

**THE EFFECTS OF INCENTIVE STRUCTURES AND CONFLICT  
MANAGEMENT ON PERCEIVED DECISION QUALITY AND THE  
STRENGTH OF CONSENSUS**

by

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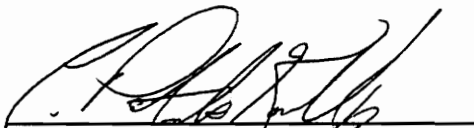
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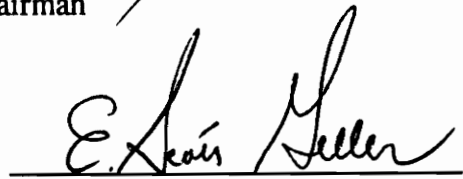
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(ABSTRACT)

This study investigated the effects of group and individual incentive structures as well as collaborative and competitive conflict management strategies on consensus and perceived decision quality. Results showed group incentives encouraged collaborative conflict management while group incentives and collaborative conflict management both encouraged the perception of consensus and decision quality. At the same time individual incentives encouraged competitive conflict management while individual incentives and competitive conflict management each reduced the perception of consensus and decision quality. I used questionnaires to measure the perception of conflict management strategies, consensus, and decision quality with a sample size of 120. I wasn't able to substantiate the same hypotheses relating to actual consensus, which I measured mathematically on the group level through a rank procedure. The sample size for actual consensus was 30 groups.

In an exploratory effort to understand a behavioral aspect of decision making groups, I found that individuals' verbal behaviors concerning how often they had spoken during the group process correlated significantly with individuals' perception of how influential individuals were on the final group ranking.

In the experiment, I used 120 students from an introductory psychology class at Virginia Tech. The sample consisted of 63 males and 57 females. All subjects watched the movie called "12 Angry Men" and were asked to decide by themselves on the order in which the 12 jurors would change their vote from guilty to not guilty. I formed groups of four, and exposed them to either group incentives or individual incentives before they were asked to make a group decision on the same ranking. I intended group and individual incentive structures to cause collaborative and competitive conflict management strategies, respectively.

## ACKNOWLEDGEMENTS

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I would like to express my great appreciation to the members of my committee, especially Dr. Harold Kurstedt who guided me through MSL's research process and taught me that inspecting rather than expecting makes conflictual situations more manageable. I also thank my other committee members, Dr. Scott Geller and Dr. Pat Koelling for their help. Scott inspired me to look at research as more than the accumulation of statistics and provided me with the needed pool of subjects to run my experiment.

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## INTRODUCTION

One way to approach, understand, and explore a phenomenon is to imagine we could look at it from many different sides very much like an object. For example, we could look at the front, the side, and the back. Each view gives us new insight and helps us delimit our domain of interest in studying the subject. The following sections in this introduction look from several angles at the phenomenon of consensus decision making and the perception of decision quality as they are affected by incentive structures and conflict management. Understanding these different angles helps me delimit my research domain to a manageable size and will help you begin to understand my paradigms concerning these phenomena.

### **Problem Statement**

With this research, I aim to investigate (characterize, conceptualize, demonstrate, and generalize) the effects different types of intragroup conflict management produced through incentive structures on the strength of consensus and perceived decision quality in small groups. I will use the results to provide recommendations to convenors, facilitators, managers, and group members on how to manage conflict effectively.

### **Relevance of Study**

Groups trying to achieve consensus are usually made up of people with a variety of backgrounds, personalities, opinions, and goals. These differences cause social pressures and behavioral predispositions that will naturally lead to conflict. If conflict is not managed properly, conflict will be detrimental to the group and the meeting's products. However, conflict and its proper management during the meeting can be essential for a successful meeting, enabling consensus groups to come up with a high

quality decision and strong acceptance of this decision among group members. One way to influence conflict management strategies is through the use of incentive structures imposed on either the individual or the group. In this study, I plan to examine the effects of individual versus group incentive structures and two conflict management styles, collaboration and competition, on the strength of consensus and the perceived quality of the group decision. Goals of consensus meetings are to create agreement on the group decision, understanding of the information shared to produce the decision, acceptance of the group decision, satisfaction with the group process and the decision, and commitment to the group decision, by providing a conflict environment stimulating creative thinking where group members have the opportunity to express their views without being punished. Convenors, facilitators, managers, and group members need to understand and learn the possible consequences of incentive structures and various intragroup conflict management styles so they can intervene in the group process before damage occurs.

### **Who Will Use this Research**

Managers can use the results of this research as an aid for administering consensus meetings. Group convenors and managers must be aware of the possible consequences when group members know before a meeting occurs that either individual effort or group effort is rewarded. Facilitators must understand the consequences of either collaborative and competitive conflict management in consensus meetings. Group convenors, facilitators, managers and the group members can use the results of this study to change the group process. They can set the stage for using a particular type of conflict management in advance or reactively manage a conflict differently after it has occurred. The term "facilitator" will be used for anyone who has the authority to change the group process. A facilitator can also include a group member.

## **Research Questions**

The following two research questions stem from the broader question: how does conflict management affect products of meetings? We can manage conflict many different ways. Of the large pool of conflict management strategies, I chose competitive and collaborative conflict management. Also, the use of particular conflict management strategies is often contingent on variables such as incentive structures, peer pressure, culture, etc. I'm interested in the effects of conflict management strategies produced through incentive structures. My research questions are:

- 1) How do collaborative and competitive intragroup conflict management styles, produced through incentive structures, influence the strength of group consensus and the perceived quality of the group decision? This question will be answered experimentally.
- 2) When groups find themselves in situations where they manage conflict inappropriately, how can group facilitators intervene in the group process to take corrective action? This question will be answered inductively, supported with evidence from my experiment and the literature.

## **Research Objectives**

I have two research objectives relating to the outcomes of this research:

- 1) This research will show facilitators the relationship between collaborative and competitive styles of intragroup conflict management and strength of consensus and

the perceived decision quality. The results will help them predict the possible consequences of collaborative and competitive conflict management produced through individual and group incentive structures.

- 2) My secondary objective is to provide facilitator guidelines for changing dysfunctional conflict management toward functional conflict management.

### **Delimitations**

Delimitations help crystallize and reduce the scope of the research. The scenarios in Appendix A have the same purpose. Scenarios delimit the research by showing how my research does or doesn't address each scenario.

- 1) I don't control for possible hostilities between individuals in a group. Since my subjects will primarily come from the same introductory psychology class, they may have had experience in managing conflicts between one another prior to the experiment.
- 2) I don't address the time during a meeting when collaborative or competitive conflict management should occur.
- 3) I will use no facilitator, since they would introduce unnecessary variance without the necessary training.
- 4) I will measure acceptance, agreement, commitment, satisfaction, and understanding as the components of consensus.

- 5) Subjects in the experiment believe it is difficult to obtain the correct answer to the task. Therefore it is more realistic to motivate them to strive for the best possible answer.

### **Assumptions**

Assumptions are conditions I take for granted in the context of my research. I don't intend to prove any of these conditions except the first assumption, which is the manipulation.

- 1) An incentive structure (monetary and extra credits toward the final grade) is sufficient to motivate the groups to resolve conflict either cooperatively or collaboratively.
- 2) The types of conflict requiring proper management will be task conflict and social conflict. I assume I can generalize my findings across both types of conflicts.
- 3) I assume individual differences such as peoples' natural conflict management modes won't be a factor in my study because of random subject selection.
- 4) The consensus questionnaire accurately measures the strength of consensus.
- 5) The perceived decision quality questionnaire accurately measures the strength of perceived decision quality.

- 6) An actual measure of consensus can be obtained by determining the statistical closeness of individual post-discussion rankings (Kendall's coefficient of concordance,  $W$ ).

### **Research Hypotheses**

The following research hypotheses reflect the overall supposition of this study.

However, They are broader and less specific than the testable hypotheses.

- 1) Collaborative conflict management induced through group incentives in decision making groups produces stronger consensus than competitive conflict management induced through individual incentives.
- 2) Collaborative conflict management induced through group incentives in decision making groups produces a higher perceived decision quality than competitive conflict management induced through individual incentives.

### **Sub-Problems**

The sub-problems partition the problem statement into pieces. These partitions are related in the conceptual model and could be treated as completely researchable units in themselves.

- 1) Develop operational definitions of conflict and conflict management and group and individual incentives.
- 2) Understand the phenomena of conflict and conflict management.

- 3) Understand some of the important characteristics of collaborative and competitive conflict management styles.
- 4) Understand some of the variables causing collaborative and competitive conflict management.
- 5) Understand some of the potential consequences of collaborative and competitive intragroup conflict management.
- 6) Operationalize strength of consensus for the scope of my study.
- 7) Operationalize perceived decision quality for the scope of my study.
- 8) Determine the procedural elements helpful in facilitating a decision making process with respect to conflict and conflict management.

### **Outputs**

The following tangible outputs result from addressing the sub-problems.

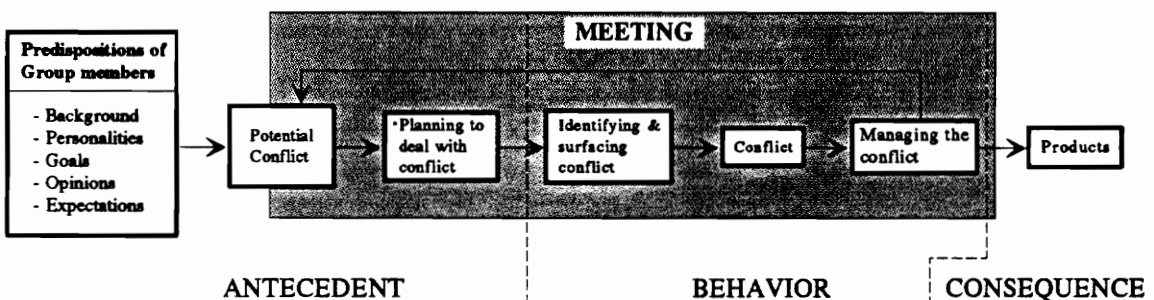
- 1) Operational definitions of conflict and conflict management and group and individual incentives.
- 2) A conceptualization of conflict and conflict management.

- 3) A description of characteristics of two different conflict management styles (collaboration and competition).
- 4) A list of interventions allowing facilitators and group members to escalate or reduce conflict collaboratively.
- 5) A list of the consequences of collaborative and competitive conflict management.
- 6) Measures of strength of consensus.
- 7) Measures of perceived decision quality.
- 8) A list of steps managers should consider in decision making groups.

## CONCEPTUAL MODELS

Conceptual models incorporate the relevant constructs and interrelationships of the phenomena to be analyzed. I will introduce a broad conceptual model of conflict in groups, introduce Management Systems Laboratories' general group process model, and finally show how these two conceptual models fit together.

Figure 1 shows a very broad conceptual model of conflict in meetings. My concept is that people bring the ingredients for disagreement and therefore for potential conflict to meetings. These ingredients include group members' different backgrounds, personalities, goals, opinions, and expectations. This potential for conflict might be based on who the group members are attending the meeting, what the problem is that will be dealt with during the meeting, how the people in the meeting are expected to interact with one another, and why the group members come to the meeting. Figure 1 shows that the potential for conflict may be an antecedent with respect to the meeting in the sense that it exists before the meeting ever begins. However, the potential for conflict can also develop during the meeting process after group members have begun to interact.



**Figure 1: Broad Conceptual Model of Conflict in Meetings**

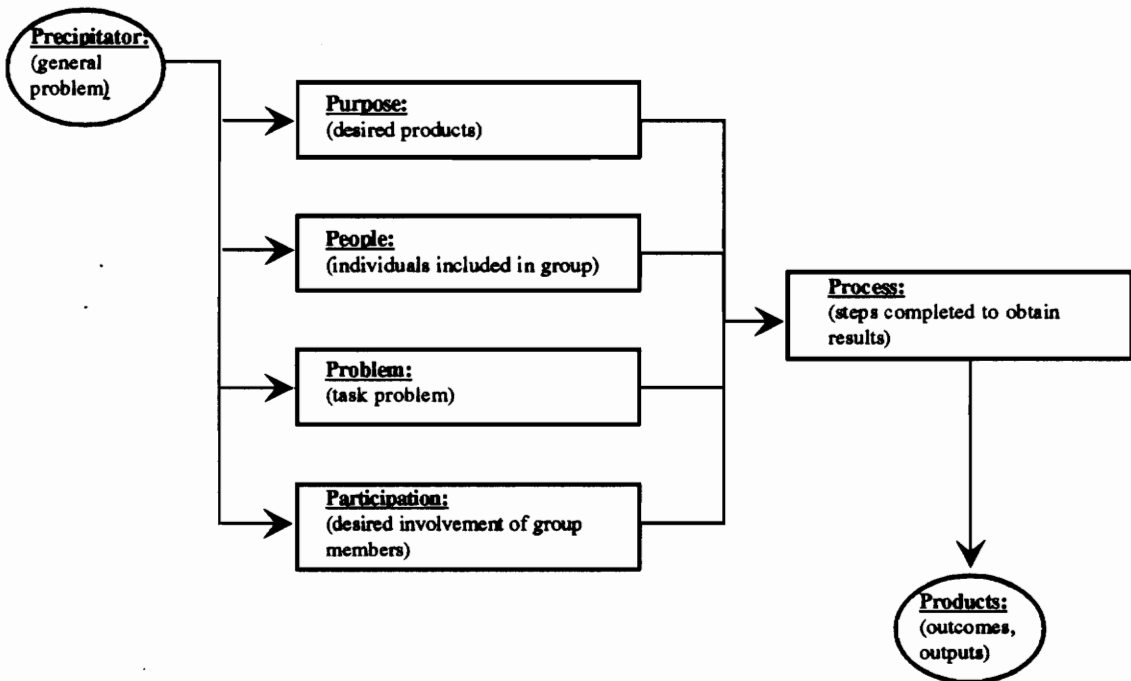
Not all members of the group may perceive this conflict potential. Unless conflict is brought out in the open and dealt with, it will more than likely go undetected. My concept says to get the best products (outcomes and/or outputs), group members must decide to deal with the potential conflict, identify, surface, and finally manage conflict by displaying the constructive behavior I explain later in this section.

Essentially, there are three ways to deal with or manage conflict. It can be raised or escalated, it can be reduced, or the decision could be made to do nothing about the conflict. Raising the conflict may mean exploring the underlying reasons in more detail or making sure all possible disagreements are aired and dealt with. One of the easiest ways to reduce conflict temporarily is to avoid or to smooth over the conflict. All attempts to deal with conflict will have some kind of effect on the group process. I call these effects products.

I view Figure 1 as a process model. In broad terms, the figure describes a sequence of events with respect to conflict taking place in meetings attended by decision making groups. Using the model to get the best products of a meeting, group members must make the choice to deal with or manage existing conflicts. Then group members must identify, surface, and finally manage the conflicts by displaying functional behavior.

Figure 2 shows Management Systems Laboratories' conceptual group-process model. In my opinion, MSL's conceptual model is a procedural and a structural model. The procedure of the meeting occurs from left to right. At the same time the model lists the structural components necessary for general group processes. Meetings can occur because a condition or a person calls for it. The cause of meetings is called a

*precipitator*. Meetings take place to accomplish a specific mission which can be achieved through a group *process*. Before the group *process* successfully takes place, the group needs to define four essential components: 1) the *purpose* of the meeting, 2) the *people* who will be part of the group (stakeholders, experts, facilitator), 3) the *problem* they'll try to solve, and 4) the type of *participation* chosen for the meeting.



**Figure 2: MSL's Conceptual Model of Group Processes**

Participation refers to the desired or expected type of group member involvement in solving the groups' problem. The involvement might be a decision-making process, simply the sharing of information, or the intent to raise and resolve conflict.

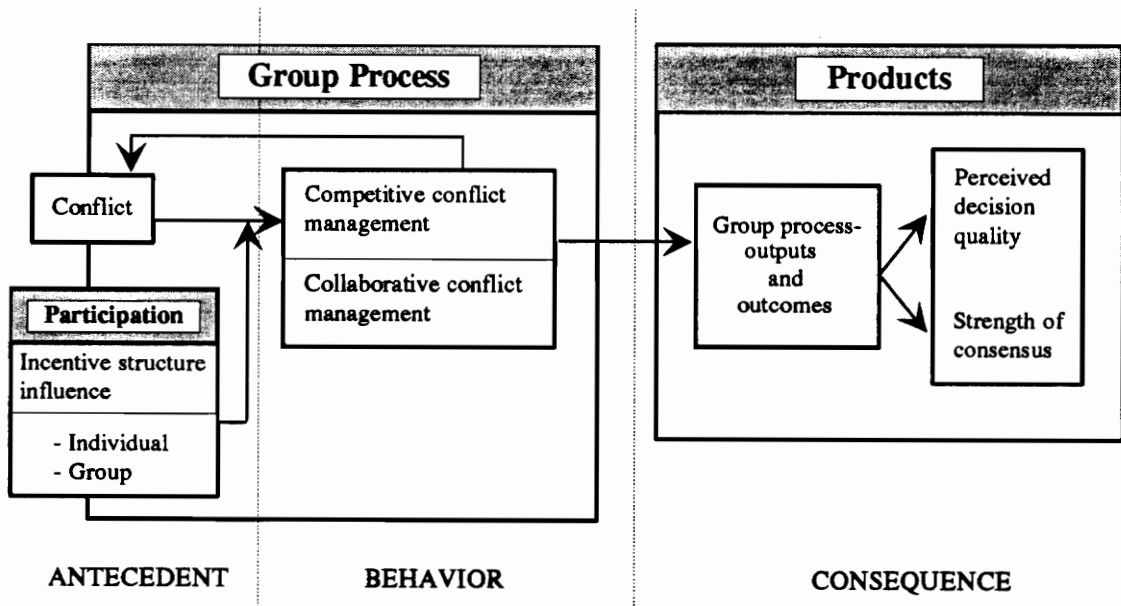
Considering the time frame in a meeting, deciding on these four components precedes the group *process*. After they are defined, the group process can begin. The process is the actual meeting, in which the group members gather in one location and interact.

