000
0.241 0.267 0.246 0.380 0.359 1.000
0.342 0.500 0.326 0.296 0.391 0.371 1.000
0.429 0.463 0.251 0.287 0.500 0.353 0.585 1.000
0 230 0.285 0.252 0.344 0.247 0.441 0.440 0.376 1.000
0 186 0.332 0.195 0.326 0.349 0.351 0.378 0.376 0.501 1.000
0 216 0.231 0.252 0.294 0.337 0.523 0.400 0.356 0.582 0.435 1.000
0 240 0 311 0.279 0.360 0.356 0.306 0.453 0.458 0.368 0.375 0.462 1.000

0.234 0.301 0.257 0.210 0.313 0.337 0.380 0.324 0.426 0.306 0.478 0.413 1.000
0.215 0.299 0.279 0.323 0.269 0.364 0.386 0.334 0.488 0.442 0.491 0.383 0.525 1.000
sample size: 195
latent variables: sleadv sleadt sleadu
relationships:
v50 - v53 v55 = sleadv
v56 - v58 v60 v61 = sleadt
v48 v49 v59 v54 = sleadu
print residuals
number of decimals = 3
end of problem

Sample Size = 195

factor analysis with correlation matrix input for leadership ql

CORRELATION MATRIX TO BE ANALYZED

	v48	v49	v50	v51	V52	v5i3
v48	1.000					
v49	0.533	1.000				
v50	0.102	0.199	1.000			
v51	0.155	0.189	0.523	1.000		
v52	0.391	0.477	0.130	0.312	1.000	
v53	0.241	0.267	0.246	0.380	0.359	1.000
v54	0.342	0.500	0.326	0.296	0.391	0.371
v55	0.429	0.463	0.251	0.287	0.500	0.353
v56	0.230	0.285	0.252	0.344	0.247	0.441
v57	0.186	0.332	0.195	0.326	0.349	0.351
v58	0.216	0.231	0.252	0.294	0.337	0.523
v59	0.240	0.311	0.279	0.360	0.356	0.306
v60	0.234	0.301	0.257	0.210	0.313	0.337
v61	0.215	0.299	0.279	0.323	0.269	0.364

CORRELATION MATRIX TO BE ANALYZED

	v54	v55	v56	v57	v58	v59
v54	1.000					
v55	0.585	1.000				
v56	0.440	0.376	1.000			
v57	0.378	0.376	0.501	1.000		
v58	0.400	0.356	0.582	0.435	1.000	

v59	0.453	0.458	0.368	0.375	0.462	1.000
v60	0.380	0.324	0.426	0.306	0.478	0.413
v61	0.386	0.334	0.488	0.442	0.491	0.383

CORRELATION MATRIX TO BE ANALYZED

	v60	v61
v60	1.000	
v61	0.525	1.000

factor analysis with correlation matrix input for leadership ql
Number of Iterations =11

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

v48 = 0.521 *sleadu, Errorvar.= 0.729 , R^ = 0.271
(0.0722) (0.0794)
7.207 9.179

y49 = 0.636*sleadu, ErTorvar.= 0.596 , R^ = 0.404
(0.0695) (0.0693)
9.157 8.590

v50 = 0.417*sleadv, Erroryar.= 0.826 , R^' = 0.174
(0.0739) (0.0870)
5.640 9.505

v51 = 0.498*sleadv, Errorvar.= 0.752 , R^ = 0.248
(0.0723) (0.0809)
6.883 9.301

v52 = 0.616*sleadv, Errorvar.= 0.621 , R^ = 0.379
(0.0696) (0.0706)
8.846 8.790

v53 = 0.572*sleadv, Errorvar.= 0.673 , R^ = 0.327
(0.0707) (0.0746)
8.087 9.023

v54 = 0.742*sleadu, Errorvar.= 0.449 , R^ = 0.551
(0.0667) (0.0604)

11.126 7.437

v55 = 0.724*sleadv, Errorvar.= 0.476 , R^ = 0.524
(0.0669) (0.0611)
10.820 7.790

v56 = 0.737*sleadt, Errorvar.= 0.457 , R^ = 0.543
(0.0660) (0.0589)
11.159 7.757

v57 = 0.627*sleadt, Errorvar.= 0.606 , R^ = 0.394
(0.0693) (0.0696)
9.048 8.717

v58 = 0.740*sleadt, Errorvar.= 0.453 , R^ = 0.547
(0.0660) (0.0587)
11.213 7.724

v59 = 0.617*sleadu, Errorvar.= 0.620 , R^ = 0.380
(0.0700) (0.0711)
8.814 8.719

v60 = 0.632*sleadt, Errorvar.= 0.600 , R^' = 0.400
(0.0692) (0.0691)
9.135 8.688

v61 = 0.693*sleadt, Errorvar.= 0.519 , R^ = 0.481
(0.0674) (0.0631)
10.286 8.226

CORRELATION MATRIX OF INDEPENDENT VARIABLES

	sleadv	sleadt	sleadu
sleadv	1.000		
sleadt	0.797	1.000	
	(0.051)		
	15.654		
sleadu	0.967	0.757	1.000
	(0.042)	(0.054)	
	22.886	14.021	

GOODNESS-OF-FIT STATISTICS

CHI-SQUARE WITH 74 DEGREES OF FREEDOM = 182.833 (P = 0.00)
ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 108.833

MINIMUM FIT FUNCTION VALUE = 0.942
POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.561
ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0871
P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.000125

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 1.262
ECVI FOR SATURATED MODEL = 1.082
ECVI FOR INDEPENDENCE MODEL = 5.393

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 91 DEGREES OF FREEDOM =1018.310
INDEPENDENCE AIC = 1046.310
MODEL AIC = 244.833
SATURATED AIC = 210.000
INDEPENDENCE CAIC = 1106.132
MODEL CAIC = 377.296
SATURATED CAIC = 658.665

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0685
STANDARDIZED RMR = 0.0685
GOODNESS-OF-FIT INDEX (GFI) = 0.879
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.828
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.619

NORMED FIT INDEX (NFI) = 0.820
NON-NORMED FIT INDEX (NNFI) = 0.856
PARSIMONY NORMED FIT INDEX (PNFI) = 0.667
COMPARATIVE FIT INDEX (CFI) = 0.883
INCREMENTAL FIT INDEX (IFI) = 0.885
RELATIVE FIT INDEX (RFI) = 0.779

CRITICAL N(CN)= 112.629

CONFIDENCE LIMITS COULD NOT BE COMPUTED DUE TO TOO SMALL P-VALUE FOR CHI-SQUARE

factor analysis with correlation matrix input for leadership ql

FITTED COVARIANCE MATRIX

	v48	v49	v50	v51	v52	v53
v48	1.000					
v49	0.331	1.000				
v50	0.210	0.256	1.000			
v51	0.251	0.306	0.207	1.000		
v52	0.310	0.379	0.257	0.307	1.000	
v53	0.288	0.351	0.238	0.285	0.352	1.000
v54	0.386	0.472	0.299	0.357	0.442	0.410
v55	0.364	0.445	0.301	0.360	0.446	0.414
v56	0.290	0.355	0.245	0.292	0.362	0.336
v57	0.247	0.302	0.208	0.249	0.308	0.286
v58	0.291	0.356	0.245	0.293	0.363	0.337
v59	0.321	0.392	0.248	0.297	0.367	0.341
v60	0.249	0.304	0.210	0.251	0.310	0.288
v61	0.273	0.334	0.230	0.275	0.340	0.316

FITTED COVARIANCE MATRIX

	v54	v55	v56	v57	v58	v59
v54	1.000					
v55	0.519	1.000				
v56	0.414	0.425	1.000			
v57	0.352	0.362	0.462	1.000		
v58	0.415	0.426	0.545	0.464	1.000	
v59	0.458	0.431	0.344	0.293	0.345	1.000
v60	0.355	0.364	0.466	0.396	0.467	0.295
v61	0.389	0.400	0.511	0.435	0.513	0.323

FITTED COVARIANCE MATRIX

	v60	v61
v60	1.000	
v61	0.438	1.000

FITTED RESIDUALS

	v48	v49	v50	v51	v52	v53
v48	0.000					
v49	0.202	0.000				
v50	-0.108	-0.057	0.000			
v51	-0.096	-0.117	0.316	0.000		
v52	0.081	0.098	-0.127	0.005	0.000	
v53	-0.047	-0.084	0.008	0.095	0.007	0.000
v54	-0.044	0.028	0.027	-0.061	-0.051	-0.039
v55	0.065	0.018	-0.050	-0.073	0.054	-0.061
v56	-0.060	-0.070	0.007	0.052	-0.115	0.105
v57	-0.061	0.030	-0.013	0.077	0.041	0.065
v58	-0.075	-0.125	0.007	0.001	-0.026	0.186
v59	-0.081	-0.081	0.031	0.063	-0.011	-0.035
v60	-0.015	-0.003	0.047	-0.041	0.003	0.049
v61	-0.058	-0.035	0.049	0.048	-0.071	0.048

FITTED RESIDUALS

	v54	v55	v56	v57	v58	v59
v54	0.000					
v55	0.066	0.000				
v56	0.026	-0.049	0.000			
v57	0.026	0.014	0.039	0.000		
v58	-0.015	-0.070	0.037	-0.029	0.000	
v59	-0.005	0.027	0.024	0.082	0.117	0.000
v60	0.025	-0.040	-0.040	-0.090	0.011	0.118
v61	-0.003	-0.066	-0.023	0.007	-0.022	0.060

FITTED RESIDUALS

	v60	v61
1	0.000	
	0.087	0.(

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.127
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.316

STEMLEAF PLOT

-12|75
-10|758
-8|60411
-615310061110
-4|8710974100
- 2|9559632
0|553153300000000000000
0|13577778148
2|45667780179
4| 17889924
6|035567
8112758
10|578
12|
14|
161
18|6
20|2
22|
24|
261
28|
30|6

STANDARDIZED RESIDUALS

	v48	v49	v50	v51	v52	v53
v48	0.000					
v49	4.842	0.000				
y50	-2.002	-1.199	0.000			
v51	-1.883	-2.616	5.870	0.000		
v52	1.806	2.512	-2.674	0.124	0.000	
v53	-0.987	-2.035	0.158	2.036	0.172	0.000
v54	-1.351	1.056	0.682	-1.639	-1.578	-1.139
v55	1.725	0.562	-1.298	-2.040	1.824	-1.872
v56	-1.250	-1.608	0.149	1.090	-2.688	2.362
v57	-1.146	0.617	-0.239	1.462	0.854	1.303
v58	-1.566	-2.896	0.131	0.015	-0.609	4.188
v59	-1.886	-2.212	0.630	1.380	-0.274	-0.814
v60	-0.282	-0.064	0.859	-0.773	0.060	0.984
v61	-1.152	-0.757	0.936	0.965	-1.579	1.027

STANDARDIZED RESIDUALS

	v54	v55	v56	v57	v58	v59
v54	0.000					
v55	2.561	0.000				
v56	0.704	-1.331	0.000			
v57	0.593	0.334	1.301	0.000		
v58	-0.409	-1.926	1.630	-0.980	0.000	
v59	-0.162	0.803	0.548	1.657	2.655	0.000
v60	0.580	-0.948	-1.348	-2.434	0.360	2.387
v61	-0.080	-1.668	-0.884	0.214	-0.846	1.279

STANDARDIZED RESIDUALS

	v60	v61
v60	0.000	
v61	2.636	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -2.896
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 5.870

STEMLEAF PLOT
- 2|9776
2|42000
-119999766666
-1143332221100
- 019988886
- 0|4332211000000000000000
0|111122234
01566666778999
11000113334
11567788
2|044
2|5667
31
31
4|2
4|8
5|
5|9

LARGEST NEGATIVE STANDARDIZED RESIDUALS

RESIDUAL FOR	v51	AND	v49	-2.616
RESIDUAL FOR	v52	AND	v50	-2.674
RESIDUAL FOR	v56	AND	v52	-2.688
RESIDUAL FOR	v58	AND	v49	-2.896

LARGEST POSITIVE STANDARDIZED RESIDUALS

RESIDUAL FOR	v49	AND	v48	4.842
RESIDUAL FOR	v51	AND	v50	5.870
RESIDUAL FOR	v58	AND	v53	4.188
RESIDUAL FOR	v59	AND	v58	2.655
RESIDUAL FOR	v61	AND	v60	2.636

THE MODIFICATION INDICES SUGGEST TO ADD THE

PATH TO	FROM	DECREASE IN CHI-SQUARE	NEW ESTIMATE
v53	sleadt	15.6	0.60
v53	sleadu	11.4	-2.63
v55	sleadu	16.3	3.25
v59	sleadv	12.0	3.02
v59	sleadt	10.4	0.44

THE MODIFICATION INDICES SUGGEST TO ADD AN ERROR COVARIANCE

BETWEEN	AND	DECREASE IN CHI-SQUARE	NEW ESTIMATE
v49	v48	23.4	0.26
v51	v50	34.5	0.35
v58	v53	12.9	0.17

Second CFA for Systems Leadership Scale

The following lines were read from file Untitled:

factor analysis with correlation matrix input for leadership ql
observed variables: v48 v49 v50 v51 v52 v53 v54 v55 v56 v57 v58 v59 v60 v61
correlation matrix:

1.000													
0.533	1.000												
0.102	0.199	1.000											
0.155	0.189	0.523	1.000										
0.391	0.477	0.130	0.312	1.000									
0.241	0.267	0.246	0.380	0.359	1.000								
0.342	0.500	0.326	0.296	0.391	0.371	1.000							
0.429	0.463	0.251	0.287	0.500	0.353	0.585	1.000						
0.230	0.285	0.252	0.344	0.247	0.441	0.440	0.376	1.000					
0.186	0.332	0.195	0.326	0.349	0.351	0.378	0.376	0.501	1.000				
0.216	0.231	0.252	0.294	0.337	0.523	0.400	0.356	0.582	0.435	1.000			

0.240 0.311 0.279 0.360 0.356 0.306 0.453 0.458 0.368 0.375 0.462 1.000
0.234 0.301 0.257 0.210 0.313 0.337 0.380 0.324 0.426 0.306 0.478 0.413 1.000
0.215 0.299 0.279 0.323 0.269 0.364 0.386 0.334 0.488 0.442 0.491 0.383 0.525 1.000
sample size: 195
latent variables: sleadv sleadt sleadu
relationships:
v50 - v53 v55 = sleadv
v56 - v58 v60 v61 = sleadt
v48 v49 v59 v54 = sleadu
let the error covariance of v48 and v49 correlate
let the error covariance of v50 and v51 correlate
print residuals
number of decimals = 3
end of problem

Sample Size = 195

factor analysis with correlation matrix input for leadership ql

CORRELATION MATRIX TO BE ANALYZED

	v48	v49	v50	v51	v52	v53
v48	1.000					
v49	0.533	1.000				
v50	0.102	0.199	1.000			
v51	0.155	0.189	0.523	1.000		
v52	0.391	0.477	0.130	0.312	1.000	
v53	0.241	0.267	0.246	0.380	0.359	1.000
v54	0.342	0.500	0.326	0.296	0.391	0.371
v55	0.429	0.463	0.251	0.287	0.500	0.353
y56	0.230	0.285	0.252	0.344	0.247	0.441
v57	0.186	0.332	0.195	0.326	0.349	0.351
v58	0.216	0.231	0.252	0.294	0.337	0.523
v59	0.240	0.311	0.279	0.360	0.356	0.306
y60	0.234	0.301	0.257	0.210	0.313	0.337
v61	0.215	0.299	0.279	0.323	0.269	0.364

CORRELATION MATRIX TO BE ANALYZED

	v54	v55	v56	v57	v58	v59
y54	1.000					
v55	0.585	1.000				

v56	0.440	0.376	1.000			
v57	0.378	0.376	0.501	1.000		
v58	0.400	0.356	0.582	0.435	1.000	
v59	0.453	0.458	0.368	0.375	0.462	1.000
v60	0.380	0.324	0.426	0.306	0.478	0.413
v61	0.386	0.334	0.488	0.442	0.491	0.383

CORRELATION MATRIX TO BE ANALYZED

	v60	v61
v60	1.000	
v61	0.525	1.000

factor analysis with correlation matrix input for leadership ql
Number of Iterations = 12

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

v48 = 0.473*sleadu, Errorvar.= 0.776 , R' = 0.224
(0.0733) (0.0832)
6.453 9.326

v49 = 0.593*sleadu, Errorvar.= 0.649 , R^ = 0.351
(0.0705) (0.0732)
8.402 8.861

v50 = 0.385*sleadv, Errorvar.= 0.852 , R^ = 0.148
(0.0746) (0.0891)
5.164 9.555

v51 = 0.471*sleadv, Errorvar.= 0.778 , R^ = 0.222
(0.0730) (0.0831)
6.455 9.367

v52 = 0.612*sleadv, Errorvar.- 0.626 , R' = 0.374
(0.0699) (0.0712)
8.759 8.785

v53 = 0.564*sleadv, Errorvar.= 0.682 , R^ = 0.318
(0.0710) (0.0754)
7.949 9.039

v54 = 0.732*sleadu, Errorvar.= 0.465 R^ = 0 535
(0.0674) (0.0621)
10.862 7.483

v55 = 0.729*sleadv, Errorvar.= 0.468 R^ = 0 532
(0.0671) (0.0616)
10.866 7.598

v56 = 0.736*sleadt, Errorvar.= 0.458 , R' = 0 542
(0.0660) (0.0589)
11.149 7.774

v57 = 0.628*sleadt, Errorvar.= 0.606 , R^ = 0 394
(0.0693) (0.0695)
9.055 8.721

v58 = 0.740*sleadt, Errorvar.= 0.452 , R^ = 0.548
(0.0659) (0.0585)
11.236 7.721

v59 = 0.627*sleadu, Errorvar.= 0.607 , R^ = 0.393
(0.0696) (0.0701)
9.003 8.663

v60 = 0.633*sleadt, Errorvar.= 0.599 , R^ = 0.401
(0.0691) (0.0690)
9.155 8.687

v61 = 0.692*sleadt, Errorvar.= 0.521 , R^ = 0.479
(0.0674) (0.0632)
10.266 8.244

Error Covariance for v49 and v48 = 0.253
(0.0596)
4.236
Error Covariance for v51 and v50 = 0.342
(0.0665)
5.133