The *products* or consequences of the *process* relate to the outputs (tangible results), and/or outcomes (intangible results) of the meeting.

I will relate Figure 2 to my study. Conflict management is a part of the group *process* and *participation*. In my experiment, the *purpose* of the meeting will be twofold: 1) to make a rank-order decision on a particular matter, and 2) the successful management of conflict. The *people* in the experiment will consist only of active group members, not facilitators. The *problem* is a rank-order decision-making exercise. In the study, I aim for collaborative and competitive consensus decision making as the *participation* mode. I induce this participation mode before the meeting begins through an incentive structure. Although the incentive structure is technically given before the group process begins, it influences the group before, during, and after the meeting. The group *process* is the accumulation of the steps necessary for the group to achieve the desired products. The *process* in my experiment includes information sharing and making a group decision on a rank-order list. The *product* of my experiment can be divided into outputs and outcomes. The tangible output is the decision. Outcomes are intangible and refer to the group characteristics with respect to the output. In my research, the outcomes are the strength of the group consensus and perceived decision quality.

Figure 3 shows the overlaps of Figure 1 and Figure 2. I feel three boxes from MSL's group process model overlap with Figure 1. The first box, the *participation* box, overlaps with the *planning to deal with conflict* box. In Figure 3, it takes on a slightly different meaning. The participation box not only represents the plan to deal with conflict, but also proactively influences the type of conflict management strategy used by imposing an incentive structure before the group process begins. This incentive

structure influences the meeting from the time it is introduced just before the group process, throughout the group process, and until the group members receive the reward after the group process has ended. This is the reason for placing the participation box only partially into the group process box in Figure 3.



**Figure 3: Conceptual Model of Meetings and Conflict Management**

The second box from Figure 2 overlapping with Figure 1 is the group *process* box, It overlaps with the *planning to deal with conflict, identifying & surfacing conflict* and *managing the conflict* boxes. The *products* box in Figure 2 is the third box that overlaps. It is the same in all three models. Further, I believe the *managing conflict* box from Figure 1 falls into the competitive and collaborative conflict management box in Figure 3. I believe collaboration or competition are the characteristics of managing conflict.

In Figure 3, I divide the group-process component into three blocks: 1) the conflict, 2) the attempt to manage the conflict, and 3) the influence of incentive structures on conflict management. I define conflict here as the *state of communicated disagreement*, often instigated by the frustration of one's interests. Frustration refers to an individuals' perception that they are kept from or hindered in pursuing their interests<sup>1</sup>. This definition does coincide with some definitions used in the literature. I believe separating conflict from the attempts to manage or resolve conflict is difficult in reality, but simpler and important in theory. Although a large percentage of conflict researchers make no clear distinction between conflict and conflict management on a theoretical basis (Deutsch, 1973; Tjosvold, 1983; Johnson & Johnson, 1974), other researchers (Schmidt & Kochan, 1972; Coser, 1956; Simmel, 1955) urge conflict researchers to distinguish more clearly among the conflict antecedents, the actual conflict, and conflict consequences. Through its frequent colloquial use in every-day conversation, they believe the word conflict has taken on multiple and different meanings such as the incorrect and synonymous usage with the phenomena of competition. However, competition is often the attempt to resolve or manage one conflict. It reflects the characteristic of the attempt to manage a conflict and often causes a new conflict at a later time in the group process. Therefore, the consequence of one conflict management attempt can produce a new conflict. This is my justification for the feedback loop in Figure 3. The loop shows the reciprocating actions of conflict on conflict management. Conflict management is instigated by the conflict in a situation, such as an individuals' frustration on a particular occurrence in the group process. Conflict management is an attempt to reduce this frustration.

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<sup>1</sup> I use the word "interest" here synonymously with personal values, beliefs, opinions, attitudes, expectations, and goals.

Accepting my conflict definition might require a break in our paradigms on conflict. For example, my definition excludes aggression from conflict. Rather, aggression is an attempt to manage or resolve an existing conflict. The antecedent to the act of aggression would have been a conflict. This distinction is lacking in the literature. Thomas (1976) provides a classification range of different conflict management styles<sup>2</sup> which include avoidance, accommodation, compromise, collaboration, and competition. I think aggression could be added to this conflict management list as an intensification of competition. I'm interested in the effects of collaborative and competitive conflict management.

Researchers in the literature identify several important variables that help explain why people choose specific *participation* modes or more specifically conflict management styles<sup>3</sup>. One variable, and the only one I will concentrate on in this study, is incentive structures. Incentive structures can be focused on an individual's or group's contributions in a meeting. Individual incentives versus group incentives for group contribution yield different conflict management patterns (Coser, 1956; Deutsch, 1973; Thomas, 1976; Johnson et al, 1981).

The products box in Figure 3 contains group process outcomes and outputs which I distinguish. A group process output is a tangible result, such as a decision, a list of recommendations, or a document whereas a group process outcome can be a characteristic of the tangible result. An example might be the amount of commitment, acceptance, agreement, understanding, and satisfaction group members have with this decision or the group process at the end of the group process. While all output and

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<sup>2</sup> Instead of using conflict management, Thomas actually uses the expression "conflict resolution."

<sup>3</sup> Thomas (1976) lists social pressures, group rules and procedures, behavioral predispositions, and incentive structures. In this research, I will not consider the first three variables.

outcome variables are affected by the conflict management strategy used in a meeting, the outcome variables are also predictors for my independent variables--strength of consensus and perceived decision quality. When I speak of perceived decision quality in this document, I refer to the degree to which a group perceives their decision matches an accepted standard or the "correct answer." Consensus strength relates to the degree to which group members perceive they have reached consensus as well as the degree to which they actually agree and support the group's final decision. Each of the components in Figure 3 and their interrelations will be covered in more detail in the literature review and methodology section.

## LITERATURE REVIEW

This section is divided into three large categories: conflict, conflict management, and desired group process products. This categorization links the literature review directly to the conceptual model.

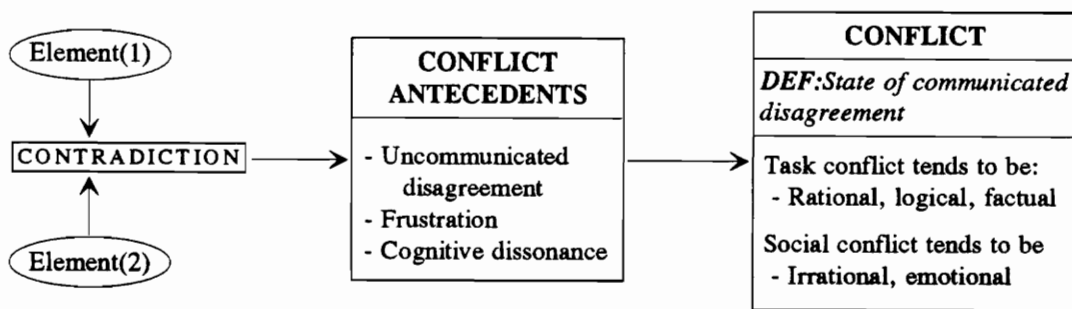
### **Conflict**

To understand conflict better, I introduce some definitions from the literature, their inconsistencies, and my definition. To conceptually understand the difference between conflict and conflict management, I introduce a model based on the Hegelian dialectic.

### **Conflict definitions**

The literature is inconclusive as to the effects of conflict on decision making groups. I believe this is a result of the inaccurate and diverse definitions used in conflict studies. There are as many conflict definitions in the literature as there are attempts to define it. The Collegiate Dictionary defines conflict as "struggle between opposing forces, mutual antagonism of ideas and interests, and clash between contradictory impulses within an individual." Forsyth (1983) believes conflict to be "disagreement, discord, and friction that occur when the actions and/or beliefs of one individual or group of individuals are incompatible with those adopted by another individual or group of individuals." Schmidt and Kochan (1972), Deutsch (1973), and Walker (1970) believe conflict occurs, when individuals perceive they have incompatible goals and are unable to share resources linked to the attainment of these goals. Katz and Kahn (1972) define conflict between two systems when "they interact directly in such a way that the actions of one tend to prevent or compel some outcome against the resistance of the other."

There are similarities among these definitions. All definitions imply conflict comprises incompatible or disagreeing elements. (See element 1 and element 2 in Figure 4.) However, there are diverging views on whether these elements refer to ideas or beliefs and interests, implying conflict will occur internally, or whether these disagreements refer to actions and behaviors, implying conflict will occur externally. While beliefs are internal or occur within a person, actions are external and usually require two or more individuals before conflict exists.



**Figure 4: Delimiting Conflict**

In my opinion, the contradicting elements in Figure 4 are internal and refer to differing values, interests (Love, Rozelle & Druckman, 1983), mutually desirable resources, or the contradiction of feelings and facts. The incompatibility of these two elements produces uncommunicated disagreement, frustration, and cognitive dissonance, which I would categorize as conflict antecedents. I believe conflict is external and occurs between two or more individuals. It is the direct result of conflict antecedents. Thomas (1976) supports this notion by saying conflict results when "one party perceives the other has frustrated, or is about to frustrate some concern or satisfaction

of this concern of his.<sup>4</sup>" When these antecedents change from being uncommunicated to being communicated, conflict begins to occur with respect to the disagreement. Therefore, I define conflict as the *state of communicated disagreement* as shown in Figures 4 and 6.

Figures 4, 5, and 6 make the distinction between conflict and conflict management. In Figure 4, I express the notion that conflict is the state of communicated disagreement. In Figure 6, I define conflict management to be the attempt aimed at resolving an existing conflict. Therefore, conflict management is one of the consequences of conflict.

The distinction between conflict and conflict management is difficult, but important. For example, we frequently refer to war or aggression as conflict between two or more systems<sup>5</sup>. I believe this is incorrect. A war or any type of aggressive behavior isn't a conflict, but rather an attempt to manage or even resolve an existing conflict. Conflict in the case of a war might have been an explicitly stated incompatibility of goals between two countries, or the communicated frustration of one country's leadership with that of the other. Therefore, conflict precedes conflict management.

Deutsch (1973) introduced an interesting conflict typology I would like to present here. He distinguishes conflict in terms of the relationship between the objective state of affairs and the perceived state of affairs by the conflicting parties. There are six types of conflict. Characteristics of *veridical conflict* are that it exists objectively and is perceived accurately, without any misconceptions. The existence of *contingent conflict*

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<sup>4</sup> "Concerns" refer to needs, desires, objectives, and standards.

<sup>5</sup> The word "systems" is used synonymously with people, groups, or countries.

also exists objectively and is perceived accurately. However, contingent conflict depends on readily rearranged circumstances, which aren't recognized by the conflicting parties. This means to say contingent conflict will disappear if the available resources for satisfying the conflicting needs were recognized. *Displaced conflict*, which also exists objectively as well as through people's perception, is a result of displacing another conflict. The parties in conflict are, so to speak, arguing about the wrong thing. *Misattributed conflict* exists objectively; however, it is perceived by the wrong parties. Therefore, the conflict occurs between the wrong parties. *Latent conflict* is the type of conflict that should be perceived, yet isn't. Latent conflict exists objectively and requires consciousness raising to become perceived by the conflicting parties. *False conflict* is the case where people believe there is a conflict, when in reality there is none. Deutsch believes conflict may start out as false conflict, but elicits new motives and sentiments that turn false conflict into true conflict.

When looking at what conflict pertains to, I categorize conflict into two large groups. I differentiate social conflict from task conflict. Social conflict is a communicated disagreement addressing another person's feelings or ego. The nature of social conflict is mostly irrational and emotional and, therefore, difficult to control. Table 1 lists examples of social conflict antecedents.

Task conflict, on the other hand, is a communicated disagreement about the problem to be solved during the meeting or the procedural elements in dealing with the problem. For example, a communicated disagreement about the quality of a given alternative generated to solve a particular problem would be a task conflict. Task conflict is rational, logical, and factual. The differences in the characteristics between task and

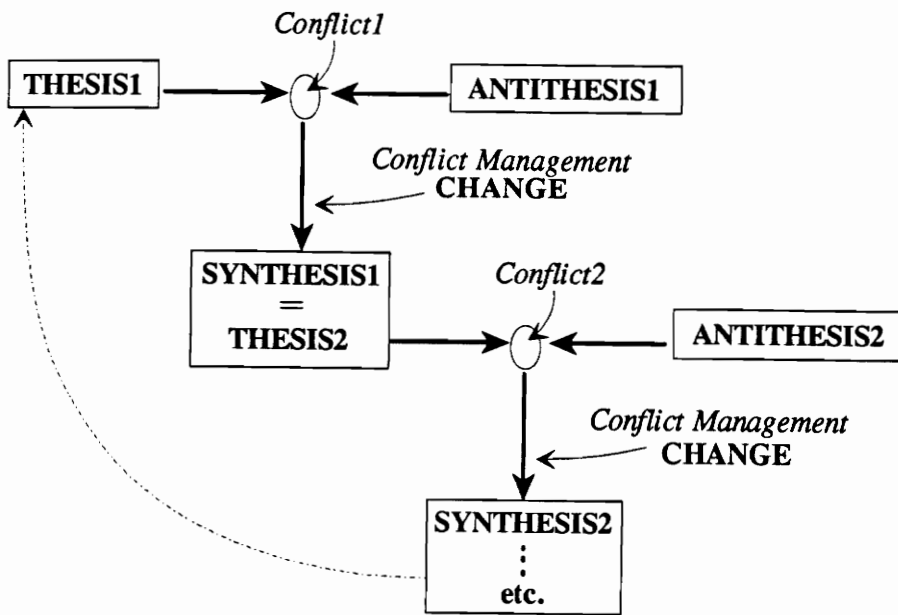
social conflicts has implications on their respective usefulness in decision-making groups.

**Table 1: Antecedents to Social Conflict and Task Conflict (adapted from Waltman, 1989)**

Social Conflict Antecedents	Task Conflict Antecedents
Disappointment	Difference in approach
Rejection	Difference in opinion
Inferiority	Procedural limitations
Embarrassment	Policy restrictions
Humiliation	Legal constraints
Insecurity	Time parameters
Anger	Format, appearance needs
Superiority	Setting or location issues
	Errors
	Missed deadlines

*A conceptualization of conflict and conflict management*

The philosopher Hegel (1974) said conflict is the antecedent and consequence of any change and is therefore directly tied to change. (See Figure 5.) Hegel believed change occurred when the thesis, or the affirmation, and its antithesis, or the negation, are resolved into a new component called the synthesis. This synthesis will contain elements of both thesis and antithesis to varying degrees. By definition, the thesis and the antithesis are in contradiction. The synthesis is the attempted resolution of this contradiction into a new state, thus causing change. The synthesis becomes the new thesis, and the same process begins again. Since this process is cyclical, change is a cause, as well as a result, of conflict.



**Figure 5: The Hegelian Dialectic**

The relationship between the phenomena of conflict and change is also referred to as the Hegelian dialectic. If conflict is the input and output to change, as Hegel says, or if change is the input and output of conflict, then conflict itself must be the independent variable controlling change. Therefore, conflict is a powerful tool to proactively manipulate change.

Another way to state the Hegelian dialectic is the interplay between thesis, antithesis, and synthesis. On a theoretical level, I believe conflict is represented by the relationship between thesis and the antithesis. Just as element 1 and element 2 in Figure 4 are incompatible, thesis and antithesis are also incompatible. In Figure 6, I define conflict management as *the process aimed at attempting to resolve an existing conflict*. I also call conflict management to be a failing attempt at resolving the conflict--where either thesis or antithesis are forced and become the new synthesis. For

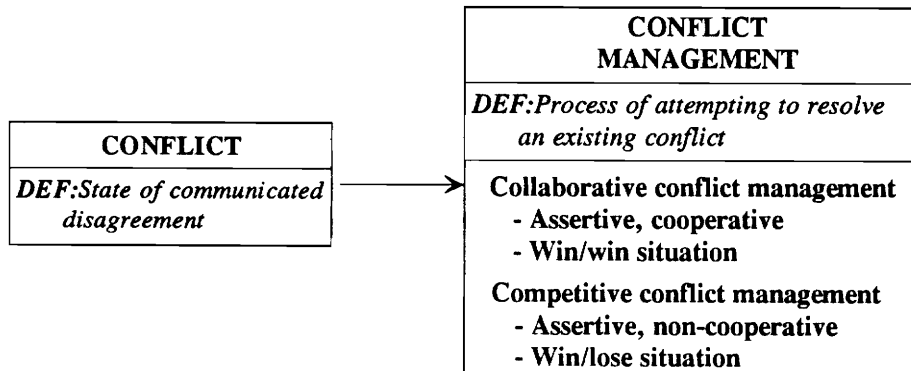
example, managers may understand the elements in conflict, but simply force element 1 of the conflict (thesis) onto their subordinates, which is in complete disagreement with a second element, element 2 (antithesis). In this case, the manager manages the existing conflict by suppressing element 2. My definition of conflict management agrees with the Hegelian dialectic in Figure 5. The process of considering thesis and antithesis to form the synthesis is equivalent to conflict management--the process attempting to resolve an existing conflict.

I believe, Dollard *et al.* (1939) with their frustration-aggression hypothesis support Hegel's dialectic and partly my understanding of conflict and conflict management. The hypothesis states that frustration leads to aggression when a particular personal frustration threshold is exceeded and individuals can no longer keep the frustration to themselves, but have to communicate it to their environment. The type of communication chosen will be of an aggressive nature. To avoid aggression, an individual's level of frustration must at some point be reduced below the threshold. The frustration makes up the two elements in contradiction, thesis and antithesis. The aggression is the attempt to search for the synthesis. If I assumed frustration was also part of conflict and not its antecedent, the frustration-aggression hypothesis would also support my conceptual understanding of conflict and conflict management. Conflict (frustration) precedes conflict management (aggression).

### **Conflict Management**

In Figure 6, I define conflict management as the process attempting to resolve an existing conflict. This occurs, when individuals make decisions and act on behalf of an existing conflict. Thomas (1976) uses the term conflict resolution. I use the expression of conflict management because conflicts are rarely ever resolved but only

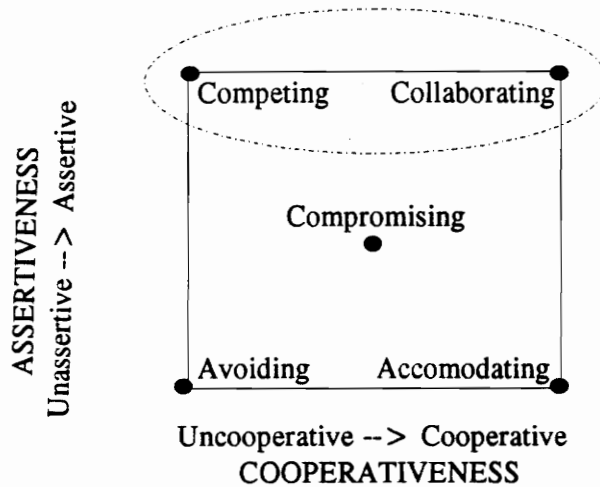
modified, or changed. The effectiveness of conflict management greatly depends on the conflict management strategy.



**Figure 6: Delimiting Conflict Management**

Based on Blake and Mouton's managerial grid (1964), Thomas and Kilmann (1974) identified five different "conflict modes" which refer to the dominant personal conflict handling styles of individuals. These five modes are avoidance, accommodation, compromise, collaboration, and competition. All five modes distinguish themselves in their degree of cooperativeness and assertiveness. (See Figure 7.) Assertiveness refers to the boldness or persistence in attempting to achieve a goal, whereas cooperation refers to the willingness to work together for a common purpose.

Tjosvold (1983), Coser (1956), and Deutsch (1949) list conflict management dimensions similar to the ones used by Thomas and Kilmann, although they don't use the same expressions. Thomas and Kilmann believe there is no one best way to resolve a conflict. The proper conflict management style depends on the context of the



**Figure 7: Thomas and Kilmann Conflict Modes (1974)**

situation. However, when the situation requires a small group to come up with a high quality decision while at the same time having strong consensus on this decision, some conflict resolution styles on Thomas-Kilmann's list are less effective than others.

Collaboration will be the most effective approach for consensus groups, since I believe it produces more of the necessary requirements for a strong consensus than the other strategies. In this research, I'm interested in contrasting competitive and collaborative conflict management strategies emphasized in Figure 7 by the dashed boundary.

Potential negative consequences of mismanaged conflict have been described in the literature. Mismanaged conflict can lead to intolerance among group members (Simmel, 1955), low commitment or support of the group and the final decision (Pettigrew, 1973, Pfeffer, 1981), reduced trust among group members (Deutsch, 1973, Tjosvold *et al*, 1983), a reduced amount of information shared between the group

members (Deutsch, 1973, Rabbie & Wilkens, 1971), and reduced decision quality. (Janis, 1972; Wall *et al*, 1987).

The potential positive outcomes from well-managed conflict are an increase in information sharing and a greater number of creative alternatives generated within the group (Hoffman, Harburg, & Maier, 1962), an increase in the satisfaction with group process and the resulting decision (Wall & Nolan, 1986), an increase in interpersonal attraction (Johnson & Johnson, 1974), and a better decision (Coser, 1956, Deutsch, 1973, Pood, 1980).

#### *Characteristics of competitive conflict management*

Doob (1937) defined a competitive situation as one where the "end sought can be achieved in equal amounts by some and not all of the individuals." Maller (1929) defines it as a situation which "stimulates an individual to strive against other members of his group for a goal which he hopes to be the sole principal possessor." Thomas and Kilmann (1974) believe the competitive conflict resolution mode is characterized as assertive yet uncooperative. This means individuals pursue their own concerns at the expense of other group members. Competitive conflict resolution is a power-oriented mode in which one uses whatever power seems appropriate to win one's position. According to Thomas (1976), competitive conflict management can occur because people have personal predisposition to using a competitive approach in managing conflict. Deutsch (1973) believes competition is caused when group members perceive their goals are negatively linked. This means one group member can achieve his or her goal only when another group member does not achieve his or her goal. This occurs frequently, when goals are not shareable.

### Consequences of competitive conflict management

Negatively linked goals in competitive conflict management creates win/lose situations: one individual wins only when another loses (Deutsch, 1949). An increase in group hostility and a reduction of trust is the result of win/lose situations (Deutsch, 1973). Intragroup hostility could be an example of the reciprocating actions between conflict and conflict management in my conceptual model (Figure 3). The hostility is a consequence of the conflict resolution attempt, producing a new conflict requiring additional conflict resolution attempts in the future.

When group members believe they can't achieve their own goal because they are competing with someone else, they are also less inclined to share relevant resources with the rest of the group, since it might give other groups or group members an advantage (Sherif, 1958). Deutsch (1969) found competitive conflict resolution stifled innovation. The cause is fear of expressing innovative ideas that would help someone else achieve their goal while reducing the chance of achieving one's own goal. In competitive conflict management, individuals expect other group members will not help them achieve their goal. They suspect other group members' messages and influence are attempts to mislead them from their goals (Deutsch, 1973; Tjosvold, 1984).

### Characteristics of collaborative conflict management

Doob (1937) defined a collaborative situation as one where the "end sought can be achieved in equal amounts by all and not one individual." Collaborative conflict management is assertive and cooperative (Thomas & Kilmann, 1974). This means both collaborative and competitive conflict management styles are assertive, but differ in their degree of cooperativeness. Collaboration is non-judgmental communication emphasizing mutual problem solving. It is the attempt to work with the other person to

find a solution that fully satisfies the concerns of both. Collaboration requires exploring the issue to identify the underlying concerns of the individuals and to find an alternative to meet both sets of concerns. Collaboration is caused when group members perceive their goals to be positively linked (Deutsch, 1973). This means one group member can achieve his or her goal only when others achieve their goals as well. This occurs frequently when goals are shareable.

### *Consequences of collaborative conflict management*

Positively linked goals in collaborative conflict management create win/win situations (Deutsch, 1973). Both parties perceive they win. When individuals in the group perceive other group members value their presence, threat and hostility appear to a lesser degree or are reduced. This provides an atmosphere for group members to express their views safely and dare to think up innovative or creative alternatives (Deutsch, 1969; Tjosvold, 1984). The increase in group participation caused through collaboration increases the stake of the group members in the group process and the final decision. The result is an increase in group commitment to the group process and the final solution. The reduction of threat and hostility among group members by using an integrative conflict management approach has another consequence. Group morale and satisfaction of individual group members increases (Deutsch, 1949; Johnson & Johnson, 1974; Gibbs, 1961; Thomas, 1976). One drawback of collaborative conflict management in consensus groups is that it is more time consuming than competitive conflict management.

### *Manipulation of conflict management*

What variables influence the type of conflict management used during meetings? Thomas (1976) believes the following four variables can be used to manipulate a

group's conflict management style: 1) a group member's behavioral predispositions of dealing with conflict, 2) social pressures on group members from other group members or outsiders, 3) rules and procedures of the existing group or group culture, and 4) incentive structures aimed toward participation within the group. Deutsch (1973), and Coser (1956) list similar variables.

For manipulation purposes in an experiment, the use of incentive structures combined with social pressure seem to be an appropriate method to manipulate subjects' conflict management styles. The analysis of individual differences to determine subjects' behavioral predispositions is vague and imprecise. Rules and procedures are simple and quick to use in an experiment, but do not produce a sufficient stake so subjects will follow the rules and procedures. Incentive structures can be used to produce social pressure causing either competitive or collaborative conflict management (Coser, 1956). Coser hypothesized incentives geared toward the individual, encourage social pressures to compete against other individuals causing interpersonal competition. On the other hand, incentives geared toward groups, giving groups common goals, tend to encourage intergroup competition, which in turn causes intragroup collaboration. Sherif (1958) supported this hypothesis in his "robbers cave" studies. After strongly competitive behaviors occurred between two groups, superordinate goals were introduced. These goals gave the two groups a common goal and focused their attention on solving the mutual problem rather than on their differences. Competitive behaviors between the groups shifted toward competitive behaviors between the group and an unknown third party. The introduction of a superordinate goal can be compared to the introduction of a new incentive, producing specific social pressure and causing a shift in the conflict management strategy.

### Group process outputs and outcomes

I distinguish between group process outputs and outcomes. In this study, a group process output is a tangible result, such as the decision, whereas a group process outcome is the characteristic of this tangible result. An example might be the group's commitment to a decision, or the amount of acceptance of the group decision. The list of my group process outcomes and outputs is limited to the components necessary to measure consensus strength and perceived decision quality. The small group literature lists many group-process products, ranging from shared information and group decisions to social ice-breaking. In terms of the conflict management context, there are five group process products I'm particularly interested in: 1) agreement, 2) acceptance, 3) understanding, 4) satisfaction, and 5) commitment. However, these variables are rarely analyzed in this context. Thomas (1976) hypothesized and Deutsch (1973) showed that a collaborative conflict management process yields higher satisfaction and sets the stage for sharing more information than does competition. However, the effects of collaboration and competition on all five dimensions under the same conditions have not been demonstrated in the literature.

### Desired Group Process Products

#### Strength of consensus

Researchers in the literature have defined consensus in many different ways. Kaprzyk and Fedrizzi (1988) defined consensus as the "degree to which most influential people in a group agree." Hirokawa (1985) defined consensus as perfect anonymity among all group members. These two examples show how diverse the understanding of consensus is. Kaprzyk and Fedrizzi's emphasis is on the people who are involved in the consensus process, whereas Hirokawa focuses more on the type of agreement.

However, when consensus is based only on agreement, Janis (1972) warns about its possible consequences. Janis believes under circumstance where groups are homogeneous and group members have known each other for a long time, groups have little difficulty agreeing on a decision. The reason for this effortless agreement is group members' familiarity with one another. It reduces the degree of how critical they are with other group members' ideas or solutions. The result can be disastrous decisions, although group members probably believe they have strong consensus. Janis calls the result groupthink. If it is possible to achieve strong consensus, while at the same time producing a poor decision, I believe the prerequisite of agreement to achieve consensus has to be extended to include other aspects.

Management Systems Laboratories has defined consensus to be "a state where a common judgment has been reached by most of those concerned. Consensus exists when a group makes and supports a decision." This definition includes multiple aspects, exceeding the requirement of agreement. To achieve this state of consensus, a process needs to occur in which the subcomponents of consensus are produced. I will measure these subcomponents to determine the existing strength of consensus on the decisions at the end of the meeting. Therefore, the following five subcomponents of consensus are my operational definition of consensus and are supported through the literature. The subcomponents are group members' agreement with the decision (Scheff, 1984; DeStephen, 1983; Fisher, 1974; Holder, 1972), acceptance of the decision (Tjosvold & Field, 1983), support or commitment to the decision (DeStephen, 1983; Miner, 1979; Johnson, 1975; Zaleznik and Moment, 1964), an understanding of the information shared to come up with the decision (Scheff, 1984; Janis, 1972), and satisfaction with the group process and the decision (DeStephen, 1983, Hoffman *et al.*, 1962). Therefore, I define consensus as a function:

Consensus = f[agreement, understanding, acceptance, satisfaction, commitment]

In this research, I view consensus not as a binary variable, but as a variable having different levels of strength. I use a questionnaire to measure the five subcomponents of consensus. Since a questionnaire only provides me with individual's perceptions, I call this measure "perceived consensus." I also measure what I call "actual consensus." I use a mathematical approach measuring the difference between all group members' individual rankings after they have made the group decision.

### *Perceived decision quality*

Decision quality is an important outcome of any decision making process. However, the quality of a particular decision often can't be determined right after the decision is made; especially if a problem doesn't have one correct answer. Frequently, the decision needs to be implemented and its quality judged, based on the consequence its implementation had. I believe this is especially true for complex decisions made by groups, such as decisions made in strategic planning meetings. It is possible that the quality of a particular strategic decision may not be measurable for five to ten years. Therefore, since it is difficult to measure the actual quality of a decision directly, it may be more applicable to consider the process elements required to achieve a particular level of decision quality. Janis believes the primary requirement for high-quality decisions is the sharing of relevant information (Janis, 1972). Coser (1956) argues decision quality is primarily influenced by the generation of a multitude of alternatives from which the group can choose from. Maier and Solem (1952) argue decision quality can be increased when minorities in the group are encouraged to voice their opinions. I believe there is no one variable solely responsible for a group process

ensuring high decision quality. Therefore, decision quality is a function of three variables and is a measure thereof:

$$\text{Decision quality} = f[\text{sharing of information, opportunity to express views} \\ \text{generation of alternatives}]$$

### *New evidence*

My intention was to measure perceived decision quality by asking group members' perception of information sharing, opportunity to express their views, and generation of alternatives. However, a pilot study by Polk and Koball (1991) with a consensus questionnaire very similar to the one I used revealed that perception of decision quality measured in two laboratory experiments are linked closer to perceived consensus than I had expected. A factor analysis of an 18-item questionnaire measuring perceived decision quality and perceived consensus showed perceived decision quality was intimately related to individual consensus. Individual consensus is the degree with which an individual consents with the group decision. An example question would be: "To what degree do you agree with the group decision?" There is also group consensus, which is the degree to which an individual believes the other group members are consenting with the group decision. An example question would be: "To what degree do you believe the other group members agreed with the decision?" For the factor analysis, perceived consensus was measured as a function of three variables: agreement, acceptance, and commitment.

There is a logical explanation for this finding. It is likely individuals have a hard time admitting they agree with the decision, accept the decision, and support the decision, while at the same time saying they perceive they have low decision quality. This creates two cognitions in dissonance with one another. To reduce this dissonance,

individuals answer questions concerning perceived decision quality and perceived individual consensus similarly.

It is possible that these results can't be substantiated in a more realistic experiment involving real world decision-making groups who have a much higher stake in the decision than laboratory groups. However, since I tested my hypotheses with data from a laboratory experiment as well, using a very similar pool of subjects, I had strong evidence to measure perceived decision quality as a function of individual consensus and to measure perceived consensus as a function of group consensus.

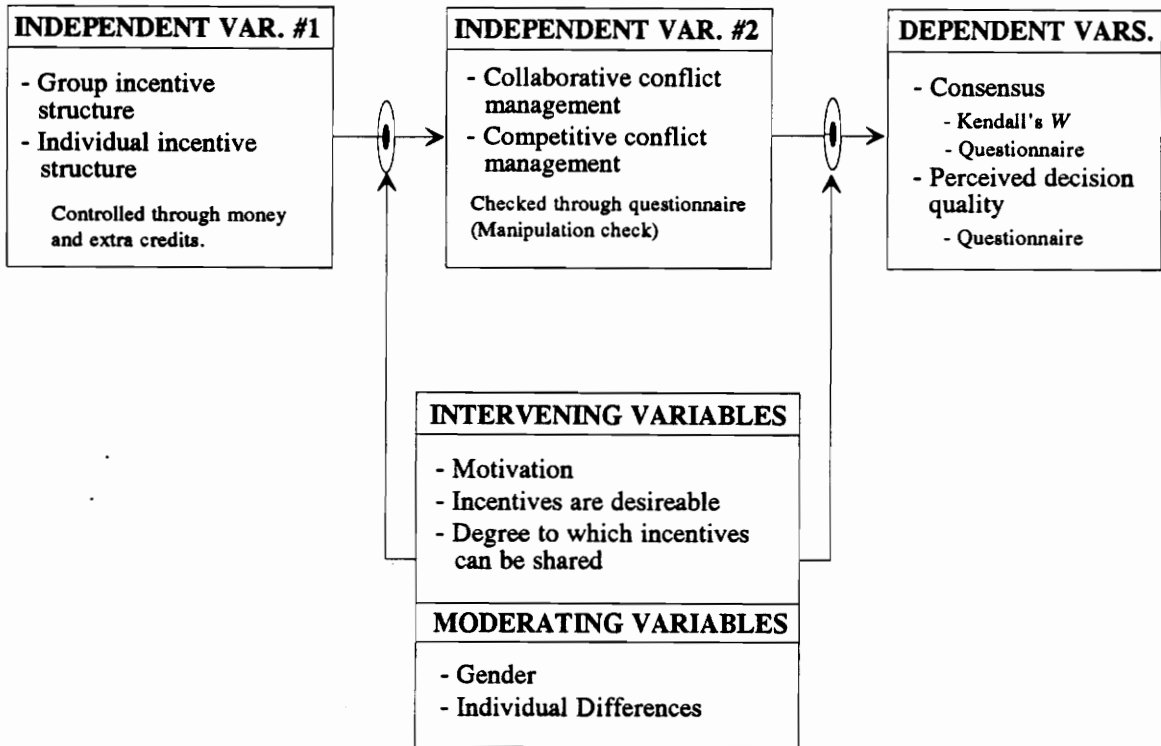
## VARIABLES

### Dependent Variables

In this research, I analyzed two phenomena: Strength of consensus and perceived decision quality. I measured strength of consensus in two ways. First, using Kendall's coefficient of concordance, I measured the actual consensus by determining the statistical closeness of the individual rankings after group members had made the group decisions. The unit of analysis for this variable was the group. A second way to measure consensus is by measuring perceived group consensus using a questionnaire asking group members about their perception of other group members' agreement, acceptance, satisfaction, understanding, and commitment with respect to the group decision. The unit of analysis for the perceived strength of consensus was the individual. The components of these measures are described in more detail in the "Literature review section," and in Appendix C.