CORRELATION MATRIX OF INDEPENDENT VARIABLES

sleadv sleadt sleadu

sleadv	1.000		
sleadt	0.797	1.000	
	(0.052)		
	15.180		
sleadu	1.006	0.796	1.000
	(0.046)	(0.054)	
	21.925	14.846	

GOODNESS-OF-FIT STATISTICS

CHI-SQUARE WITH 72 DEGREES OF FREEDOM = 124.088 (P = 0.000134)
ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 52.088
90 PERCENT CONFIDENCE INTERVAL FOR NCP = (25.079 ; 86.964)

MINIMUM FIT FUNCTION VALUE = 0.640
POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.268
90 PERCENT CONFIDENCE INTERVAL FOR FO = (0.129 ; 0.448)
ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0611
90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0424 ; 0.0789)
P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.154

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.980
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.841 ; 1.160)
ECVI FOR SATURATED MODEL = 1.082
ECVI FOR INDEPENDENCE MODEL = 5.393

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 91 DEGREES OF FREEDOM-1018.310
INDEPENDENCE AIC = 1046.310
MODEL AIC =190.088
SATURATED AIC = 210.000
INDEPENDENCE CAIC = 1106.132
MODEL CAIC = 331.097
SATURATED CAIC = 658.665

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0555
STANDARDIZED RMR = 0.0555
GOODNESS-OF-FIT INDEX (GFI) = 0.915
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.876
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.627

NORMED FIT INDEX (NFI) = 0.878
NON-NORMED FIT INDEX (NNFI) = 0.929
PARSIMONY NORMED FIT INDEX (PNFI) = 0.695
COMPARATIVE FIT INDEX (CFI) = 0.944
INCREMENTAL FIT INDEX (IFI) = 0.945
RELATIVE FIT INDEX (RFI) = 0.846

CRITICAL N(CN)= 161.745

factor analysis with correlation matrix input for leadership ql

FITTED COVARIANCE MATRIX

	v48	v49	v50	v51	v52	v53
v48	1.000					
v49	0.533	1.000				
v50	0.183	0.230	1.000			
v51	0.224	0.281	0.523	1.000		
v52	0.291	0.365	0.236	0.288	1.000	
v53	0.268	0.336	0.217	0.266	0.345	1.000
v54	0.346	0.434	0.283	0.347	0.450	0.415
v55	0.347	0.435	0.281	0.344	0.446	0.412
v56	0.277	0.347	0.226	0.276	0.359	0.331
v57	0.236	0.296	0.193	0.235	0.306	0.282
v58	0.279	0.349	0.227	0.278	0.361	0.333
v59	0.297	0.372	0.243	0.297	0.386	0.356
v60	0.238	0.299	0.194	0.238	0.309	0.285
v61	0.261	0.327	0.212	0.260	0.337	0.311

FITTED COVARIANCE MATRIX

	v54	v55	v56	v57	v58	v59
v54	1.000					
v55	0.537	1.000				
v56	0.429	0.428	1.000			
v57	0.366	0.365	0.462	1.000		
v58	0.431	0.430	0.545	0.465	1.000	
v59	0.459	0.460	0.367	0.313	0.370	1.000
v60	0.369	0.368	0.466	0.397	0.469	0.316
v61	0.403	0.402	0.510	0.434	0.512	0.345

FITTED COVARIANCE MATRIX

	v60	v61
1	1.000	
	0.438	l(

FITTED RESIDUALS

	v48	v49	v50	v51	v52	v53
v48	0.000					
v49	0.000	0.000				
v50	-0.081	-0.031	0.000			
v51	-0.069	-0.092	0.000	0.000		
v52	0.100	0.112	-0.106	0.024	0.000	
v53	-0.027	-0.069	0.029	0.114	0.014	0.000
v54	-0.004	0.066	0.043	-0.051	-0.059	-0.044
v55	0.082	0.028	-0.030	-0.057	0.054	-0.059
v56	-0.047	-0.062	0.026	0.068	-0.112	0.110
v57	-0.050	0.036	0.002	0.091	0.043	0.069
v58	-0.063	-0.118	0.025	0.016	-0.024	0.190
v59	-0.057	-0.061	0.036	0.063	-0.030	-0.050
v60	-0.004	0.002	0.063	-0.028	0.004	0.052
v61	-0.046	-0.028	0.067	0.063	-0.068	0.053

FITTED RESIDUALS

	v54	v55	v56	v57	v58	v59
v54	0.000					
v55	0.048	0.000				
v56	0.011	-0.052	0.000			
v57	0.012	0.011	0.039	0.000		
v58	-0.031	-0.074	0.037	-0.030	0.000	
v59	-0.006	-0.002	0.001	0.062	0.092	0.000
v60	0.011	-0.044	-0.040	-0.091	0.009	0.097
v61	-0.017	-0.068	-0.022	0.008	-0.021	0.038

FITTED RESIDUALS

	v60	v61

v60	0.000	
v61	0.087	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.118
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.190

STEMLEAF PLOT
-10|826
-8|211
-649988321
-4|9977210076440
2|11000887421
- 0|764420000000000000000
0|122489111246
2|4568966789
4338234
6|23336789
8127127
10|0024
12|
14|
161
18|0

STANDARDIZED RESIDUALS

	v48	v49	v50	^51	v52	v5:)
v48	0.000					
v49	0.000	0.000				
v50	-1.460	-0.618	0.000			
v51	-1.318	-1.974	0.000	0.000		
v52	2.211	2.828	-2.186	0.523	0.000	
v53	-0.573	-1.638	0.560	2.368	0.334	0.000
v54	-0.120	2.321	1.099	-1.394	-1.951	-1.352
v55	2.260	0.898	-0.770	-1.576	1.887	-1.860
v56	-0.984	-1.436	0.514	1.402	-2.623	2.456
v57	-0.943	0.731	0.045	1.689	0.891	1.370
v58	-1.314	-2.739	0.491	0.336	-0.565	4.267
v59	-1.290	-1.591	0.767	1.420	-0.790	-1.234
v60	-0.084	0.047	1.128	-0.516	0.092	1.048
v61	-0.906	-0.600	1.257	1.251	-1.514	1.121

STANDARDIZED RESIDUALS

	v54	v55	v56	v57	v58	v59
v54	0.000					
v55	2.073	0.000				
v56	0.311	-1.431	0.000			
v57	0.296	0.269	1.306	0.000		
v58	-0.879	-2.068	1.622	-1.005	0.000	
v59	-0.216	-0.062	0.013	1.298	2.224	0.000
v60	0.270	-1.039	-1.354	-2.455	0.318	2.050
y61	-0.442	-1.749	-0.824	0.232	-0.831	0.847

STANDARDIZED RESIDUALS

	v60	v61
v60	0.000	
v61	2.635	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -2.739
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 4.267

STEMLEAF PLOT
- 2|765
-2|2100
-119766655
.11444443332000
- 01999888866665
- 0|42111000000000000000000
01123333333
01555678899
1101113333444
1|679
2|1122334
2|568
3|
3|
413
LARGEST NEGATIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v56 AND v52 -2.623

RESIDUAL FOR v58 AND v49 -2.739
LARGEST POSITIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v52 AND v49 2.828
RESIDUAL FOR v58 AND v53 4.267
RESIDUAL FOR v61 AND v60 2.635

THE MODIFICATION INDICES SUGGEST TO ADD THE

PATH TO	FROM	DECREASE IN CHI-SQUARE	NEW ESTIMATE
v53	sleadt	16.8	0.63
v55	sleadt	8.8	-0.47

THE MODIFICATION INDICES SUGGEST TO ADD AN ERROR COVARIANCE

BETWEEN	AND	DECREASE IN CHI-SQUARE	NEW ESTIMATE
v58	v53	12.9	0.17

Final CFA for Systems Leadership Scale

The following lines were read from file Untitled:

```
factor analysis for leadership ql
observed variables: v48 v49 v50 v51 v52 v54 v55 v56 v57 v58 v59 v60 v61
correlation matrix:
 1.000
0.533  1.000
0.102  0.199  1.000
0.155  0.189 0.523  1.000
0.391  0.477 0.130 0.312  1.000
0.342  0.500 0.326 0.296 0.391  1.000
0.429 0.463  0.251  0.287 0.500 0.585  1.000
0.230 0.285  0.252 0.344 0.247 0.440 0.376  1.000
0.186 0.332  0.195 0.326 0.349 0.378 0.376 0.501  1.000
0.216 0.231  0.252 0.294 0.337 0.400 0.356 0.582 0.435  1.000
0.240 0.311  0.279 0.360 0.356 0.453 0.458 0.368 0.375 0.462  1.000
0.234 0.301  0.257 0.210 0.313 0.380 0.324 0.426 0.306 0.478 0.413  1.000
0.215 0.299 0.279 0.323 0.269 0.386 0.334 0.488 0.442 0.491  0.383 0.525  1.000
sample size: 195
latent variables: sleadgm sleadt
relationships:
v48 v49 v50 v51 v52 v54 v55 v59 = sleadgm
v56 - v58 v60 v61 = sleadt
let the error covariance of v48 and v49 correlate
let the error covariance of v50 and v51 correlate
print residuals
number of decimals = 3
```

end of problem

Sample Size = 195

factor analysis for leadership ql

CORRELATION MATRIX TO BE ANALYZED

	v48	v49	v50	v51	^52	v54
v48	1.000					
v49	0.533	1.000				
v50	0.102	0.199	1.000			
v51	0.155	0.189	0.523	1.000		
v52	0.391	0.477	0.130	0.312	1.000	
v54	0.342	0.500	0.326	0.296	0.391	1.000
v55	0.429	0.463	0.251	0.287	0.500	0.585
v56	0.230	0.285	0.252	0.344	0.247	0.440
v57	0.186	0.332	0.195	0.326	0.349	0.378
v58	0.216	0.231	0.252	0.294	0.337	0.400
v59	0.240	0.311	0.279	0.360	0.356	0.453
v60	0.234	0.301	0.257	0.210	0.313	0.380
v61	0.215	0.299	0.279	0.323	0.269	0.386

CORRELATION MATRIX TO BE ANALYZED

	v55	v56	v57	v58	v59	v60
v55	1.000					
v56	0.376	1.000				
v57	0.376	0.501	1.000			
v58	0.356	0.582	0.435	1.000		
v59	0.458	0.368	0.375	0.462	1.000	
v60	0.324	0.426	0.306	0.478	0.413	1.000
v61	0.334	0.488	0.442	0.491	0.383	0.525

CORRELATION MATRIX TO BE ANALYZED

	v61
v61	1.000

factor analysis for leadership ql
Number of Iterations = 10

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

```
v48 = 0.483*sleadgm, Errorvar.= 0.766  , R^ = 0.234
    (0.0733)              (0.0826)
     6.593                9.277

v49 = 0.611 *sleadgm, Errorvar.= 0.627  , R^ = 0.373
    (0.0699)              (0.0713)
     8.740                8.783

v50 = 0.376*sleadgm, Errorvar.= 0.859  , R' = 0.141
    (0.0750)              (0.0898)
     5.014                9.555

v51 = 0.446*sleadgm, Errorvar.= 0.801  , R^ = 0.199
    (0.0737)              (0.0851)
     6.056                9.411

v52 = 0.613*sleadgm, Errorvar.= 0.624  , R^ = 0.376
    (0.0698)              (0.0710)
     8.788                8.790

v54 = 0.746*sleadgm, Errorvar.= 0.443  , R^ = 0.557
    (0.0658)              (0.0582)
     11.339               7.618

v55 = 0.750*sleadgm, Errorvar.= 0.437  , R' = 0.563
    (0.0657)              (0.0578)
     11.423               7.563

v56 - 0.737*sleadt, Errorvar.= 0.457  , R^ = 0.543
    (0.0663)              (0.0595)
     11.111               7.684

v57 = 0.628*sleadt, Errorvar.= 0.606  , R' = 0.394
    (0.0695)              (0.0699)
     9.025                8.673

v58 = 0.735*sleadt, Errorvar.= 0.460  , R' = 0.540
    (0.0663)              (0.0597)
     11.076               7.706
```

```
v59 - 0.629*sleadgm, Errorvar.= 0.604    R^ = 0 396
    (0.0693)              (0.0695)
     9.077                 8.695

v60 = 0.635*sleadt, Errorvar.= 0.597    R^ = 0 403
    (0.0693)              (0.0692)
     9.161                 8.625

v61 = 0.696*sleadt, Errorvar.= 0.516    R^ = 0 484
    (0.0675)              (0.0633)
     10.304                8.139

Error Covariance for v49 and v48 = 0.238
                         (0.0584)
                          4.072
Error Covariance for v51 and v50 = 0.355
                         (0.0678)
                          5.240

      CORRELATION MATRIX OF INDEPENDENT VARIABLES

          sleadgm     sleadt

 sleadgm      1.000

  sleadt      0.755       1.000
         (0.048)
          15.774


                GOODNESS-OF-FIT STATISTICS

      CHI-SQUARE WITH 62 DEGREES OF FREEDOM = 92.979 (P = 0.00662)
         ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 30.979
       90 PERCENT CONFIDENCE INTERVAL FOR NCP = (8.988 ; 60.936)

              MINIMUM FIT FUNCTION VALUE = 0.479
         POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.160
       90 PERCENT CONFIDENCE INTERVAL FOR FO = (0.0463 ; 0.314)
       ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0507
      90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0273 ; 0.0712)
        P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.456
```

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.778
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.665 ; 0.933)
ECVI FOR SATURATED MODEL = 0.938
ECVI FOR INDEPENDENCE MODEL = 4.913

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 78 DEGREES OF FREEDOM = 927.128
INDEPENDENCE AIC = 953.128
MODEL AIC = 150.979
SATURATED AIC = 182.000
INDEPENDENCE CAIC = 1008.677
MODEL CAIC = 274.896
SATURATED CAIC = 570.843

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0520
STANDARDIZED RMR = 0.0520
GOODNESS-OF-FIT INDEX (GFI) = 0.931
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.899
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.634

NORMED FIT INDEX (NFI) = 0.900
NON-NORMED FIT INDEX (NNFI) = 0.954
PARSIMONY NORMED FIT INDEX (PNFI) = 0.715
COMPARATIVE FIT INDEX (CFI) = 0.964
INCREMENTAL FIT INDEX (IFI) = 0.964
RELATIVE FIT INDEX (RFI) = 0.874

CRITICAL N (CN) = 190.460

factor analysis for leadership ql

FITTED COVARIANCE MATRIX

	v48	v49	v50	v51	v52	v54
v48	1.000					
v49	0.533	1.000				
v50	0.182	0.230	1.000			
v51	0.216	0.273	0.523	1.000		
v52	0.296	0.375	0.231	0.274	1.000	
v54	0.361	0.456	0.281	0.333	0.458	1.000
v55	0.363	0.458	0.282	0.335	0.460	0.560

v56	0.269	0.340	0.209	0.248	0.341	0.415
v57	0.229	0.290	0.178	0.212	0.291	0.354
v58	0.268	0.339	0.209	0.248	0.340	0.414
v59	0.304	0.385	0.237	0.281	0.386	0.470
v60	0.232	0.293	0.180	0.214	0.294	0.358
v61	0.254	0.321	0.198	0.235	0.322	0.392

FITTED COVARIANCE MATRIX

	v55	v56	v57	v58	v59	v60
v55	1.000					
v56	0.417	1.000				
v57	0.356	0.462	1.000			
v58	0.416	0.541	0.461	1.000		
v59	0.472	0.350	0.298	0.349	1.000	
v60	0.360	0.468	0.399	0.467	0.302	1.000
v61	0.394	0.513	0.437	0.511	0.331	0.442

FITTED COVARIANCE MATRIX

	v61
v61	1.000

FITTED RESIDUALS

	v48	v49	v50	v51	v52	v54
v48	0.000					
v49	0.000	0.000				
v50	-0.080	-0.031	0.000			
v51	-0.061	-0.084	0.000	0.000		
v52	0.095	0.102	-0.101	0.038	0.000	
v54	-0.019	0.044	0.045	-0.037	-0.067	0.000
v55	0.066	0.005	-0.031	-0.048	0.040	0.025
v56	-0.039	-0.055	0.043	0.096	-0.094	0.025
v57	-0.043	0.042	0.017	0.114	0.058	0.024
v58	-0.052	-0.108	0.043	0.046	-0.003	-0.014
v59	-0.064	-0.074	0.042	0.079	-0.030	-0.017
v60	0.002	0.008	0.077	-0.004	0.019	0.022
v61	-0.039	-0.022	0.081	0.088	-0.053	-0.006

FITTED RESIDUALS

	v55	v56	v57	v58	v59	v60
v55	0.000					
v56	-0.041	0.000				
v57	0.020	0.039	0.000			
v58	-0.060	0.041	-0.026	0.000		
v59	-0.014	0.018	0.077	0.113	0.000	
v60	-0.036	-0.042	-0.093	0.011	0.111	0.000
v61	-0.060	-0.025	0.005	-0.020	0.052	0.083

FITTED RESIDUALS

	v61
v61	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.108
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.114

STEMLEAF PLOT
-10|81
- 8|4340
-61474100
-415328321
-2199761106520
- 0197446430000000000000000
0|25581789
210245589
4|01223345628
6|6779
8|13856
1012134