The second phenomena I investigated as a dependent variable was the group members' perception of their decision quality. I defined perceived decision quality as the individuals' belief that they had come up with the best possible ranking to the ranking of the movie. My justification for measuring the perception of the decision quality rather than the actual quality of the group decision lied in the nature of the scenario. The scenario of this experiment was set through a movie. Any decision group members had to make would have been compared to the actual decision the film producer decided on when he produced the film; so the group decision would have been compared to the producers' biased opinion, not general truth. Using the outcome of the film to determine decision quality was therefore not acceptable. In addition to directly asking group members about their perception of decision quality, I measured

perceived decision quality through perceived group consensus. (Refer to "New evidence" in the "Literature Review" section for further explanation.)



**Figure 8: Research Variables**

I asked group members' perception of their own agreement, acceptance, satisfaction, understanding, and commitment to the group decision. The unit of analysis for the perception of decision quality was also the individual. Figure 8 showed all dependent, independent, moderating, and intervening variables for this research.

**Independent Variables**

There were two independent variables for this research. They were conflict management and incentive structures. In one case, conflict management was

collaborative; in the other, it was competitive. The difference between collaboration and competition lies in the degree of cooperativeness among group members. I manipulated the degree of cooperativeness in the group through either individual or group incentives. To make sure I knew if and to what extent group members perceived the group process to be either collaborative or competitive, I used a questionnaire measure to check for either of these conditions. I didn't use a particular cut-off value to categorize groups according to either the collaborative or the competitive category. Rather than using an absolute measure, I chose to look at the relative difference between the two conditions. Statistically, they should have been significantly different to fall into either the collaborative or competitive conflict management category.

### **Intervening and Moderating Variables**

Intervening variables affect the dependent variable after the independent variable has been manipulated. Stone (1981) says an "intervening variable is an unobservable process and/or state associated with an organism that helps to explain linkages between the independent and dependent variable." I list motivation, perceived value, and shareability of the incentive as intervening variables. All three variables are closely linked and relate to the monetary and grade incentive structure I used. The degree to which the incentive structure was able to influence conflict management behavior depended on how motivating the incentive was perceived to be. The motivational effects of an incentive were in turn dependent on its perceived value to the group members. For some subjects, money might have played a more important role than for others. Consequently, these subjects perceived a greater value for monetary incentives. The shareability of incentives among group members might have reduced the motivational aspect of the incentive. In my pilot study, I noticed one group agreed that whoever would end-up getting the reward would share it with the other group

members, practically short-circuiting the purpose of the incentive, since its perceived value was greatly reduced and therefore less motivating. This was the reason to introduce a non-shareable incentive as well. Class credits are not transferable or divisible.

A moderating variable is considered a "variable which when systematically varied causes the relationship between two other variables to change" (Stone, 1981). I suggest gender and individual differences moderated the relationship between my two independent variables, incentives and conflict management, and my two dependent variables, consensus and perceived decision quality. I believe women and men have different perceptions related to the intensity of different conflict management strategies. For example, one and the same group process may be perceived to be collaborative by a man but competitive by a woman. I attempted to control this moderator by assigning two male and two female subjects to each group. Further, individual differences play a major role in the way people behave. Thomas and Kilmann (1974) introduced an instrument called the "T-K conflict mode type" instrument. Their belief was that individuals could be categorized to pursue predominantly five different strategies of conflict management: competition, compromise, accommodation, collaboration, and avoidance. Both researchers believe conflict management styles are unique to each person and by nature one person may be more collaborative, whereas the other may be more competitive. Individual differences influenced my study, since it might have been difficult, for example, to encourage competitive personalities to collaborate or collaborative personalities to compete. To reduce systematic variation of conflict management predispositions I randomly assigned subjects to their conditions.

In the VARIABLES TO EXPLORE section (page 59), I list additional dependent variables included in this study. These variables are of exploratory nature and were accumulated through additional questionnaire measures and behavioral observations.

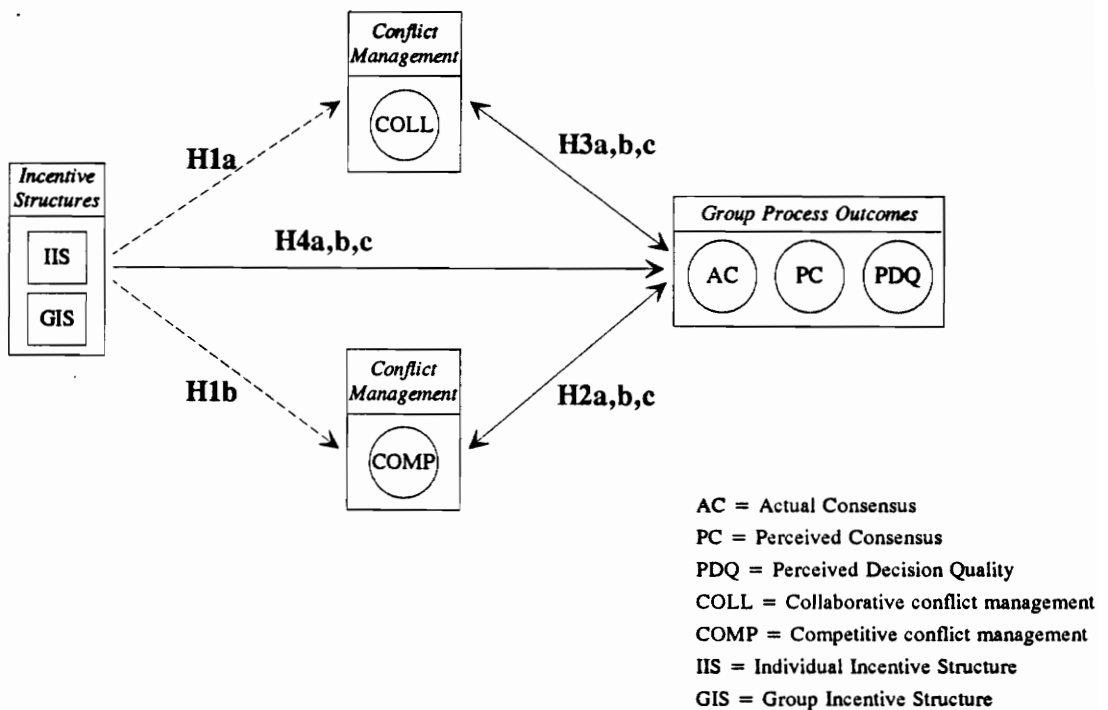
## SPECIFIC HYPOTHESES

Based on my conceptual model for meetings, I developed eleven expected relationships. I represented these relationships as a set of four hypotheses dealing with five variables. The two independent variables were incentive structures and conflict management and the dependent variables were actual consensus, perceived consensus, and perceived decision quality.

For my research model in Figure 9, square boxes represent categorical data, whereas circles represent continuous data from scales. Here are the specific hypotheses I tested.

- H1. a.** Group incentive structures encourage stronger collaborative conflict management than individual incentive structures. (This is a manipulation check.)
- b.** Individual incentive structures encourage stronger competitive conflict management than group incentive structures. (This is a manipulation check.)
- H2. a.** Competitive conflict management predicts weak actual consensus.
- b.** Competitive conflict management predicts weak perceived consensus.
- c.** Competitive conflict management predicts low perceived decision quality.
- H3. a.** Collaborative conflict management predicts strong actual consensus.
- b.** Collaborative conflict management predicts strong perceived consensus.
- c.** Collaborative conflict management predicts high perceived decision quality.

- H4. a.** Group incentive structures encourage stronger actual consensus than individual incentive structures.
- b.** Group incentive structures encourage stronger perceived consensus than individual incentive structures.
- c.** Group incentive structures encourage higher perceived decision quality than individual incentive structures.



**Figure 9: Research Model**

### **Significance of the Variables in the Hypotheses**

My point of focus in this study was the analysis of the effects of conflict management strategies on group process outcomes. To create different conflict management conditions I needed a manipulation that would increase the possibility of having significantly different conflict management strategies. In my research, I choose incentive structures. *Since I use incentive structures only as a means to an end, I consider them, in terms of independent variables, less important than conflict management strategies.* This means, that the primary hypotheses are Hypothesis2 and Hypothesis3. Hypothesis1 serves as a manipulation check. In Figure 9, manipulation checks are represented by dashed arrows. While the findings of Hypothesis4 are interesting, I consider them less important, since they don't involve conflict management variables.

## METHODS

The purpose of this chapter is to define the type of research I proposed and define the methodology used for the experiment with respect to the task the experiment was based on, the types of groups I used, my suggestions for the manipulation, a procedural flowchart of the experiment, and the data analysis.

### **Type of Research**

There are several different ways to classify research. I choose to classify this research according to its objective (basic versus applied research), and the approach taken to seek information about the unknown (inductive versus deductive research) (Leedy, 1989). Basic research formulates, expands, and evaluates theory, whereas applied research seeks the solution to a practical problem. I believe my research covers both spectrums. This research is basic research. I have researched the literature allowing me to develop my own conceptual understanding of conflict management in group processes. I test this conceptual understanding with formal hypotheses generated by the literature. My aim is to understand a new facet of decision making and confirm and expand its theory through the exploration of my independent and dependent variables.

At the same time, this research is applied since it was inspired by two realistic problems. The first question was: When group facilitators or managers in decision-making groups reward individual group members for their contribution and not the entire group, can they expect the group to achieve consensus? Geared toward the proper management of conflict, the second question was: What type of conflict management should facilitators promote to build consensus while at the same time increasing the perception of decision quality? As an output of my experiment and the

literature search, I addressed these practical problems by generating a list of guidelines facilitators can use in future group processes.

Considering the acquisition of information about the unknown, this research is also deductive in nature. Deductive research begins with a theory. I collected data to test this theory. Hypothesis testing is aimed at affirming or rejecting the accuracy of this theory or concept. Therefore, I moved from theory to facts. My research is deductive, because I supported my conceptual model based on theory and common sense.

## **Scenario**

### **Description of the movie and the experimental task by J. Hall (1971)**

The movie "12 Angry Men" is a jury-room drama. It is a feature length movie released by United Artists with veteran actors, including Henry Fonda, Lee Cobb, and E.G. Marshall.

The movie begins as 12 weary jurymen with vastly different backgrounds and personalities receive instructions from the judge in a murder trial, then file into the jury-room. It appears their deliberations will be brief. They are eager for a quick verdict. It's a hot day and they're tired and close to agreement. They've heard overpowering testimony that the teen-aged defendant had killed his father with a knife. They take an informal poll and all are willing to vote "guilty" except one man played by Henry Fonda. The verdict is eleven to one, guilty. They continue to deliberate and each man explains how he feels about the case. Many try to persuade the maverick juror to go along. E.G. Marshall, as a very objective stockbroker, tallies all the facts

in the case and concludes the boy is obviously guilty. Still, says Fonda, there is reasonable doubt.

After 35 min of movie time the jurors take a second vote--this time by secret ballot, with Fonda abstaining. When the foreman (Martin Balsam) counts the slips of paper, ten jurors vote for guilty and one for not guilty. (In my methodology, I turned the movie off at this time.)

### **Characteristics of the Scenario**

The task for my experiment was subjective and imprecise since there was ambiguity in the storyline. This ambiguity offered plenty of opportunity for group discussion. During the movie, I expected the subjects in my experiment to develop different impressions of the twelve angry men. In the movie, Lee Cobb revealed that his son, about the same age as the defendant, was cowardly, ungrateful, and disrespectful. Some subjects took this to mean that Cobb would be one of the last to change because he was prejudiced against all young people. Others thought Cobb was brooding over his lost son and would atone for his own mistreatment and lack of understanding for his son by giving the defendant a symbolic last chance. Still others may have argued from a different perspective that Cobb would be the last to change his vote because Hollywood film-makers would want to save a famous star for a last dramatic hold-out in the movie. These arguments offered sufficient potential for disagreement.

However, the task was not entirely ambiguous. I believe subjects didn't get discouraged due to their perception of an insufficient amount of available information. In the first 35 min of the film, scriptwriter Reginald Rose foreshadowed the outcome by supplying insights into each juror. Jack Klugman, for example, revealed he was

raised in a slum environment similar to the defendant's. Ed Bergly, as an overtly bigoted old garage owner, is incredulous that anyone could fail to see guilt in the dark-skinned defendant. And Jack Warden implied he would go along with any decision to speed up the deliberations; his intention was to go to a baseball game across town.

### **Experimental Task**

I told the subjects in the experiment that on the basis of what they had seen about the jurors in the movie--their occupations, their backgrounds, and their apparent biases and personalities--to predict the sequence all jurors would change their verdict from guilty to not guilty. The exercise became a simple rank-order exercise ranking the jurors from one to eleven. Since Henry Fonda was the first to change his vote, he was ranked one. Subjects had seating charts of the twelve jurors available to take down notes during the movie. (See Appendix C.) The subjects' task was not to predict if the accused was guilty or not.

### **Groups**

#### **Group members**

For my study, I used 120 students in an introductory psychology class and placed them into thirty groups of four students. I suspected males and females to behave differently under collaborative and competitive conflict management conditions. For example, a man may perceive a group process as collaborative while a woman may perceive the same process as competitive. Controlling for gender required me to have an equal distribution of males and females in my groups--two males and two females per group.

### Facilitators

Although one of the objectives in this research is to provide guidelines for facilitators, I chose to run groups without facilitators. The addition of one facilitator per group would have increased the random variation in groups because each facilitator behaves differently. Training facilitators would have required much time without eliminating the variation. I believe I was able to minimize experimental variation by providing written guidelines concerning incentive structures that proctors read to their groups. In my experiment, this written statement replaced the facilitator. Since my experiment didn't make use of facilitators, there may be concerns that written instructions don't permit me to make recommendations to improve facilitator effectiveness on how to manage conflict. However, recommendations would only be valid if they stemmed from a clear understanding of the interplay between the independent and dependent variables of this research. To achieve this understanding, I believed I needed to reduce methodological variation. Further research should include facilitators applying the written guidelines.

### Group size

The literature says the ideal group size for evaluating and judging tasks is generally five (Nutt, 1989). When I helped proctor a graduate student's experiment, who had groups of five subjects, I noticed group interaction was minimal and therefore, in my opinion, undesirable. I believe poor group interactions were a result of the type of the task he used called "Lost on the Moon" and the larger group size. Yukl (1989) believes the amount of participation can be increased if groups are smaller because each group member has more time to speak. Therefore, I believe a smaller and even group size of four would have been more appropriate in this experiment. Another reason supporting the use of even-sized groups is that it is more difficult to use a majority voting

procedure for the decision-making process. Majority voting isn't desirable, since it reduces the number of group interactions. In groups of four, the vote might be a split vote with no prevailing majority. Odd-size groups will always be able to make a decision by majority vote. The last reason to use a group size of four rather than any larger size is due to the behavioral observation task. I worry that proctors have a difficult time as it is to keep track of four group members speaking, and categorizing their verbal behavior. Increasing the group size increases the complexity of the proctors' task and causes a reduced accuracy in the data. Therefore, to increase the sample size of groups, the subjects' participation, decrease the chances of majority voting, and ease the proctors' task during behavioral observation, I used four subjects per group.

### **Manipulation**

This research investigates how groups can achieve consensus and perceived decision quality. In my pilot study, I told groups in both conditions I expected them to be consensus groups and briefly explained to them what consensus was. I have come to believe this was a mistake. (See Appendix J.) The goal in the experiment was to have group members either compete or collaborate throughout the group process. The consensus statement seemed to work only in favor of the collaborative groups. Competitive groups were confused by the demand to produce consensus while at the same time having to compete. Therefore, I didn't subject any groups to a consensus statement asking them to come to consensus on their decision.

In the "Conceptual Model" section of this document, I list incentive structures as a variable that can influence a group to either collaborate or compete. I manipulated this variable to make sure my groups were managing conflict competitively and

collaboratively. I used monetary and grade-rewards as incentives producing two conditions. First, competitive conflict management groups received instructions saying the person whose individual pre-group discussion ranking was closest to the group ranking was to receive money and an extra-credit point. One way subjects could ensure the group ranking was closest to their pre-group discussion ranking was to impose their individual ranking solution on the group. Therefore, the individual reward should have led to competitive conflict management between group members. Second, collaborative groups received incentives to compete as a group against other groups who had the same task. In this case, the reward was based on the group with the best ranking. This intergroup competition should have encouraged intragroup collaboration (Coser, 1956). The instructions I used in the experiment for each condition are stated next:

Instructions for the competitive conflict management condition:

*You are in a contest with other individuals in this experiment. The individual in this group whose individual ranking is closest to the group ranking is rewarded with \$10 and one extra class credit.*

Instructions for the collaborative conflict management condition:

*You are in a contest with other groups doing the same experiment. The group having the most correct answer according to the ranking in the movie is rewarded with \$10 and one extra class credit per group member.*

## Procedural Flowchart

Figure 10 is a representation of the experimental procedure in graphical form.

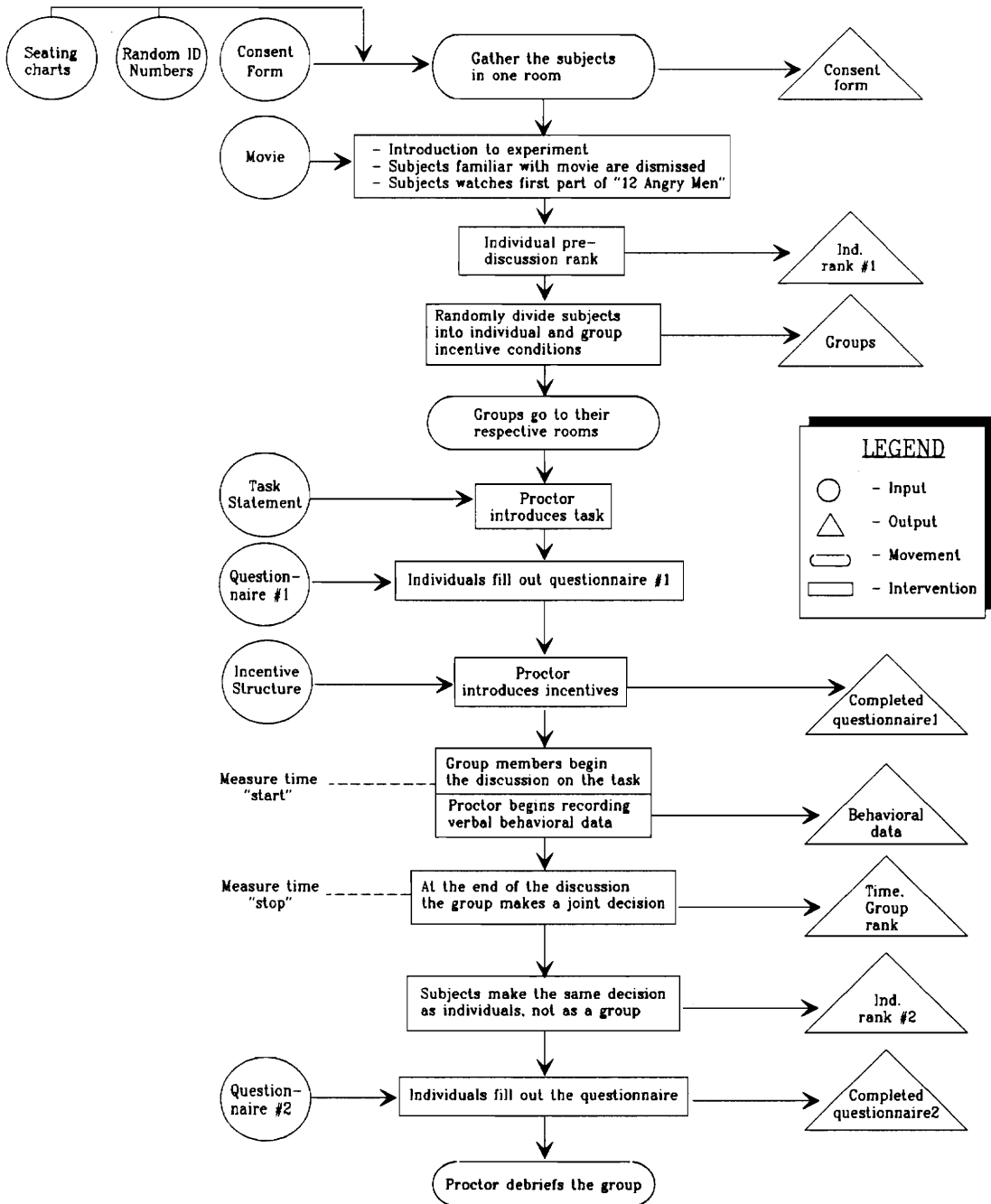


Figure 10: Specific Procedure Flow Chart

The following text describes the flowchart in Figure 10 in more detail. The total time span of the experiment, excluding the waiting time for all subjects to show up, was approximately two hours.

- 1) As subjects walked into the room, the proctors gave each one a random ID number, a pencil, and a seating chart used for identifying the characters in the movie. The proctors used the ID number to assign the subjects to conditions later on.
- 2) Subjects filled out the consent form.
- 3) I, the experimenter, told the subjects that they were about to watch a movie called "12 Angry Men" made in the fifties. The setting was a jury room and the main actor was Henry Fonda. Again, as on the sign-up sheet for the experiment, I reminded the subjects they weren't allowed to participate in the experiment if they had seen the movie or play at any time. I told the subjects the objective in the experiment was to watch part of the movie and pay particular attention to the different characters. They had to predict the second part of the movie by watching the first part. The group watched the first part of the movie lasting about 35 minutes. During this time, the experimenter began to assign randomly subjects to the individual and the group incentive conditions. After the movie was over, the subjects used their seating charts and, as individuals, rank-ordered the sequence in which the twelve jurors change their vote.
- 4) I assigned one proctor to each group. Each proctor was responsible for one group and took the group to the designated room.
- 5) The proctor used an overhead projector to read the task statement in front of all subjects. This way, subjects could read the instructions themselves while at the same time listening to them. The task statement explained that subjects had to determine as a group the order in which the other eleven jurors would be changing

their verdict from guilty to not guilty. The subjects had a seating chart of the jury to familiarize themselves with the film's characters. They ranked Henry Fonda as juror #1, since he was the first to vote not guilty. The next character the group thought to change his vote was ranked #2, etc.

- 6) Group members filled out the first short questionnaire exploring how comfortable the group members felt. I called this instrument SID (Subjects's Index of Discomfort). There were no formal hypotheses stated for the data collected with this instrument. The purpose was only to log data for exploratory reasons.
- 7) The proctor made use of the overhead projector and read the incentive structure statement.
- 8) Group members began to discuss the task. At the same time, the proctor began observing the group discussion and took notes on group members' verbal behavior. The proctor had a form on which he or she checked the sequence in which the subjects spoke and if they asked task relevant questions, shared task relevant information, or shared non-task relevant information.
- 9) During the group process, groups made their joint decision as they went along. After the group had concluded its group decision making process, the proctor collected the individual and the group ranking to calculate who won the prize.
- 10) After the group made the decision, individuals were asked to make the decision again for themselves. This remaking of the decision permitted a mathematical calculation of consensus through Kendall's *W*.
- 11) Group members filled out the second questionnaire. It included questions pertaining to: consensus (commitment, acceptance, agreement, understanding, satisfaction), perceived decision quality, a manipulation check, group atmosphere questions, and SID.

12) When group members were debriefed, they didn't receive the answer for the correct ranking. Further, I didn't reveal any of my hypotheses or other reasons for running the study. The experimenter asked subjects not to talk about the experiment with their fellow class-mates since other groups were involved in the same exercise the following day.

On the way out, group members were paid their monetary reward and told they received the one extra credit point if they were the most successful in achieving the goal set out in the two incentive structures. Subjects in the group incentive condition received a reward if their group achieved the best score among all other groups.

The subjects exposed to the individual incentive structure whose individual rank was most similar to the group ranking were rewarded the monetary and grade reward.

There was little chance for subject deception at the end of the experiment, since the two manipulations for both conditions set subjects' expectations on the rewards.

13) After the experiment was completed, the subjects' psychology professor told all participants of the experiment they all had received the third class credit, not just those who had the best scores in the experiment.

## **Measures**

My questionnaire consisted of 39 questions, 35 questions on a Likert-type scale from 1 to 7, and 4 open-ended questions geared toward eliciting the general feeling about the experiment. Questions measured perceived consensus (five-item scale), perceived decision quality (eight-tem scale), collaborative conflict management (five-item scale), competitive conflict management (five-item scale), group atmosphere questions (six-item scale), and SID (Subjects' Index of Discomfort) (five-item scale).

### Perceived consensus

I measured perceived consensus with five variables: agreement, acceptance, satisfaction, commitment, and understanding. Further, when I measured perceived consensus, I measured perceived group consensus. I define group consensus as an aggregate of an individual's perceptions of other group members' consents.

Perceived consensus:

- 1) The final group ranking doesn't represent the preferences of everyone in my group (acceptance).
- 2) My group reached agreement on the topic we discussed (agreement).
- 3) If asked to defend my group's solution, I believe the other group members would do so (commitment).
- 4) If the other group members were asked, to what degree do you think they are satisfied with the group decision (satisfaction).
- 5) Some of us did not understand all the information that was shared (understanding).

### Actual consensus

I was able to calculate mathematically a score for consensus by comparing the difference between each group member's individual second ranking. The second ranking took place after the group had jointly made a decision. The statistical procedure used was Kendall's coefficient of concordance (Kendall's  $W$ ).

### Perceived decision quality

I measured the individuals' perception of how good they believed their decision was. The first three questions were directly aimed at the decision, whereas questions 4 through 8 were perceived individual consensus questions. (Refer to "New evidence" in

"Literature Review" for an explanation.) Perceived individual consensus is the degree to which the individuals consent to the group decision.

#### Perceived decision quality

- 1) The final group ranking was the best decision we could make.
- 2) My group's ranking is incorrect.
- 3) I think my group arrived at a good decision.
- 4) I'm willing to accept the group's solution as my own (acceptance.)
- 5) I disagree with the group decision (agreement).
- 6) If asked to defend my group's solution, I would be willing to do so (commitment).
- 7) I'm dissatisfied with the decision my group reached (satisfaction).
- 8) I understood all the information that was shared (understanding).

#### Conflict management style manipulation check

The purpose of the manipulation check here was to determine if and to what extent my individual incentives really caused groups to be competitive and to what degree the group incentives really caused collaborative group behavior. This manipulation check coincided with the two assumptions I intended to confirm. The questions here were modified from the Thomas-Kilmann Conflict Mode Instrument.

#### Collaborative conflict management:

- 1) I sought the other's help in working out the solution.
- 2) I attempted to get all concerns and issues out in the open.
- 3) I told other group members my ideas and asked for theirs.
- 4) I attempted to work through all the differences immediately.
- 5) I was concerned with satisfying all our wishes.

Competitive conflict management:

- 1) I was firm in pursuing my goals.
- 2) I tried to win my position.
- 3) I tried to convince the other group members of the merits of my position.
- 4) I tried to show the other person the logic and benefits of my position.
- 5) I pressed to get my points made.

### **Data Analysis**

Figure 11 shows a data flowchart to visualize the process used to analyze the data. The first step in my data analysis was the evaluation of my instruments. I used a Cronbach's alpha measure to assess the reliability of the instruments. I use several models for testing the hypotheses. I set the alpha value at 0.02. In case the value of  $p$  for any particular test is below 0.02, I will reject the null hypothesis. To reduce Type I error, I lumped four hypotheses into one major statistical umbrella model, a multivariate analysis of variance (MANOVA). This reduced the value for "n" in the overall Type I error equation to four<sup>6</sup>. The smaller the value of "n," the better. The hypotheses I lumped into the MANOVA model used the individual subjects as unit of analysis. The hypotheses included Hypothesis1.a, Hypothesis1.b, Hypothesis4.b, Hypothesis4.c. What can't be readily seen from the figure is that a MANOVA permits me to discriminate gender as well without increasing my Type I error. The other hypotheses could not be included in the umbrella model since they either used the

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<sup>6</sup> Type I error refers to the incorrect rejection of a true null hypothesis. The Type I error for the analysis of my data set is  $1-(1-0.02)^4 = 0.078$ . The four statistical models I use are one MANOVA, one regression model, one Spearman rho correlation, and one Mann Whitney-U test.

group as the unit of analysis, or didn't include categorical data as independent measures.

To test the two main hypotheses (Hypothesis2, Hypothesis3) in this experiment (see p.42 for explanation), I would have liked to show the cause-effect relationship between conflict management strategies and the group process outcomes. However, since the data for the dependent and the independent variables were all collected at the same time after the group process, it isn't possible for me to show a cause-effect relationship. To the best of my knowledge, a correlational analysis is the only appropriate method of testing Hypothesis2 and Hypothesis3, because I gathered the data after the fact.

I used a regression model to test Hypothesis2.b, Hypothesis2.c, Hypothesis3.b, and Hypothesis3.c. Since my independent measures were not categorical data, but scale data, a correlational analysis such as the regression was suitable. Further, the regression allowed me to hold one of the dependent measures constant while determining the effects on the other.

For hypotheses using the group as the unit of analysis (Hypothesis2.a, Hypothesis3.a, Hypothesis4.a), I used Kendall's coefficient of concordance ( $W$ ) to calculate the actual consensus scores for all group members. Using the Spearman correlation, I tested Hypothesis2.a and Hypothesis3.a, correlating conflict management styles and actual consensus. Finally, I tested hypothesis Hypothesis4.a using a Mann-Whitney-U t-test. This t-test indicates whether the incentive structures produced significantly different levels of actual consensus.

My perceived consensus measure consists of five sub-measures. It includes understanding, agreement, acceptance, satisfaction, and commitment. For each variable, I have one questions on a scale from 1 to 7. To calculate a perceived consensus score, I calculated the average score of these five variables. I used the same concept to calculate a score for perceived decision quality. Both perception measures used the individual as the unit of analysis, whereas Kendall's coefficient of concordance ( $W$ ) used the group as unit of analysis to calculate the actual consensus.

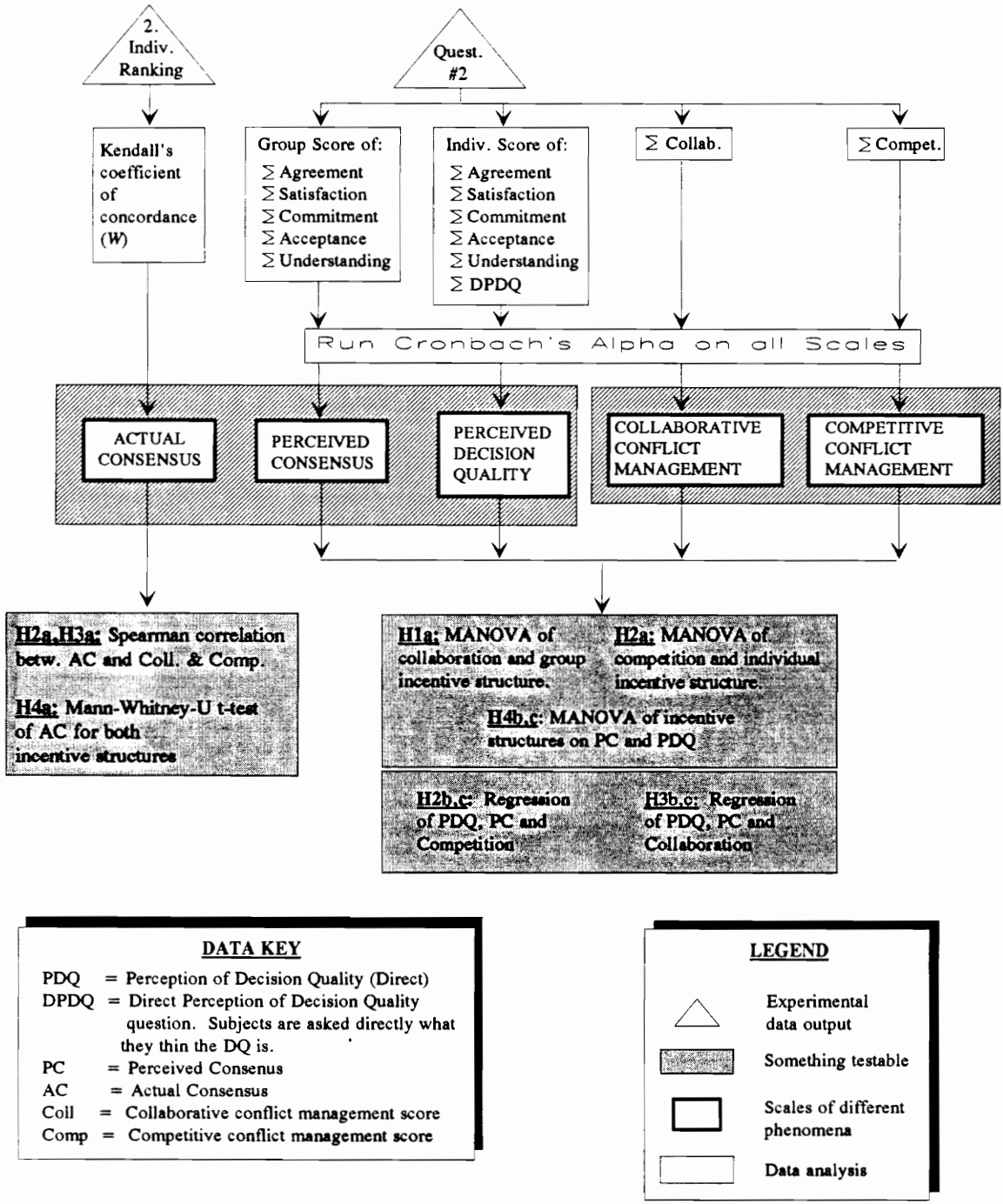


Figure 11: Flowchart for Data Analysis

## VARIABLES TO EXPLORE

I measured several other dependent variables using a mixture of behavioral observations and questionnaires. These dependent variables are neither built into my conceptual model nor mentioned in my research model. I was interested in looking at these dependent variables just for exploratory purposes--for example, to possibly find support that individual and group incentive structures not only affect people's perception of a group process (measured through the questionnaires), but also their verbal behavior (measured through observation). There are four additional dependent measures: 1) subjects' verbal behavior, 2) subject's index of discomfort (SID), 3) subjects' perception of group participation, and 4) group atmosphere.