STANDARDIZED RESIDUALS

	v48	v49	v50	v51	v52	v54
v48	0.000					
v49	0.000	0.000				
v50	-1.437	-0.634	0			

v51	-1.143	-1.799	0.000	0.000		
v52	2.108	2.617	-2.072	0.826	0.000	
v54	-0.542	1.486	1.199	-1.028	-2.246	0.000
v55	1.947	0.155	-0.835	-1.343	1.368	1.194
v56	-0.780	-1.216	0.806	1.868	-2.082	0.649
v57	-0.788	0.838	0.289	2.046	1.158	0.551
v58	-1.046	-2.386	0.814	0.901	-0.075	-0.372
v59	-1.464	-1.928	0.890	1.744	-0.783	-0.574
v60	0.038	0.155	1.336	-0.074	0.376	0.504
v61	-0.755	-0.471	1.481	1.664	-1.129	-0.156

STANDARDIZED RESIDUALS

	v55	v56	v57	v58	v59	v60
v55	0.000					
v56	-1.092	0.000				
v57	0.464	1.317	0.000			
v58	-1.590	1.801	-0.886	0.000		
v59	-0.495	0.401	1.542	2.526	0.000	
v60	-0.827	-1.442	-2.522	0.386	2.249	0.000
v61	-1.500	-0.974	0.159	-0.804	1.119	2.575

STANDARDIZED RESIDUALS

	v61
v61	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -2.522
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 2.617

STEMLEAF PLOT
2154211
1|986554432111000
- 0|988888886655542110000000000000000
0|22234445566888899
1|122233455577899
2|012566
LARGEST POSITIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v52 AND v49 2.617

Initial CFA for Perceived Performance Scale

The following lines were read from file Untitled:

```
Factor analysis for conflict scale without item 67 ql
observed variables: v90-v95
correlation matrix:
 1.000
0.592  1.000
0.464 0.406  1.000
0.615 0.545 0.404  1.000
-0.120-0.116 -0.172 0.034  1.000
0.431  0.375 0.408 0.440 -0.049  1.000
sample size: 195
Latent variables: perf
relationships:
v90 - v95 = perf
print residuals
number of decimals = 3
end of problem
```

Sample Size = 195

Factor analysis for conflict scale without item 67 ql

CORRELATION MATRIX TO BE ANALYZED

	v90	v91	v92	v93	v94	v95
v90	1.000					
v91	0.592	1.000				
v92	0.464	0.406	1.000			
v93	0.615	0.545	0.404	1.000		
v94	-0.120	-0.116	-0.172	0.034	1.000	
v95	0.431	0.375	0.408	0.440	-0.049	1.000

Factor analysis for conflict scale without item 67 ql
Number of Iterations = 4

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

v90 = 0.812*perf, Errorvar.= 0.341 , R^ = 0.659

```
    (0.0648)            (0.0563)
     12.524              6.046

v91  = 0.719*perf, Errorvar.= 0.483  , R^ = 0 517
    (0.0674)            (0.0623)
     10.678              7.743

v92 = 0.579*perf, Errorvar.= 0.665  , R^ = 0 335
    (0.0712)            (0.0748)
     8.128              8.887

v93 = 0.750*perf, Errorvar.= 0.438  , R^ = 0.562
    (0.0665)            (0.0600)
     11.266              7.306

v94 =  - 0.112*perf, Errorvar.= 0.987 , R^ = 0.0126
      (0.0781)            (0.100)
      -1.440              9.825

v95 = 0.562*perf, Errorvar.= 0.685  , R^ = 0.315
    (0.0716)            (0.0763)
     7.843              8.970


  CORRELATION MATRIX OF INDEPENDENT VARIABLES

        perf

       1.000


                GOODNESS-OF-FIT STATISTICS

    CHI-SQUARE WITH 9 DEGREES OF FREEDOM = 15.775 (P = 0.0717)
       ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 6.775
    90 PERCENT CONFIDENCE INTERVAL FOR NCP = (0.0 ; 21.922)

           MINIMUM FIT FUNCTION VALUE = 0.0813
      POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.0349
     90 PERCENT CONFIDENCE INTERVAL FOR FO = (0.0 ; 0.113)
    ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.0623
    90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0 ; 0.112)
      P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.301
```

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.205
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.170 ; 0.283)
ECVI FOR SATURATED MODEL = 0.216
ECVI FOR INDEPENDENCE MODEL = 1.738

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 15 DEGREES OF FREEDOM = 325.207
INDEPENDENCE AIC = 337.207
MODEL AIC = 39.775
SATURATED AIC = 42.000
INDEPENDENCE CAIC = 362.845
MODEL CAIC = 91.051
SATURATED CAIC = 131.733

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0423
STANDARDIZED RMR = 0.0423
GOODNESS-OF-FIT INDEX (GFI) = 0.974
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.939
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.417

NORMED FIT INDEX (NFI) = 0.951
NON-NORMED FIT INDEX (NNFI) = 0.964
PARSIMONY NORMED FIT INDEX (PNFI) = 0.571
COMPARATIVE FIT INDEX (CFI) = 0.978
INCREMENTAL FIT INDEX (IFI) = 0.979
RELATIVE FIT INDEX (RFI) = 0.919

CRITICAL N (CN) = 267.456

Factor analysis for conflict scale without item 67 ql

FITTED COVARIANCE MATRIX

	v90	v91	v92	v93	v94	v95
v90	1.000					
v91	0.584	1.000				
v92	0.470	0.416	1.000			
v93	0.609	0.539	0.434	1.000		
v94	-0.091	-0.081	-0.065	-0.084	1.000	
v95	0.456	0.404	0.325	0.421	-0.063	1.000

FITTED RESIDUALS

	v90	v91	v92	v93	v94	v95
v90	0.000					
v91	0.008	0.000				
v92	-0.006	-0.010	0.000			
v93	0.006	0.006	-0.030	0.000		
v94	-0.029	-0.035	-0.107	0.118	0.000	
v95	-0.025	-0.029	0.083	0.019	0.014	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.107
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.118

STEMLEAF PLOT
-Ij1
-0|
-014333311000000
0|11112
0|8
1|2

STANDARDIZED RESIDUALS

	v90	v91	v92	v93	v94	v95
v90	0.000					
v91	0.527	0.000				
v92	-0.261	-0.316	0.000			
v93	0.486	0.285	-1.006	0.000		
v94	-0.871	-0.797	-1.936	2.887	0.000	
v95	-1.071	-0.872	1.927	0.626	0.251	0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -1.936
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 2.887

STEMLEAF PLOT
-1|910
- 0|99833000000
0133556

1|9
2|9
LARGEST POSITIVE STANDARDIZED RESIDUALS
RESIDUAL FOR v94 AND v93 2.887

THE MODIFICATION INDICES SUGGEST TO ADD AN ERROR COVARIANCE
BETWEEN AND DECREASE IN CHI-SQUARE NEW ESTIMATE
v94 v93 8.3 0.16

CFA for Modified Perceived Performance Scale

The following lines were read from file Untitled:

Factor analysis for conflict scale without item 67 ql
observed variables: v90-v93 v95
correlation matrix:
1.000
0.592 1.000
0.464 0.406 1.000
0.615 0.545 0.404 1.000
0.431 0.375 0.408 0.440 1.000
sample size: 195
Latent variables: perf
relationships:
v90 v91 v92 v93 v95 = perf
print residuals
number of decimals = 3
end of problem

Sample Size = 195

Factor analysis for conflict scale without item 67 ql

CORRELATION MATRIX TO BE ANALYZED

	v90	v91	v92	v93	v95
v90	1.000				
v91	0.592	1.000			
y92	0.464	0.406	1.000		
v93	0.615	0.545	0.404	1.000	
v95	0.431	0.375	0.408	0.440	1.000

Factor analysis for conflict scale without item 67 ql
Number of Iterations = 4

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

```
v90 = 0.810*perf, Errorvar.= 0.344  . R^ = 0.656
    (0.0649)            (0.0565)
     12.475              6.088

v91  = 0.718*perf, Errorvar.= 0.484  , R^ = 0.516
    (0.0674)            (0.0625)
     10.651              7.754

v92 = 0.576*perf, Errorvar.= 0.669  , R^ = 0.331
    (0.0713)            (0.0751)
     8.074              8.900

v93 = 0.755*perf, Errorvar.= 0.430  , R^ = 0.570
    (0.0664)            (0.0597)
     11.364              7.214

v95 = 0.562*perf, Errorvar.= 0.684  , R^ = 0.316
    (0.0716)            (0.0763)
     7.851              8.965
```

CORRELATION MATRIX OF INDEPENDENT VARIABLES

perf
1.000

GOODNESS-OF-FIT STATISTICS

CHI-SQUARE WITH 5 DEGREES OF FREEDOM = 5.047 (P = 0.410)
ESTIMATED NON-CENTRALITY PARAMETER (NCP) = 0.0469
90 PERCENT CONFIDENCE INTERVAL FOR NCP = (0.0 ; 9.734)