### **Behavioral Data**

Proctors in the study collected behavioral data during the subjects' decision making process. The behavioral data acquisition form permits verbal behavior to be grouped into four categories. First, proctors check which group member spoke, then they decide if the statement was a task related question, task related information, or an off-task related remark. The form is shown in Appendix H.

### **Training of proctors for behavioral measures**

Measuring behaviors is difficult when observers have to make judgment calls about the categories a particular behavior falls into. More difficulties arise when the behaviors in a particular situation occur at a very rapid rate. To obtain a measure of the behavioral data quality, I trained my proctors. I videotaped a mock-decision making group having very similar characteristics and task as the decision making groups in my experiment.

The mock decision-making group consisted of two male and two female graduate students involved in a ranking task.

During the two-hour proctor training, I specifically taught proctors how to use the behavioral data form. I chose several short clips from the training video exemplifying the categories on the behavioral data form. Proctors were asked to rate each clip according to the verbal behavioral categories on the form. After each clip, I provided them with the correct answer. Through this iterative process, the variance of the proctors' decisions was generally reduced. I didn't use very precise means to measure the variance among the proctors' rankings. Rather, I guessed on the number of correct answers proctors had achieved by inspecting their rank forms visually to my correct key. I aimed to achieve an 80% accuracy. After having trained all proctors, there was only one proctor who didn't meet the 80% criteria. This proctor had difficulty distinguishing the voices on the video tape. However, I felt this individual was still capable to partake in the experiment, because the training tape was far more difficult than the anticipated actual group process. Instead of a small TV screen with one loudspeaker, the proctor was observing the whole group from nearby and was better able to distinguish the voices of the four group members.

### **Subjects' Index of Discomfort**

In addition to measuring verbal behavior, I designed a short questionnaire on the subjects' level of discomfort, referred to as SID. The purpose of this measure was to determine the level of subjects' perceived physical and psychological discomfort before the group process began and when it was over. I hoped to find different levels of discomfort for collaborating and competing conditions. SID is an accumulation of questions I believe to measure a person's level of well-being. Although I have no

literature back-up on this phenomena or the questions I asked in the instrument, I believe collaborative versus competitive conflict management styles have different effects on group members. Intuitively, I believed subjects' in collaborative groups felt less stressed and frustrated, than subjects in competitive groups. Here are the four dichotomous scales:

*Q.: On a scale from 1 to 7, how would you describe your general "state of mind"?*

- |                |   |   |   |   |   |   |   |               |
|----------------|---|---|---|---|---|---|---|---------------|
| 1) Satisfied   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Frustrated    |
| 2) Stressed    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unstressed    |
| 3) Comfortable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Uncomfortable |
| 4) Relaxed     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Tense         |

### **Group Atmosphere**

The individual's perception of discomfort or stress might be correlated to a group perception. I measured this group perception with the group atmosphere questions. Additional questions included manipulation checks. I asked group members' perception of whether their group process was collaborative or competitive. Further, I asked their perception of the two dimensions Thomas and Kilmann (1974) used to operationally define the distinction between different conflict management styles. These two dimensions are cooperation and assertiveness. The dimensions are graphically illustrated in Figure 7. I assumed a positive perception of the group atmosphere might be related to low individuals' levels of discomfort. Here is the list of all group atmosphere questions from the questionnaire:

*Q.: On a scale from 1 to 7, how would you describe the group's atmosphere?*

- |                |   |   |   |   |   |   |   |                 |
|----------------|---|---|---|---|---|---|---|-----------------|
| 1) Friendly    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unfriendly      |
| 2) Supportive  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Non-supportive  |
| 3) Cooperative | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Non-cooperative |
| 4) Assertive   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Non-assertive   |
| 5) Competitive | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Non-competitive |

- |                  |   |   |   |   |   |   |   |                   |
|------------------|---|---|---|---|---|---|---|-------------------|
| 6) Accepting     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Rejecting         |
| 7) Collaborative | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Non-collaborative |

**Perception of Influence on the Group Decision**

As a last exploratory dependent variable, I wanted subjects to estimate the proportion of influence each group member (including themselves) had on the final group decision. I thought this questionnaire measure might support some of the behavioral data concerning the frequency of verbal behavior. For example, if behavioral data showed one individual in a group spoke more often than anyone else, was he or she also perceived to have influenced the group decision more than other group members? On the questionnaire, subjects estimated the percentage each group member influenced the final decision and tagged each response with the subject ID number.

*Q.: Estimate the proportion of influence each group member (including yourself) had on the final group decision?*

Percent influence; ID# _____	%; ID# _____
Percent influence; ID# _____	%; ID# _____
Percent influence; ID# _____	%; ID# _____
Percent influence; ID# _____	%; ID# _____
-----	
Total	100 %

**Exploratory Data Analysis**

Due to the less-structured approach of exploratory data analysis, statistical limitations are less stringent and don't need to be discussed here. In the RESULTS AND DISCUSSION OF EXPLORATORY ANALYSIS section, I will mention the types of tests I used to analyze these additional exploratory variables.

## RESULTS

This chapter presents the results from testing my hypotheses<sup>7</sup>. I set alpha at 0.02 for all tests. All hypotheses based on the individual unit of analysis were supported with the exception of one, while no hypotheses based on the group unit of analysis were supported. Individual and group incentive structures caused group members to perceive conflict to be managed competitively or collaboratively, respectively. I tested this relationship as a manipulation check. Collaborative conflict management increased subjects' perceptions of consensus and decision quality, while competitive conflict management reduced subjects' perceptions of consensus and decision quality. The use of either incentive structure predicted subjects' perceptions on the strength of consensus and decision quality concerning the ranking exercise they completed.

I ran the experiment over a period of two days, one session per day. Each session included 60 subjects drawn from an introductory psychology course at Virginia Tech. A total of 63 males and 57 females took part in the study. The first session consisted of 7 groups exposed to the group incentive structure and 8 groups exposed to the individual incentive structure, while the second session had 8 groups exposed to group incentives and 7 groups exposed to individual incentives. Therefore the sample size for the individual unit of analysis was 120. Because all groups had four subjects the group unit of analysis had a sample size of 30.

### **Internal Consistency of Scales**

For this study, I used a four-scale questionnaire. The items on the perceived consensus scale I used are similar to the scales other researchers at MSL (Brubaker, 1990; Polk,

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<sup>7</sup> For the analysis of the data in this experiment, I used SAS 6.0 and SPSS 4.1.

1991) have used. Both conflict management scales were modified from Thomas and Kilmann's (1973) conflict mode questions. I computed Cronbach's alpha coefficient for all four scales to check for internal consistency. Alpha scores were acceptable and ranged from 0.66 to 0.88 as shown in Table 2. The Cronbach alpha coefficient for all scales is based on a sample size of 118. The perceived decision quality scale consisted of eight items, while the other three scales had five items each. All scales ranged from 1 to 7. Here is the key for the different variables I'll be referring to in this chapter:

- PC = Perceived Consensus
- AC = Actual Consensus
- PDQ = Perceived Decision Quality
- COLCM = COLlaborative Conflict Management
- COMCM = COMpetitive Conflict Management
- IIS = Individual Incentive Structure
- GIS = Group Incentive Structure
- CTYPE --> Condition consisting of GIS and IIS

**Table 2: Cronbach Alpha Values for Questionnaire Scales**

Scale	k	n	alpha
PC	5	118	0.66
PDQ	8	118	0.88
COLCM	5	118	0.67
COMCM	5	118	0.88

**Individual as Unit of Analysis**

I used a multivariate analysis of variance (MANOVA) model as my umbrella design to test several hypotheses. This model included two categorical independent variables: 1) incentive structures and 2) gender. The four dependent variables were 1) perceived consensus, 2 ) perceived decision quality, 3) collaborative conflict management, and 4) competitive conflict management.

Using the MANOVA model, I found significant differences between the groups in the overall design ( $F = 7.47, p < .01$ ). Therefore, I looked at the univariate ANOVAS to

determine which relationships in the overall design were significantly different for the four conditions set up by the 2x2 design. The independent variables in the design were incentive structures and gender. The descriptive statistics for the univariate ANOVAS are listed in Table 3.

**Table 3: Means and Standard Deviations**

Level: CTYPE	Level: GENDER		PDQ		PC		COLCM		COMCM	
		N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
GIS	MALE	31	5.802	0.800	5.265	0.701	5.484	0.823	4.882	0.819
GIS	FEMALE	28	5.781	0.796	5.507	0.759	5.696	0.688	4.935	0.667
IIS	MALE	31	4.951	0.869	4.600	0.932	5.005	0.691	5.457	1.182
IIS	FEMALE	28	5.125	0.952	4.643	0.932	5.565	0.621	5.548	1.000

All scores for the dependent measures are above the midpoint. Results showed gender wasn't a significant contributor to differences in the dependent measures with the exception of collaboration. Table 4 shows that gender contributed to the different perception of collaboration more significantly ( $F = 8.66, p < .01$ ) than incentive structures [Hypothesis1.a] ( $F = 5.72, p < .02$ ). The interaction of both independent variables relative to the dependent variables was not significant ( $F = 1.75, p > .02$ ).

**Table 4: Analysis of Variance for Collaborative Conflict Management**

Dependent Variable: COLCM					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	2.900	2.900	5.72	0.0184
GENDER	1	4.391	4.391	8.66	0.0039
CTYPE *GENDER	1	0.888	0.888	1.75	0.1882
Model	3	8.180	2.727	5.38	0.0017
Error	114	57.790	0.507		
Corr. Totl.	117	65.971			

For all other dependent variables in the MANOVA, incentive structures were the only significant contributors to differences in the dependent measures. Table 5 shows perceived decision quality was significantly different for either group incentive structures and individual incentive structures ( $F = 23.18, p < .01$ ). This finding supports Hypothesis4.c.

**Table 5: Analysis of Variance for Perceived Decision Quality**

Dependent Variable: PDQ					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	16.971	16.970	23.18	0.0001
GENDER	1	0.170	0.170	0.23	0.6304
CTYPE *GENDER	1	0.278	0.278	0.38	0.5387
Model	3	17.420	5.807	7.93	0.0001
Error	114	83.471	0.732		
Corr. Totl.	117	100.890			

Both incentive structures also produced significantly different results for perceived consensus [Hypothesis4.b] ( $F = 24.28, p < .01$ ) illustrated in Table 6 and competitive conflict management [Hypothesis1.b] ( $F = 11.73, p < .01$ ) illustrated in 7. Therefore all hypotheses I intended to test using the MANOVA model were supported.

**Table 6: Analysis of Variance for Perceived Consensus**

Dependent Variable: PC					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	17.009	17.009	24.28	0.0001
GENDER	1	0.600	0.600	0.86	0.3569
CTYPE *GENDER	1	0.294	0.294	0.42	0.5187
Model	3	17.901	5.967	8.52	0.0001
Error	114	79.858	0.701		
Corr. Totl.	117	97.739			

**Table 7: Analysis of Variance for Competitive Conflict Management**

Dependent Variable: COMCM					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	10.381	10.381	11.73	0.0009
GENDER	1	0.151	0.151	0.17	0.6800
CTYPE *GENDER	1	0.011	0.011	0.01	0.9134
Model	3	10.543	3.514	3.97	0.0098
Error	114	100.909	0.885		
Corr. Totl.	117	111.452			

The second model I ran was a regression analysis to determine the effects of collaborative and competitive conflict management on perceived decision quality and perceived consensus. The bivariate correlation matrix is shown in Table 8, while Tables 9 and 10 illustrate the results of the regression.

**Table 8: Correlation Matrix of Perceived Consensus, Decision Quality, and Both Conflict Management Styles**

Descriptive Statistics				
Variable	N	Mean	Std. Dev.	
COLCM	118	5.428	0.750	
COMCM	118	5.203	0.976	
PC	118	5.000	0.914	
PDQ	118	5.413	0.930	
Pearson Correlation Coefficients Prob >  R  under Ho: Rho = 0				
	COLCM	COMCM	PC	PDQ
COLCM	1.000			
COMCM	0.326	1.000		
PC	0.382	-0.295	1.000	
PDQ	0.536	-0.176	0.800	1.000

The partial correlation between the perception of collaborative conflict management and perceived consensus [Hypothesis3.b] was significant ( $t = 6.69, p < .01, r = .54$ ). Partial correlation between the perception of competitive conflict management and perceived consensus [Hypothesis2.b] was significant ( $t = -5.87, p < .01, r = -.47$ ) as indicated in Table 9. The overall regression of perceived consensus on conflict

management was significant ( $F = 30.01, p < .01$ ). Thirty-four percent of the variance in perceived consensus is explained by the presence of collaboration and competition.

**Table 9: Regression of Perceived Consensus on Conflict Management Styles**

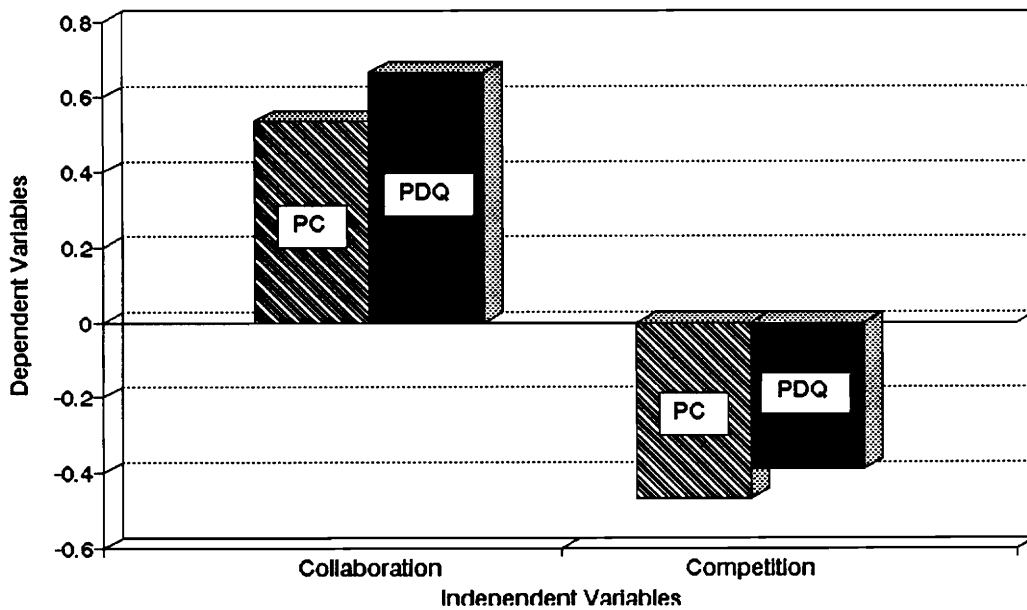
Dep. = PC		Regression			
Source	DF	Sum of Squ.	Mean Squ.	F Value	Prob > F
Model	2	33.525	16.762	30.010	0.0001
Error	115	64.235	0.559		
C Total	117	97.76			
Root MSE	0.747	R-square	0.343		
Dep. Mean	5.000	Adj. R-sq	0.332		
C.V.	14.947				
Parameter Estimates					
Variable	DF	Par. Estim.	T for Ho:	Prob >  T	Std. Estimate
INTERCEP	3.753	0.549	6.836	0.0001	0.000
COLCM	0.654	0.097	6.692	0.0001	0.535
COMCM	-0.439	0.075	-5.873	0.0001	-0.470

Table 10 shows that the partial correlation between the perception of collaborative conflict management and perceived decision quality [Hypothesis3.c] was also significant ( $t = 8.87, p < .01, r = .66$ ) as was the partial correlation between the

**Table 10: Regression of Perceived Decision Quality on Conflict Management Styles**

Dep. = PDQ		Regression			
Source	DF	Sum of Squ.	Mean Squ.	F Value	Prob > F
Model	2	44.860	21.430	42.467	0.0001
Error	115	58.031	0.505		
C Total	117	100.891			
Root MSE	0.747	R-square	0.425		
Dep. Mean	5.000	Adj. R-sq	0.415		
C.V.	14.947				
Parameter Estimates					
Variable	DF	Par. Estim.	T for Ho:	Prob >  T	Std. Estimate
INTERCEP	2.900	0.522	5.556	0.0001	0.000
COLCM	0.821	0.093	8.874	0.0001	0.664
COMCM	-0.373	0.071	-5.246	0.0001	-0.392

perception of competitive conflict management and perceived decision quality [Hypothesis2.c] ( $t = -5.25, p < .01, r = -.39$ ). The overall regression of perceived decision quality on conflict management was significant ( $F = 42.47, p < .01$ ). Forty-three percent of the variance in perceived decision quality is explained by the presence of collaborative and competitive conflict management. Figure 12 illustrates the effect both conflict management strategies have on perceived decision quality and perceived consensus. Collaborative conflict management correlated positively with each dependent variable, while competitive conflict management correlated negatively. The data for Figure 12 stem from Table 9 and 10.



**Figure 12: Correlation of Conflict Management Styles with Perceived Consensus and Perceived Decision Quality**

### Group as Unit of Analysis

The only other hypotheses remaining to be tested were related to a group measure of consensus. I used Kendall's coefficient of concordance ( $W$ ) to calculate mathematically the group's consensus. I labeled this measure actual consensus. I computed the

coefficient of concordance for each group twice. For the first measure, I used the subjects' first individual rank, then I used the subjects' second, or post-group-process individual rank. I was interested in the relative change in the group's consensus before their group process and after their group process. Therefore, I subtracted the groups' second consensus score from their first to get actual consensus. Because of the small sample size on the group level (30), I used a Mann Whitney-U to determine if the actual consensus was significantly different between the incentive conditions (Table 11). The analysis didn't support Hypothesis4.a ( $Z = 1.58, p > .02$ ).

**Table 11: Test if Actual Consensus is Different for Either Incentive Structure**

Dep: AC		Wilcoxon Rank Sum Scores				
CTYPE	N	Sum of Sq.	Expected	Std. Dev.	Mean	
1	15	271.0	232.5	24.109	18.067	
2	15	194.0	232.5	24.109	12.933	
Wilcoxon 2-Sample test (Normal Approximation)						
S	=271.00	Z=1.576	P >  Z	= 0.1150		

To determine the correlation between the conflict management styles and actual consensus [Hypothesis2.a, Hypothesis3.a] I calculated Spearman's rho. Table 12 shows that competitive conflict management was negatively yet not significantly correlated with actual consensus [Hypothesis2.a] ( $r = -.28, p > .02$ ). Collaborative

**Table 12: Spearman Correlation between Actual Consensus and Conflict Management Styles**

Spearman Correlation Coefficients			
Variables	COLCM	COMCM	AC
COLCM	1.0		
	0.0		
COMCM	-0.194	1.0	
	0.303	0.0	
AC	0.053	-0.276	1.0
	0.780	0.139	0.0

conflict management was positively, yet not significantly, correlated with actual consensus [Hypothesis3.a] ( $r = .05, p > .02$ ). Therefore, all hypotheses using the group as the unit of analysis were not supported.

### Summary of Results

Table 13 summarizes all statistical results concerning the eleven specific hypotheses. All hypotheses are stated on page 40-41.

**Table 13: Summary Statistics**

Hypothesis	Supported?	Independent Variable(s)	Dependent Variable(s)	Significant Differences	
				t-, z-, F-value	p-value
Hypothesis1.a	Yes	CTYPE	COLCM	$F = 5.72$	$p = .018$
Hypothesis1.b	Yes	CTYPE	COMCM	$F = 11.73$	$p = .0001$
Hypothesis2.a	No	COMCM	AC	$r = -.28$	$p = .14$
Hypothesis2.b	Yes	COMCM	PC	$r = -.47$	$p = .0001$
Hypothesis2.c	Yes	COMCM	PDQ	$r = -.39$	$p = .0001$
Hypothesis3.a	No	COLCM	AC	$r = .05$	$p = .78$
Hypothesis3.b	Yes	COLCM	PC	$r = .54$	$p = .0001$
Hypothesis3.c	Yes	COLCM	PDQ	$r = .66$	$p = .0001$
Hypothesis4.a	No	CTYPE	AC	$Z = 1.58$	$p = .12$
Hypothesis4.b	Yes	CTYPE	PC	$F = 24.28$	$p = .0001$
Hypothesis4.c	Yes	CTYPE	PDQ	$F = 23.18$	$p = .0001$

PC = Perceived Consensus

AC = Actual Consensus

PDQ = Perceived Decision Quality

COLCM = COLlaborative Conflict Management

COMCM = COMpetitive Conflict Management

IIS = Individual Incentive Structure

GIS = Group Incentive Structure

CTYPE --> Condition consisting of GIS and IIS

## DISCUSSION

The goal of this study was to understand better how incentive structures and different conflict management styles affect the group decision making process and its outcomes. Ultimately, this knowledge has implications for management. This chapter reviews all hypotheses and why I believe they were or weren't supported. I conclude this chapter by proposing several steps managers should consider when they are faced with conflict in decision-making groups. Most of these steps aren't directly supported through the results of my study. Rather my research provides the underlying framework for these steps.

### **Hypothesis Testing**

I repeat each hypothesis, state if it was or wasn't supported, and offer my rationale for the outcome of the statistical tests.

#### **Hypothesis 1.a: Group incentive structures encourage stronger collaborative conflict management than individual incentive structures (supported).**

I used two unique aspects of incentives in this study. First, incentives can be used to establish or introduce a conflict. Second, assuming the incentives are desirable, they can be used to modify specific behavior.

For example, if the incentive is geared toward the entire group, the group as a whole rather than the individual group members within this group is motivated to obtain this incentive jointly. The group receives this reward if it achieves a particular goal other groups don't achieve. This aim represents a conflict at the group level, since there will be disagreement among groups as to who should receive the reward. This

disagreement exists only because the group incentive creates the perception that each group must compete with the other groups to obtain the scarce resource. Therefore, I believe group incentives cause a conflict that groups choose to manage competitively with other groups.

However, group incentives work very much like superordinate goals (Sherif, 1958). When an entire group receives the reward, individual group members within one group see the reward as shareable--all group members receive a part of the group reward. The fact that the reward will be shared reduces individuals' need to compete. Therefore, I believe group incentives encourage individuals to manage conflict collaboratively within the group.

**Hypothesis 1.b: Individual incentive structures encourage stronger competitive conflict management than group incentive structures (supported).**

Another type of incentive is geared toward individuals within a group. This means individuals rather than the group as a whole are motivated to obtain this incentive. If the individual achieves a particular goal other group members didn't achieve, he or she alone receives the reward. This aim represents a conflict on the individual level, since there will be disagreement among the group members as to who should receive the reward. This disagreement exists only because the incentive creates the perception that each group member must compete to obtain the scarce resource within the group. Therefore, I believe individual incentives cause a conflict that group members choose to manage competitively within the group.

**Hypothesis 2.a: Competitive conflict management encourages weak actual consensus (not supported).**

**Hypothesis 3.a: Collaborative conflict management encourages strong actual consensus (not supported).**

**Hypothesis 4.a: Group incentive structures encourage stronger actual consensus than individual incentive structures (not supported).**

I lumped these three hypotheses together since all of them failed to be supported for similar reasons. The rationale behind why I thought they would be supported will be given in the description of the support for Hypothesis2.b, Hypothesis3.b, and Hypothesis4.b.

I believe consensus can be measured in different ways. In this study I included two types of consensus measures. The first is a perceptual measure of individual consensus, the second is a mathematical measure of group consensus only valid for measuring ranking-type problems. I named the mathematical measure actual consensus. I believed both measures would react similarly to the independent variables. However, this wasn't the case.

I list three possible explanations why I believe these three hypotheses involving actual consensus were not supported. First, in my study, actual consensus is measured at the group level. This resulted in a sample size of only 30 instead of 120, causing a reduction in the statistical power of the test. The second explanation lies in the assumption going into the design of both consensus measures. I address two sides of this second point. Actual consensus is a reflection of group members' discrepancies in their individual rankings with the individual rankings of the other group members expressed through Kendall's coefficient of concordance ( $W$ ). On the one hand, this discrepancy only measures the degree to which one group member's ranking agrees with the other group members' ranking, not to what extent the group members agree with the group decision, are satisfied, committed, accept it, and understand the

information going into the decision. Therefore, both types of consensus shouldn't be expected to correlate highly or be similarly affected by the independent variables. On the other hand, I believe firmly that when individuals rank the order in which the twelve jurors changed their vote, they will consciously or unconsciously check these five variables making up perceived consensus. This is the reason why I expected actual consensus to be similarly affected by the independent variables as was perceived consensus. A third explanation for nonsignificance in these three hypotheses was a procedural flaw in the experiment. Two groups achieved perfect actual consensus scores, since they had written their group score on the black board, or the group proctor failed to collect the group score before group members started to fill out their individual post ranking. These individuals copied the group ranking over onto their individual post ranking sheets.

**Hypothesis 2.b: Competitive conflict management encourages weak perceived consensus (supported).**

**Hypothesis 3.b: Collaborative conflict management encourages strong perceived consensus (supported).**

In the LITERATURE REVIEW section under New evidence, I operationally defined perceived consensus as a function of five variables: agreement, acceptance, commitment, understanding, and satisfaction. These variables relate to one group member's perception as to how the rest of the group thinks about the decision. To produce weak perceived consensus, group members must believe the rest of the group scores low on these five variables. A competitive group process, in which group members individually chase a reward, produces these low perceptions of consensus since the goals of group members are contritely interdependent (Deutsch, 1973)--the goals create a win/lose situation. One person can only win if the other people lose. If group members recognize they're losing, they'll have a tougher time making

confirmative statements about the decision with the person who potentially receives the reward. In other words, it is counter intuitive to admit on the one hand you're competing with an individual, yet at the same time admit you have agreement, satisfaction, commitment and acceptance of the group decision. This paradox would produce cognitive dissonance. This dissonance is avoided by either saying you aren't competing with other group members; and, therefore you can justify your agreement with their decisions. The other possibility to avoid this cognitive dissonance is to admit you're competing against other group members and use competition as a justification to disagree with other individual's decisions.

In the case of collaboration, the inverse is true. Group members believe their goals to be promotively interdependent (Deutsch, 1973). These goals create a win/win situation. One group member in the group can only win if all other group members also win. This scenario doesn't produce cognitive dissonance because individual goals coincide with those of the rest of the group. Therefore, not admitting that other group members will score high on consensus in a collaborative group would cause cognitive dissonance. Therefore, group members will be more inclined to score high on perceived consensus.

**Hypothesis 2.c: Competitive conflict management encourages low perceived decision quality (supported).**

**Hypothesis 3.c: Collaborative conflict management encourages high perceived decision quality (supported).**

In the LITERATURE REVIEW section under New evidence, I operationally defined perceived decision quality as a function of five variables: agreement, acceptance, commitment, understanding, and satisfaction. For perceived decision quality, these

variables relate to the individual's perception of the decision. The rationale for the linkage between the two different conflict management styles and perceived decision quality follows the rationale from Hypothesis2.b and Hypothesis3.b closely. Admitting the group decision was of high quality in competitive environment after knowing you won't receive the reward produces cognitive dissonance. A possible way to reduce this dissonance is by either admitting the group process was really collaborative or by not showing support for the quality of the group decision. The opposite is true for the collaborative situation.

**Hypothesis 4.b: Group incentive structures encourage stronger perceived consensus than individual incentive structures (supported).**

**Hypothesis 4.c: Group incentive structures encourage higher perceived decision quality than individual incentive structures (supported).**

My rationale for the support of these two hypotheses is simple. I explained the logic behind Hypothesis1, hypothesizing the effects of the two incentive structures on conflict management. I explained the logic behind Hypothesis2 and Hypothesis3, hypothesizing the effects between conflict management and perceived decision quality and consensus. Hypothesis4 takes both steps at once and merges Hypothesis1 with Hypothesis2 and Hypothesis3. Therefore, if Hypothesis1, Hypothesis2, and Hypothesis3 hold true, theoretically Hypothesis4 should also hold true. The results support this logic.

### **Implications**

The results of this study concerning incentive structures have real-world implications. If we expect individuals to manage conflict collaboratively with other group members, we shouldn't reward the individual alone. Deming (1988) illustrates this concept, when

he contrasts the characteristics of quality circles in corporate United States with those in Japan. He said that in the United States, monetary rewards for a suggestion go to the individual; whereas, in Japan, the benefit is distributed to all employees. Recognition of group achievement supersedes monetary benefit to the individual. Targeting the individual for monetary rewards results in a competitive work environment in the United States where individuals won't pool their ideas for fear they'll either lose the monetary reward or for fear someone else will receive credit for their ideas. This fear shows the problem with individualistic and competitive effort. Competitive conflict management can produce fear and, as a result, information or knowledge must be guarded. By providing rewards to the entire group, individuals learn they can't benefit by protecting information or knowledge, since the individual can only receive rewards if the rest of the group receives rewards as well.

### **Steps Managers Should Consider in Decision Making Groups**

The following are my recommendations to managers of consensus decision making processes. The results of my experiment aren't directly apparent in these steps, yet the steps are represented in my conceptual model of conflict management. The experimental results form the backbone of all steps--the ability to manage conflict in a collaborative fashion. Some elements of these recommended steps stem from the findings of the exploratory section, others are my own convictions.

The following five steps for decision making groups and the associated methods to escalate or reduce task conflict are not intended to be cookbook guidelines as how to deal with conflict. Rather, they should serve as helpful ideas or hints offering possible alternatives to dealing with conflict.

*Step 1: Determine what motivates individuals or how desirable existing incentives are.*

To deal with conflict in a particular fashion, managers need to have a tool allowing them to influence group members' behavior. Incentives structures are a tool to manipulate group process behavior. Often, managers assume money will motivate all people; therefore, we choose to offer extensive monetary incentives for desired behaviors. This may be a fallacy (Henderson, 1989). An open-ended question on the experiments' questionnaire addressed the motivational aspect of the \$10 monetary incentive. Many individuals stated they weren't influenced by the money, but rather by the additional grade incentive. This demonstrates that to maximize the motivational effects of an incentive, it needs to be tailored to the situation and the people involved. One approach to determining the most effective incentives might be through informal conversations with group members or using a questionnaire to elicit individual preferences.

*Step 2: Recognize that group members' predispositions always bear the potential for conflict.*

When individuals gather as a group to make a decision, they bring with them many differences: backgrounds, beliefs, values, etc. Managers should stress the importance of these differences, since they will permit the group to view the same problem from several different angles. Differences could also exist in group members' goals, opinions, and expectations concerning the purpose of the meeting, the actual problem to be dealt with during the meeting, the group process of the meeting, or the other group members attending the meeting. The potential for conflict exists at the outset of any meeting. If conflict doesn't arise during the group process, it was more than likely suppressed.

*Step 3: Set group members' expectations on the type of group process that will be used in the meeting or tell them how they are supposed to interact.*

Before the group process begins, managers should set group members' expectations as to how they are expected to behave during the group process. This expectation reduces group members' anxieties or surprises, especially if they aren't familiar with other group members. The effects of setting the wrong expectations is illustrated in the following example: In organizations such as universities, professors are frequently rewarded according to how many papers they publish each year. At the same time department heads complain about the lack of teamwork and collaboration during planning retreats between faculty members. Among other reasons, rewarding for individual papers is an individual incentive structure that discourages the desired behavior of working together. If collaboration is a desired process descriptor, some incentives should address the group, rather than the individual.

I believe incentives have a natural limit of functionality. They work as long as all group members work for the same department or organization. This means a common authority can provide a common incentive to all group members. An example where this incentive approach may not work well is a meeting convened for the purpose of mediating a conflict between two parties from different organizations, interest groups, or countries. Such a situation poses an infinitely more complex problem, since there is no mutual authority for both groups able to provide a desirable group incentive for all parties in conflict. It may be possible for a conflict mediator to enter the situation. If he or she can gain the trust of both conflicting parties, the mediator may acquire temporarily authority to impose group incentives.

*Step 4: Plan to deal with the conflict.*

Planning to deal with conflict is crucial and requires the overcoming of the natural fear of conflict. Conflict, the communication of disagreement, is not a dangerous phenomena and shouldn't be threatening. However, the way this disagreement is communicated makes conflict constructive or destructive. Conflict is one of the primary tools in a group process to elicit new angles, opinions, information, and alternative solutions required to make a high-quality decision. Research has shown that too little conflict endangers the outcome of the group process and results in poor decisions (Janis, 1972). Groupthink is an example of bad decisions made by groups with too little conflict.

In a group with little stake in the decision, conflict may have to be raised, since group members may not be inclined to raise it by themselves. For group members, raising conflict may mean taking a side, which could be an uncomfortable position to be in. In groups where group members have high stake in the group decision, conflict probably already exists and needs to be managed so it can eventually be resolved. The decision to deal with conflict must however be a conscious one and drive many of the procedural elements of the group process.

*Step 5: Raise, identify and manage the conflict*

I define raising conflict as the escalation or expansion of conflict. The identification of conflict refers to locating the conflict and separating it from the context of the group process to isolate it. By managing the conflict, I mean reducing or attempting to resolve the conflict. If conflicting issues were not brought out in the open, the group loses potential ideas for improving decision quality. If group members attempt to make

a decision without managing the existing conflict first, resentment may be associated with the decision.

In the literature review section I distinguish between task conflict and social conflict. Generally speaking, task conflict (conflict dealing with the purpose of the meeting) should be raised and managed during the group process. Social conflict (personal problems dealing with possibly the personality or the general character among individuals) should be avoided during meetings since it doesn't move the group closer to making a decision on the task. Social conflict creates hostilities and may cause individuals to form factions that aren't based on their beliefs of the meeting's problem, but instead based on personal attraction.

Next, I will suggest methods that will escalate or reduce task conflict in a collaborative fashion. Here are some group techniques that may help escalate the possibility for task conflict while decreasing the possibility of social conflict:

1) *Brain storming*: Brain storming is a widely-used group technique that helps develop new ideas or alternatives through the unrestrained participation of group members in the discussion. An increase in the number of potential alternative solutions also raises the probability of disagreement on these alternatives.

*Brain writing*: Brain writing requires individuals to write their ideas on paper before they communicate them to the entire group. The next step involves passing the written ideas to another person, who may piggyback on some of the written ideas from the previous person and add his own ideas.

- 2) *Role playing:* Devil's Advocacy is one example of role play. In devil's advocacy, individuals are artificially placed into the position of the devil's advocate. His or her role is to question the other group members' information or proposed alternatives causing the group to reevaluate their alternatives. Because the devil's advocate is only filling a role, his or her criticism isn't seen as a personal attack.  
*Dialectical inquiry:* In dialectical inquiry two groups are assigned opposing positions to the problem. Each prepares and presents its arguments. After a full discussion, members drop their assigned positions and reach a solution.
- 3) *Rephrasing the problem statement:* If an insufficient amount of conflict exists, the group facilitator may restate the problem statement in a more controversial or provocative fashion. Another possibility is to tailor the problem statement more specifically to the individuals' areas of expertise. This allows individuals to see more quickly the link between the problem to be solved in the meeting and their ability to contribute to the decision-making process.