MINIMUM FIT FUNCTION VALUE = 0.0260
POPULATION DISCREPANCY FUNCTION VALUE (FO) = 0.000242

90 PERCENT CONFIDENCE INTERVAL FOR FO = (0.0 ; 0.0502)
ROOT MEAN SQUARE ERROR OF APPROXIMATION (RMSEA) = 0.00695
90 PERCENT CONFIDENCE INTERVAL FOR RMSEA = (0.0 ; 0.100)
P-VALUE FOR TEST OF CLOSE FIT (RMSEA < 0.05) = 0.656

EXPECTED CROSS-VALIDATION INDEX (ECVI) = 0.129
90 PERCENT CONFIDENCE INTERVAL FOR ECVI = (0.129 ; 0.179)
ECVI FOR SATURATED MODEL = 0.155
ECVI FOR INDEPENDENCE MODEL = 1.662

CHI-SQUARE FOR INDEPENDENCE MODEL WITH 10 DEGREES OF FREEDOM = 312.434
INDEPENDENCE AIC = 322.434
MODEL AIC = 25.047
SATURATED AIC = 30.000
INDEPENDENCE CAIC = 343.799
MODEL CAIC = 67.777
SATURATED CAIC = 94.095

ROOT MEAN SQUARE RESIDUAL (RMR) = 0.0257
STANDARDIZED RMR = 0.0257
GOODNESS-OF-FIT INDEX (GFI) = 0.990
ADJUSTED GOODNESS-OF-FIT INDEX (AGFI) = 0.970
PARSIMONY GOODNESS-OF-FIT INDEX (PGFI) = 0.330

NORMED FIT INDEX (NFI) - 0.984
NON-NORMED FIT INDEX (NNFI) = 1.00
PARSIMONY NORMED FIT INDEX (PNFI) = 0.492
COMPARATIVE FIT INDEX (CFI) = 1.00
INCREMENTAL FIT INDEX (IFI) = 1.00
RELATIVE FIT INDEX (RFI) = 0.968

CRITICAL N (CN) = 581.003

Factor analysis for conflict scale without item 67 ql

FITTED COVARIANCE MATRIX

	v90	v91	v92	v93	v95
v90	1.000				
v91	0.582	1.000			
v92	0.466	0.413	1.000		

v93	0.611	0.542	0.434	1.000	
v95	0.455	0.404	0.324	0.424	1.000

FITTED RESIDUALS

	v90	v91	v92	v93	v95
v90	0.000				
v91	0.010	0.000			
v92	-0.002	-0.007	0.000		
v93	0.004	0.003	-0.030	0.000	
v95	-0.024	-0.029	0.084	0.016	0.000

SUMMARY STATISTICS FOR FITTED RESIDUALS
SMALLEST FITTED RESIDUAL = -0.030
MEDIAN FITTED RESIDUAL = 0.000
LARGEST FITTED RESIDUAL = 0.084

STEMLEAF PLOT
-0|3321 00000000
0|12
0|8

STANDARDIZED RESIDUALS

	v90	v91	v92	v93	v95
v90	0.000				
v91	0.690	0.000			
v92	-0.096	-0.224	0.000		
y93	0.292	0.153	-1.043	0.000	
v95	-1.033	-0.862	1.953	0.525	>0.000

SUMMARY STATISTICS FOR STANDARDIZED RESIDUALS
SMALLEST STANDARDIZED RESIDUAL = -1.043
MEDIAN STANDARDIZED RESIDUAL = 0.000
LARGEST STANDARDIZED RESIDUAL = 1.953

STEMLEAF PLOT
-1|00
-0|92100000
0|2357
1|
2|0

APPENDIX C

ANALYSIS OF VARIANCE TO EXAMINE

INSTRUCTOR EFFECT ON GRADES

ANOVA to Predict GRADE - Timel

The GLM Procedure

Class Level Information

Class	Levels	Values
inst	5	12 3 4 5

Number of observations 76

The GLM Procedure

Dependent Variable: grd

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	135.343636	33.835909	2.25	0.0724
Error	71	1068.543127	15.049903		
Corrected Total	75	1203.886763			

R-Square	CoeffVar	Root MSE	grd Mean
0.112422	4.304866	3.879420	90.11711

Source	DF	Type I SS	Mean Square	F Value	Pr > F
inst	4	135.3436359	33.8359090	2.25	0.0724

Source	DF	Type III SS	Mean Square	F Value	Pr > F
inst	4	135.3436359	33.8359090	2.25	0.0724

Level of inst	N	grd Mean	grd Std Dev
1	13	91.0246154	4.29109663
2	14	90.6342857	1.61232615
3	26	88.5053846	2.43138682
4	7	92.8557143	4.29840225
5	16	90.3481250	6.08351677

ANOVA to Predict GRADE - Time2

The GLM Procedure

Class Level Information

Class	Levels	Values
inst	5	12 3 4 5

Number of observations 76

Dependent Variable: grd

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	583.049806	145.762452	13.72	<.0001
Error	71	754.055704	10.620503		
Corrected Total	75	1337.105511			

R-Square	CoeffVar	Root MSE	grd Mean

0.436054 3.540887 3.258911 92.03658

Source	DF	Type 1 SS	Mean Square	F Value	Pr>F
inst	4	583.0498061	145.7624515	13.72	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
inst	4	583.0498061	145.7624515	13.72	<.0001

Tukey's Studentized Range (HSD) Test for grd

NOTE: This test controls the Type I experimentwise error rate.

Alpha 0.05
Error Degrees of Freedom 71
Error Mean Square 10.6205
Critical Value of Stiidentized Range 3.95855

Comparisons significant at the 0.05 level are indicated by

inst Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
2 -4	3.2357	-0.9870	7.4584	
2 5	4.3282	0.9899	7.6666	***
2 - 1	6.2388	2.7253	9.7523	***
2 -3	7.6665	4.6425	10.6904	***
4 2	-3.2357	-7.4584	0.9870	
4 -5	1.0925	-3.0413	5.2263	
4 1	3.0031	-1.2734	7.2796	
4 -3	4.4308	0.5465	8.3151	***
5 -2	-4.3282	-7.6666	-0.9899	***
5 -4	-1.0925	-5.2263	3.0413	
5 -1	1.9106	-1.4956	5.3167	
5 -3	3.3383	0.4398	6.2368	***
1 -2	-6.2388	-9.7523	-2.7253	***

1	-4	-3.0031	-7.2796	1.2734	
1	-5	-1.9106	-5.3167	1.4956	
1	-3	1.4277	-1.6709	4.5263	
3	2	-7.6665	-10.6904	-4.6425	**+
3	-4	-4.4308	-8.3151	-0.5465	***
3	-5	-3.3383	-6.2368	-0.4398	***
3	-1	-1.4277	-4.5263	1.6709	

Level of inst	N	grd Mean	grd Std Dev
1	13	90.6969231	3.20750262
2	14	96.9357143	1.86188785
3	26	89.2692308	3.09267124
4	7	93.7000000	4.97954148
5	16	92.6075000	3.62989715

ANOVA to Predict GRADE - Time3

The GLM Procedure

Class Level Information

Class	Levels	Values
inst	5	12 3 4 5

Number of observations 76

Dependent Variable: grd

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	584.126042	146.031510	7.30	<.0001
Error	71	1419.396162	19.991495		
Corrected Total	75	2003.522204			

R-Square	CoeffVar	Root MSE	grd Mean

0.291550	4.872003	4.471185	91.77303

Source	DF	Type I SS	Mean Square	F Value	Pr > F
inst	4	584.1260415	146.0315104	7.30	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
inst	4	584.1260415	146.0315104	7.30	<.0001

Tukey's Studentized Range (HSD) Test for grd

NOTE: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	71
Error Mean Square	19.9915
Critical Value of Stiidentized Range	3.95855

Comparisons significant at the 0.05 level are indicated by ***.

inst Comparison		Difference BetweenI Means	Simultaneous 95% Confidence Limits		
2	-1	1.456	-3.364	6.277	
2	4	5.000	-0.793	10.793	
2	3	6.033	1.884	10.182	***
2	5	7.243	2.663	11.823	***
1	-2	-1.456	-6.277	3.364	
1	-4	3.544	-2.323	9.411	
1	3	4.577	0.326	8.828	***
1	-5	5.787	1.114	10.460	***
4	2	-5.000	-10.793	0.793	
4	-1	-3.544	-9.411	2.323	
4	3	1.033	-4.296	6.362	
4	-5	2.243	-3.428	7.915	

3	2	-6.033	-10.182	-1.884	***
3	•• 1	-4.577	-8.828	-0.326	***
3	••4	-1.033	-6.362	4.296	
3	5	1.210	-2.766	5.187	
5	2	-7.243	-11.823	-2.663	***
5	•-1	-5.787	-10.460	-1 114	***
5	•-4	-2.243	-7.915	3.428	
5	-3	-1.210	-5.187	2.766	

Level of inst	N	——grd- Mean	Std Dev
1	13	94.6153846	2.46774058
2	14	96.0714286	3.49646603
3	26	90.0384615	5.17285816
4	7	91.0714286	6.43187746
5	16	88.8281250	4.24432832

APPENDIX D

SEEMINGLY UNRELATED REGRESSION (SUR) ANALYSES

Effect of Social Category Diversity on Relationship Conflict Moderated by Solidarity and Maintenance Behaviors

The Mixed Procedure

Model Information

Data Set	W0RK.DISSERT2
Dependent variable	relc
Covariance Structure	Compound Symmetry
Subject Effect	idno
Estimation Method	REML
Residual variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level information

Class	Levels	values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	9
Columns in Z	0
Subjects	76
Max Obs Per Subject	3
Observations Used	228
Observations Not Used	0
Total Observations	228

The Mixed Procedure

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
		440.70546717	
		433.13366349	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Farm	Subject	Estimate
CS	idno	0.07269
Residual		0.2992

Fit Statistics

Res Log Likelihood	-216.6
Akaike s information Criterion	-218.6
Schwarz's Bayesian Criterion	-220.9
-2 Res Log Likelihood	433.1

Null Model Likelihood Ratio Test

DF	Chi-square	Pr > chiSq
1	7.57	0.0059

Solution for Fixed Effects

Effect	time	Estimate	Error	DF	t value	Pr > |t|	
time	1	1.7585	0.2813	143	6.25	<.0001	
time	2	1.6322	0.2805	143	5.82	<.0001	
time	3	1.5965	0.2810	143	5.68	<.0001	
visd*time	1	0.6689	0.3004	143	2.23	0.0275	(0.0138)
visd*time	2	1.5447	0.2449	143	6.31	<.0001	(<.0001)
visd*time	3	1.1411	0.2372	143	4.81	<.0001	(<.0001)
intl*time	1	-0.2052	0.07372	143	-2.78	0.0061	(0.0031)
intl*time	2	-0.3924	0.06130	143	-6.40	<.0001	(<.0001)
intl*time	3	-0.3122	0.07169	143	-4.35	<.0001	(<.0001)

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F value	Pr > F
time	3	143	28.43	<.0001
visd*time	3	143	20.36	<.0001
intl*time	3	143	20.18	<.0001

Contrasts

Label	Num DF	Den DF	F value	Pr > F	
visd 1 vs 3	2	143	2.69	0.0717	(0.0359)
visd 1 vs 2	1	143	5.31	0.0227	(0.0114)
visd 2 vs 3	1	143	1.55	0.2157	(0.1079)
intl 1 vs 3	2	143	2.00	0.1394	(0.0697)
intl 1 vs 2	1	143	3.99	0.0478	(0.0239)
intl 2 vs 3	1	143	0.80	0.3722	(0.1861)

Effect of Value Diversity Moderated by Solidarity/ Maintenance Behaviors on Relationship Conflict

The Mixed Procedure

Model information

Data Set	W0RK.DISSERT2

Dependent variable	relc
Covariance Structure	Compound Symmetry
Subject Effect	idno
Estimation Method	REML
Residual variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level Information

Class	Levels	values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	9
Columns in Z	0
Subjects	76
Max Obs Per Subject	3
Observations Used	228
Observations Not Used	0
Total Observations	228

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0		400.65513950	
1		397.70315446	0.00000010
2		397.70315421	0.00000000

Convergence criteria met.

Covariance parameter Estimates

Cov Farm	Subject	Estimate
CS	idno	0.03721
Residual		0.2735

Fit Statistics

Res Log Likelihood	-198.9
Akaike s information criterion	-200.9
Schwarz's Bayesian criterion	-203.2
-2 Res Log Likelihood	397.7

Null Model Likelihood Ratio Test

DF	Chi-square	Pr > ChiSq
1	2.95	0.0858

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|	
time	1	1.2521	0.3490	143	3.59	0.0005	
time	2	0.7467	0.3536	143	2.11	0.0364	
time	3	1.1309	0.3032	143	3.73	0.0003	
undd*time	1	0.8425	0.2198	143	3.83	0.0002	(0.0001)
undd*time	2	1.4483	0.1980	143	7.31	<.0001	(<.0001)
undd*time	3	1.2553	0.1969	143	6.37	<.0001	(<.0001)
int2*time	1	-0.1977	0.05929	143	3.33	0.0011	(0.0006)
int2*time	2	-0.2779	0.06841	143	4.06	<.0001	(<.0001)
int2*time	3	-0.2897	0.07292	143	3.97	0.0001	(<.0001)

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F value	Pr > F
time	3	143	9.77	<.0001
undd*time	3	143	33.52	<.0001
int2*time	3	143	13.41	<.0001

Contrasts

Label	Num DF	Den DF	F value	Pr > F	
undd 1 vs 3	2	143	2.20	0.1146	(0.0573)
undd 1 vs 2	1	143	4.31	0.0396	(0.0198)
undd 2 vs 3	1	143	0.51	0.4764	(0.2382)
int2 1 vs 3	2	143	0.64	0.5308	(0.2654)
int2 1 vs 2	1	143	0.81	0.3683	(0.1842)
int2 2 vs 3	1	143	0.01	0.9041	(0.4521)

Effect of Informational Diversity Moderated by Task-Oriented Behaviors on Task Conflict

The Mixed Procedure

Model Information

Data Set	W0RK.DISSERT2
Dependent variable	taskc
Covariance Structure	Compound Symmetry
subject Effect	idno
Estimation Method	REML
Residual variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level Information

Class	Levels	Values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	g
Columns in z	o
Subjects	76
Max obs Per Subject	3
Observations Used	228
Observations Not Used	0
Total Observations	228

The Mixed Procedure

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0		349.72513602	
1		338.03240993	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
CS	idno	0.05975
Residual		0.1850

Fit Statistics

Res Log Likelihood	-169.0
Akaike s information Criterion	-171.0
Schwarz's Bayesian Criterion	-173.3
-2 Res Log Likelihood	338.0

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
1	11.69	0.0006

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t value	Pr > |t|
time	1	1.4795	0.3461	143	4.27	<.0001
time	2	1.6491	0.3223	143	5.12	<.0001
time	3	2.2965	0.2889	143	7.95	<.0001
taskd*time	1	0.8561	0.1741	143	4.92	<.0001
taskd*time	2	0.9396	0.1478	143	6.36	<.0001
taskd*time	3	1.1783	0.1978	143	5.96	<.0001
int3*time	1	-0.1689	0.03979	143	-4.25	<.0001
int3*time	2	-0.1902	0.04103	143	-4.64	<.0001
int3*time	3	-0.3050	0.05562	143	-5.48	<.0001

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F value	Pr > F
time	3	143	30.37	<.0001
taskd*time	3	143	29.04	<.0001
int3*time	3	143	20.80	<.0001

Contrasts

Label	Num DF	Den DF	F value	Pr > F
taskd 1 vs 3	2	143	0.85	0.4291 (0.2146)
taskd 1 vs 2	1	143	0.14	0.7076 (0.3538)
taskd 2 vs 3	1	143	1.04	0.3096 (0.1548)
int3 1 vs 3	2	143	2.20	0.1151 (0.0576)
int3 1 vs 2	1	143	0.15	0.7029 (0.3515)
int3 2 vs 3	1	143	3.01	0.0849 (0.0425)

Effects of Relationship Conflict, Task Conflict.and the Interaction between Relationship and Task Conflicts on Grade

The Mixed Procedure

Model information

Data Set	W0RK.DISSERT2
Dependent variable	grd
Covariance Structure	Compound Symmetry
subject Effect	idno
Estimation Method	REML
Residual variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level information

Class	Levels	values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	12
Columns in Z	0
subjects	76
Max Obs Per Subject	3
Observations Used	228
Observations Not Used	0
Total observations	228

The Mixed Procedure

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0		1301.40964084	
1		1278.37436351	0.00000019
2		1278.37428110	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
CS	idno	7.1688
Residual		13.0117

Fit Statistics

Res Log Likelihood	-539 2
Akaike s Information Criterion	-641 2
Schwarz's Bayesian Criterion	-643 5
-2 Res Log Likelihood	1278 4

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > chiSq
1	23.04	<.0001

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|
time	1	90.5275	5.3097	140	17.05	<.0001
time	2	96.2726	3.7569	140	25.63	<.0001
time	3	89.7332	4.8030	140	18.68	<.0001
relc*time	1	-0.3183	3.6016	140	-0.09	0.9297 (0.4649)
relc*time	2	-3.1838	2.2175	140	-1.44	0.1533 (0.0767)
relc*time	3	3.1789	2.5423	140	1.25	0.2132 (0.1066)
taskc*time	1	0.5467	2.4545	140	0.22	0.8241 (0.4121)
taskc*time	2	-1.0429	1.6097	140	-0.65	0.5181 (0.2591)
taskc*time	3	0.7539	2.1728	140	0.35	0.7291 (0.3646)

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|
int4*time	1	-0.2961	1.4292	140	-0.21	0.8362 (0.4181)
int4*time	2	0.8778	0.7115	140	1.23	0.2194 (0.1097)
int4*time	3	-1.2663	0.9734	140	-1.30	0.1954 (0.0977)

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
time		140	399.40	<.0001
relc*time		140	1.21	0.3070
taskc*time		140	0.20	0.8956
int4*time		140	1.05	0.3716

Effects of Relationship Conflict, Task Conflict, and the Interaction betw^een Relationship and Task Conflicts on Perceived Performance

The Mixed Procedure

Model Information

Data Set	W0RK.DISSERT2
Dependent Variable	perf
Covariance Structure	Compound Symmetry
Subject Effect	idno
Estimation Method	REML
Residual variance Method	Profile

Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level information

Class	Levels	values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	12
Columns in Z	0
Subjects	76
Max Obs Per Subject	3
Observations Used	228
Observations Not used	0
Total Observations	228

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	343.19181321	
1	2	326.62722264	0.00055038
2	1	326.60727532	0.00000122
3	1	326.60723220	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
CS	idno	0.07891
Residual		0.1630

Fit Statistics

Res Log Likelihood	-163.3
Akaike s information Criterion	-165.3
Schwarz's Bayesian Criterion	-167.6
-2 Res Log Likelihood	326.6

Null Model Likelihood Ratio Test

DF	chi-square	Pr > ChiSq
1	16.58	<.0001

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t value	Pr > |t|

time	1	4.3575	0.5901	140	7.38	<.0001	
time	2	5.0835	0.4175	140	12.18	<.0001	
time	3	5.5989	0.5335	140	10.49	<.0001	
relc*time	1	0.1382	0.4003	140	0.35	0.7304	(0.3652)
relc*time	2	-0.5149	0.2466	140	-2.09	0.0386	(0.0193)
relc*time	3	-0.5969	0.2825	140	-2.11	0.0363	(0.0182)
taskc*time	1	-0.3611	0.2728	140	-1.32	0.1877	(0.0939)
taskc*time	2	-0.2418	0.1790	140	-1.35	0.1787	(0.0894)

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|	
taskc*time	3	-0.6054	0.2414	140	-2.51	0.0133	(0.0067)
int4*time	1	-0.00730	0.1588	140	-0.05	0.9634	(0.4817)
int4*time	2	0.03563	0.07913	140	0.45	0.6532	(0.3266)
int4*time	3	0.1706	0.1081	140	1.58	0.1169	(0.0585)

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F value	Pr > F
time		140	96.71	<.0001
relc*time		140	3.06	0.0302
taskc*time		140	3.04	0.0310
int4*time		140	0.92	0.4319

Effects of Relationship Conflict, Task Conflict, and the Interaction between Relationship and Task Conflicts on Satisfaction

The Mixed Procedure

Model Information

Data Set	W0RK.DISSERT2
Dependent variable	kun
Covariance Structure	Compound Symmetry
Subject Effect	idno
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level information

Class	Levels	values
idno	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters 2

Columns in X	12
Columns in z	*n*
Subjects	76
Max obs Per Subject	3
Observations used	227
observations Not used	1
Total observations	228

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	487.65108731	
1	2	485.47142349	0.00000057
^	1	485.47139761	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
CS	idno	0.05201
Residual		0.4179

Fit Statistics

Res Log Likelihood	-242.7
Akaike s Information Criterion	-244.7
Schwarz's Bayesian Criterion	-247.1
-2 Res Log Likelihood	485.5

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
1	2.18	0.1398

Solution for Fixed Effects

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|
time	1	5.8926	0.8839	139	6.67	<.0001
time	2	6.7245	0.6361	139	10.57	<.0001
time	3	8.0768	0.7965	139	10.14	<.0001
relc*time	1	0.1730	0.5995	139	0.29	0.7733 (0.3867)
relc*time	2	-0.7454	0.3736	139	-1.99	0.0480 (0.024)
relc*time	3	-1.4515	0.4221	139	-3.44	0.0008 (0.0004)
taskc*time	1	-0.3676	0.4088	139	-0.90	0.3701 (0.1851)
taskc*time	2	-0.1701	0.2709	139	-0.63	0.5311 (0.2656)
taskc*time	3	-0.9208	0.3610	139	-2.55	0.0118 (0.0059)
int4*time	1	-0.06323	0.2377	139	-0.27	0.7906 (0.3953)
int4*time	2	-0.02305	0.1199	139	-0.19	0.8478 (0.4239)
int4*time	3	0.3534	0.1616	139	2.19	0.0304 (0.0152)

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
time	3	139	83.75	<.0001
relc*time	3	139	5.34	0.0016
taskc*time	3	139	2.51	0.0611
int4*time	3	139	1.65	0.1813

APPENDIX E

REPEATED MEASURES ANALYSIS OF VARIANCE TO EXAMINE CHANGE IN PERCEPTIONS OF INFORMATIONAL DIVERSITY

The Mixed Procedure

Model Information

Data set	WORK.DISSERT
Dependent variable	taskd
Covariance Structure	Compound Symmetry
Subject Effect	id
Estimation Method	REML
Residual variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-within

Class Level information

Class	Levels	Values
id	76	5011 5012 5013 5014 5015 5016 5017 5018 5021 5023 5024 5025 5026 5027 5028 5029 5031 5032 5033 5034 5035 5036 5037 5038 5039 5041 5042 5043 5045 5046 5048 5051 5052 5053 5054 5055 5056 5057 5059 5061 5062 5064 5066 5067 5071 5072 5073 5074 5075 5077 5078 5081 5082 5083 5084 5085 5086 5087 5088 5089 5091 5092 5093 5094 5096 5097 5098 5099 5101 5102 5103 5104 5105 5106 5107 5108
time	3	1 2 3

Dimensions

Covariance Parameters	2
Columns in X	4
Columns in Z	0
Subjects	76
Max Obs Per Subject	3
Observations Used	228
Observations Not used	0
Total Observations	228

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0		375.20179908	
1		324.95933521	0.00000000

convergence criteria met.

Covariance Parameter Estimates

cov Parm	Subject	Estimate

cs	**id**	0.1441
Residual		0.1487

Fit Statistics

Res Log Likelihood	-162.5
Akaike s Information Criterion	-164.5
Schwarz's Bayesian Criterion	-166.8
-2 Res Log Likelihood	325.0

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
1	50.24	<.0001

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F value	Pr > F
time	2	150	10.08	<.0001

Least Squares Means

Effect	time	Estimate	Standard Error	DF	t value	Pr > |t|
time	1	2.9474	0.06208	150	47.48	<.0001
time	2	2.8184	0.06208	150	45.40	<.0001

Least Squares Means

Effect	time	Estimate	Standard Error	DF	t Value	Pr > |t|
time	3	2.6667	0.06208	150	42.96	<.0001

Differences of Least Squares Means

Effect	time	_time	Estimate	Standard Error	DF	t value	Pr > |t|
time	1	2	0.1289	0.06256	150	2.06	0.0410 (0.0205)
time	1	3	0.2807	0.06256	150	4.49	<.0001 <.0001
time	2	3	0.1517	0.06256	150	2.43	0.0165 (0.0083)

APPENDIX F

REGRESSION RESULTS FOR GRADE

time=l

The REG Procedure
Model: MODEL1
Dependent variable: grd

Analysis of variance

Source	DF	Sum of Squares	Mean Square	F value	Pr > F
Model	3	46.74545	15.58182	0.97	0.4119
Error	72	1157.14131	16.07141		
Corrected Total	75	1203.88676			

Root MSE	4.00892	R-Square	0.0388
Dependent Mean	90.11711	Adj R-Sq	-0.0012
Coeff var	4.44856		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	95.90429	5.22349	18.36	<.0001
relc	1	-4.44785	3.54229	-1.26	0.2133
taskc	1	-1.70267	2.41551	-0.70	0.4832
int4	1	1.37994	1.40413	0.98	0.3290

time=2

The REG Procedure
Model: MODELl
Dependent variable: grd

Analysis of variance

Source	DF	Sum of Squares	Mean Square	F value	Pr > F
Model	3	80.51718	26.83906	1.54	0.2121
Error	72	1256.58833	17.45262		
Corrected Total	75	1337.10551			

Root MSE	4.17763	R-Square	0.0602
Dependent Mean	92.03658	Adj R-Sq	0.0211
Coeff var	4.53910		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t value	Pr > |t|
Intercept	1	99.84936	3.85085	25.93	<.0001
relc	1	-4.69153	2.27970	-2.06	0.0432
taskc	1	-2.67870	1.65313	-1.62	0.1095
int4	1	1.51708	0.73263	2.07	0.0420

time=3

The REG Procedure
Model: MODEL1
Dependent variable: grd

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	73.14290	24.38097	0.91	0.4409
Error	72	1930.37930	26.81082		
Corrected Total	75	2003.52220			

Root MSE	5.17792	R-Square	0.0365
Dependent Mean	91.77303	Adj R-Sq	-0.0036
Coeff Var	5.64209		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	89.22887	6.07528	14.69	<.0001
relc	1	2.82683	3.22052	0.88	0.3830
taskc	1	1.10716	2.75366	0.40	0.6888
int4	1	-1.18050	1.23258	-0.96	0.3414