Here are some group techniques that may help reduce the possibility for task conflict while decreasing the possibility of social conflict:

- 1) *Partition the problem:* Try to reach agreement on a subset of the problem and hold off difficult parts of the decision until a successful decision is reached on the subset of the larger problem.
- 2) *Summarize different viewpoints in writing:* Ask group members to summarize their different view points on a black board or flip chart. This can be followed by creating a written pros-and-cons list of all the alternatives. Writing helps move an

irrational conflict into more rational domains because it removes the often emotional charged undertone of verbal communication.

- 3) *Identify shared interests and note mutual gains:* In conflicting situations, groups can easily lose sight of elements of a decision they agree on and focus solely on their differences. Stepping back from the conflict and recognizing shared interests and mutual gains the group has already achieved provides time for the parties in conflict to cool off and paints a more optimistic picture of the decision-making process.
- 4) *Use a more structured technique:* Group techniques such as the NGT or the Delphi technique structure the decision-making process and confine the amount of freedom group members have to interact. Limiting the interaction and allotting equal amounts of time for all group members to speak may increase group members' perception of equity. Structuring interactions among group members helps create the perception of a win/win situation since everyone will get the chance to speak and have equal decision-making privileges.
- 5) *Encourage constructive norms:* Develop group norms that all group members, regardless of position, can express their opinions, doubts, hunches, and ideas without fear of being punished. Some groups may go so far as to sign pledge cards saying that no individuals will be punished for voicing controversial ideas or opinions.
- 6) *Change the environment:* In some situations, conflict may persist because of a poor meeting environment. Poor ventilation or the type of seating arrangement may

reduce group members' level of comfort. Taking a break or moving the meeting to a more informal setting such as a country club can reduce the amount of disagreement by providing a physically more appealing and relaxing environment. In my experiment, I found the level of comfort to be an important aspect in the exploratory analysis to achieve perceived decision quality and consensus.

- 7) *Have a third party intervene*: If conflict has escalated to a point where it becomes difficult to control the group process, a third party may be called in to 1) facilitate, 2) moderate, or 3) arbitrate the conflict. In my opinion, the difference in these three techniques lies in the degree of interaction group members have with one another. The largest amount of interaction between the parties in conflict occurs in facilitation; the smallest amount of interaction occurs in arbitration. I think, the more severe the conflict, the smaller the amount of interaction that should exist between the parties in conflict.
- 8) *Introduce superordinate goals*: Superordinate goals are goals that have a higher rank or order than the current group goals. Too much group disagreement can possibly be reduced by introducing a more important group goal that is sure to find more support from all group members than the current goal. Producing a joint group goal can help group members reduce their differences within the group. An example of a superordinate goal could be the introduction of sports events such as playing basketball or sailing competitively against other groups.
- 9) *Adjourn the meeting*: If conflict is at a point where a group has maneuvered itself into a deadlock and the other techniques don't help reduce the conflict, a better idea

would be to adjourn the meeting before the conflict escalates to a point where future work may become impossible.

## RESULTS AND DISCUSSION OF EXPLORATORY ANALYSIS

My previous RESULTS and DISCUSSION sections are in response to my hypotheses stated in the SPECIFIC HYPOTHESES section of the document. My intention is to distinguish clearly those results from the ones not as directly related to these hypotheses, yet have bearing on the general understanding of decision-making groups. In this chapter, I comment on results from gender differences for some of the specific hypotheses, the results of a scale which I believe to measure group members' level of discomfort, differences in group atmosphere, length of the group process, and group members' motivation to acquire the \$10 as an individual or as a group according to the two incentive conditions. Further, I report the findings of a verbal behavioral analysis of the groups. Since this is the exploratory part of my experiment, I'm not concerned about the probability of Type I error. I will use the results of these analyses to recommend an expansion of this study for potential future research. However, I will maintain my cut-off alpha value at  $\alpha = 0.01$  to determine significance.

### Gender Differences for Specific Hypotheses

The model used to test Hypothesis1a and Hypothesis1b also included gender as an independent variable. The interesting finding was that gender was not a significant contributor to the different scores in the perception of competition ( $F = 0.17, p > .05$ ), yet it was a significant contributor to the different perceptions of collaboration ( $F = 8.66, p < .01$ ). The mean collaboration score for females was significantly higher ( $M = 5.63$ ) than the male scores ( $M = 5.24$ ) on a scale from 1 to 7. Although females scored higher on the average on all instruments than males, none of these differences were significant. One possible explanation is that males and females have different perceptions of collaboration and competition. One explanation could be that males

perceive situations more black and white--they are either competitive or collaborative. At the same time, women may find the same situation competitive and collaborative. This would explain why both score equally on competition, yet differently on collaboration. Tables 3-7 in the RESULTS section include gender results.

**Subjects' Index of Discomfort**

People, who find themselves in conflict situations, having to defend their own positions against attacks perceive different levels of discomfort. Some individuals tend to thrive on these circumstances, yet I believe the average person feels more at ease when they can collaboratively manage conflict with other individuals. I can't say what level of discomfort is optimal for consensus decision making or even if there is any such ideal level. The instrument used here measured Subjects' Levels of Discomfort (SID) before the group experiment as a baseline measurement and then immediately after the group discussion. I believed the group incentive would reduce the individual's SID from the baseline because of the resulting collaborative conflict management, whereas the individual incentive would increase the SID from the baseline because of the resulting competitive conflict management. Table 14 lists the Cronbach alpha coefficients for all exploratory scales including SID. The alpha values for the SIDs increased after the experiment. The second time subjects replied to the instrument the alpha value had increased from 0.70 to 0.81. The increase in the alpha value may indicate that subjects for each group had become more homogenous after the joint group exercise.

**Table 14: Cronbach Alpha Values for Exploratory Scales**

Scale	k	n	alpha
SID (before group process)	4	120	0.70
SID (after group process)	4	120	0.81
Group Atmosphere Instrument	8	120	0.88

Table 15 lists the bivariate correlations between conflict management styles, perceived consensus, perceived decision quality, and SID. Just as expected, SID correlated positively with collaboration and negatively with competition. This means, competitive group processes tended to increase the level of discomfort, whereas collaboration reduced the level. Further, SID correlates positively with perceived consensus and perceived decision quality. This finding is interesting, since it supports the emotional aspect of perceived consensus and PDQ. This finding may give further justification for using the satisfaction with the group decision element when measuring PDQ and perceived consensus, which also refers to the emotional state.

**Table 15: Descriptive Statistics and Correlation Matrix for Subjects' Index of Discomfort (SID) and Both Conflict Management Styles PDQ and Perceived Consensus.**

Descriptive Statistics				
Variable	N	Mean	Std. Dev.	
COLLAB	118	5.428	0.750	
COMPETE	118	5.203	0.976	
CONSENS	118	5.000	0.914	
PDQ	118	5.413	0.929	
SID	120	-0.083	1.352	
Abbreviated Matrix of Pearson Correlation Coefficients Prob >  R  under Ho: Rho = 0				
	COLLAB	COMPETE	CONSENS	PDQ
SID	0.249 0.0065	-0.170 0.065	0.390 0.0001	0.415 0.0001

Table 16 shows the results of a regression. The partial correlation between the perception of collaborative conflict management and SID was significant ( $t = 3.71$ ,  $p < .01$ ,  $r = .34$ ). Partial correlation between the perception of competitive conflict management and SID was also significant ( $t = -3.06$ ,  $p < .05$ ,  $r = -.28$ ). The overall regression of SID on conflict management was significant ( $F = 8.79$ ,  $p < .01$ ).

Thirteen percent of the variance in SID is explained by the presence of collaboration and competition.

**Table 16: Regression of Subjects' Index of Discomfort (SID) on Conflict Management Styles**

Dep. = SID		Regression			
Source	DF	Sum of Squ.	Mean Squ.	F Value	Prob > F
Model	2	28.792	14.396	8.793	0.0003
Error	115	188.271	1.637		
C Total	117	217.064			
Root MSE	1.280	R-square	0.1326		
Dep. Mean	-0.076	Adj. R-sq	0.1176		
C.V.	-1677.579				
Parameter Estimates					
Variable	DF	Par. Estim.	T for Ho:	Prob >  T	St. Estimate
INTERCEP	-1.391	0.940	-1.480	0.142	0.0000
COLLAB	0.618	0.167	3.710	0.0003	0.3410
COMPETE	-0.392	0.128	-3.059	0.0028	-0.2810

Further, if changes in the SID were significant for collaboration and competition, they will more than likely also be significant with respect to the two incentive conditions.

Table 17 shows the results of the analysis of variance.

**Table 17: Analysis of Variance for Subjects' Index of Discomfort**

Dependent Variable: SID					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	14.700	14.700	8.52	0.0042
GENDER	1	0.336	0.336	0.19	0.6600
CTYPE * GENDER	1	2.197	2.197	1.27	0.2615
Model	3	17.233	5.744	3.33	0.0221
Error	116	92.951	0.801		
Corr. Totl.	119	117.373			

The table shows that the incentive structure rather than the difference in gender causes the difference in SID ( $F = 8.52, p < .01$ ). The means and standard deviations are shown in Table 18.

**Table 18: Means and Standard Deviations for the MANOVA of Group Atmosphere, SID, and the Amount Subjects Spoke**

Level: Ctype	Level: Gender	N	Amount SUBJECTS spoke		SID		Group Atmosphere	
			Mean	SD	Mean	SD	Mean	SD
GIS	MALE	32	41.78	20.01	0.344	0.849	2.414	0.837
GIS	FEMALE	28	42.82	21.12	0.179	1.467	2.170	0.786
IIS	MALE	32	85.40	65.66	-0.609	1.134	3.348	0.942
IIS	FEMALE	28	70.50	47.95	-0.232	1.720	2.835	1.001

The results of the SID analysis show clearly that both types of incentive structures and both types of conflict management had significant effects on subjects' index of discomfort. Further, as the correlation in Table 15 showed, Subjects' Index of Discomfort can be used as a tool to predict perceived consensus and perceived decision quality.

### **Group Atmosphere**

Very much like the SID, I produced a scale attempting to get at the perception of the group atmosphere. In a sense, the group atmosphere scale could be considered a SID for the group. The rationale behind the scale is that group incentives produce a better group atmosphere than individual incentives. I operationalize the group atmosphere through the individual questions in the scale. They include items such as friendliness, productiveness, helpfulness, etc. Table 19 confirms my hunch that group atmosphere is perceived to be significantly different for both incentive structures ( $F = 24.46, p < .01$ ). I view these results as confirmation of the SID instrument. As a next step, it would be helpful to run a factor analysis on the SID and the group atmosphere instrument, to tune the individual items, or possibly expand or shorten the scales.

**Table 19: Analysis of Variance on Group Atmosphere**

Dependent Variable: Group Atmosphere					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	19.602	19.602	24.46	0.0001
GENDER	1	4.282	4.282	5.34	0.0226
CTYPE * GENDER	1	0.538	0.538	0.67	0.4143
Model	3	24.421	8.141	10.16	0.0001
Error	116	334.045	2.880		
Corr. Totl.	119	366.800			

**Behavioral Analysis**

The purpose of the behavioral analysis was to see if there was a correlation between people's perceptions of the group process and their verbal behaviors. I produced an individual profile of each group member's verbal behavior. During the experiment, proctors for each group logged the quantity of verbal interactions of all group members and classified them according to task questions, shared task information, and off-task verbal behavior. Results (Table 20) showed the difference in the amount of verbal behavior due to gender was insignificant ( $F = 0.76, p > .01$ ). However, incentive structure did contribute significantly to the amount of verbal behavior ( $F = 20.69, p < .01$ ). Groups using competitive conflict management strategies had larger amounts of verbal behavior than groups using collaborative conflict management.

**Table 20: Analysis of Variance for Subjects' Quantity of Verbal Behavior**

Dependent Variable: SUBJECT (quantity of verbal behavior)					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	39277.01	39277.01	20.69	0.0001
GENDER	1	1435.060	1435.060	0.76	0.3863
CTYPE * GENDER	1	1898.68	1898.68	1.00	0.3194
Model	3	42611.297	14203.766	7.48	0.0001
Error	116	220240.29	1898.62		
Corr. Totl.	119	262851.59			

This significance probably results from the difference in the amount of time groups exposed to the two different incentives took to reach the decision. On the average, groups exposed to group incentives took ten minutes less than their individual incentive counterparts in making the decision. I suspect the difference in length of the group process and the amount of verbalization is heavily dependent on the motivation people are given to spend time on the group process. Another reason for the significant differences in the amount people spoke might have been the competitive and collaborative environment. In a collaborative case, group members collaborate, while the group as a whole competes against other groups. In my experiment, collaborative groups were not physically able to see their rival groups, therefore reducing the rivals' impact on the group. In the competitive environment, group members saw their rivals, since they were a part of the group. The impact was more immediate, since individuals felt they had at least a chance to directly influence their rivals.

Table 21 shows the combined results of three regressions. The results support the notion that the variable time is the single significant contributor to the different quantities of task questions ( $t = 6.60, p < .01, r = .86$ ), task related information ( $t = 7.32, p < .01, r = .79$ ), and off-task behaviors ( $t = 3.00, p < .01, r = .59$ ) in the group discussion. I performed this analysis using the group as the unit of analysis. The three independent variables I included in the model were length of the group process (TIME), the average group score of collaborative (COLLMEAN) and competitive (COMPMEAN) conflict management.

Further, I was interested in the relation between actual verbal behaviors and perceptions of behaviors. To compare individuals' verbal behaviors with their perceptions, I correlated the rank of the person who had spoken most to the one who

had spoken least with the rank of group members' perception of how much each group member had contributed to the group decision. If a correlation or relationship existed

**Table 21: Regression of Group's Quantity of Task Related Questions on Length of Group Process, Collaboration, and Competition**

Dep. = QU (Quantity of Task Questions)					
Dep = INFO (Quantity of Task Relevant Information shared)					
Dep = OFFT (Quantity of Off-Task verbal behavior)					
Source	DF	Sum of Squ.	Mean Squ.	F Value	Prob > F
Model (QU)	3	26652.45	8884.15	22.70	0.0001
Model (INFO)	3	490583.51	163527.84	36.63	0.0001
Model (OFFT)	3	1284.76	428.25	5.31	0.0055
Parameter Estimates (QU, INFO, OFFT)					
Variable	DF	Par. Estim.	T for Ho:	Prob >  T	St. Estimate
INTERCEP	1	-31.21	-0.446	0.6590	0.0000
TIME	1	2.20	6.604	0.0001	0.8616
COLLMEAN	1	5.52	0.600	0.5542	0.0637
COMPMEAN	1	-0.72	-0.088	0.9305	-0.0117
INTERCEP	1	-36.17	-0.153	0.8794	0.0000
TIME	1	8.24	7.320	0.0001	0.7947
COLLMEAN	1	-28.41	-0.914	0.3692	-0.0808
COMPMEAN	1	34.34	1.235	0.2277	0.1374
INTERCEP	1	18.29	0.576	0.5696	0.0000
TIME	1	0.45	3.007	0.0058	0.5878
COLLMEAN	1	-4.16	-0.995	0.3289	-0.1585
COMPMEAN	1	-0.23	-0.060	0.9524	-0.0120

between perceptions and behaviors, future researchers will have evidence that 1) my questionnaire measure can be used to infer this particular verbal behavior and 2) individuals' behavior during a group process predicts their perceptions. Table 22 illustrates the combination of the matches between actual behaviors and perceptions of influence on the group decision. The diagonal shows the perfect matches where the perception rank correlated perfectly with the behavior rank.

The results show the highest concentration of matches is along the diagonal. Further, I find it interesting to note that individuals seem to predict better the group members who

were perceived to be most and least influential rather than those in the middle. I also used a Chi-square test of independence to examine if the behaviors depend on the

**Table 22: Verbal Behaviors versus Perceptions of Influence**

	Perception Rank 1	Perception Rank 2	Perception Rank 3	Perception Rank 4
Behavior Rank 1	18	8	3	2
Behavior Rank 2	10	13	3	4
Behavior Rank 3	4	5	14	6
Behavior Rank 4	2	5	6	17

perceptions of influence. The results showed both variables to be related ( $\chi^2_{obs} = 54.65$ ,  $\chi^2_{crit} = 21.66$ ). In addition to the Chi-square test of independence, I used a Spearman rho correlation also using the group as unit of analysis to see in how many groups a positive correlation existed between perceptions and behaviors. Out of 30 groups, 8 groups had a perfect correlation ( $r = 1$ ,  $p < .01$ ). Only 4 groups correlated negatively between perceptions and behaviors. The binomial test of the probability that 26 groups out of 30 groups correlate positively was significant at  $p < .01$ . The Spearman rho correlation says perceptions and behaviors are significantly correlated. The findings indicate that the quantity of people's verbal behaviors leads them to perceive they have influenced the group process. So the quantity of participation rather than the quality of the participation influences group members' perception (a frightening thought).

The behavioral data collection and analysis considerably increased the cost of my experiment, because of the necessary training of proctors and the analysis of the data.

However, I found it worthwhile since I didn't expect to find meaningful results in correlating perceptions and behaviors. The results indicate behaviors can predict perceptions. Therefore behavioral analysis can potentially be used to predict questionnaire measures, situation permitting.

**Causes for Individuals' Desire to Obtain \$10 Reward for Themselves or as a Group**

The motivation for this analysis stemmed from the interest in determining who tried to obtain the monetary incentives and if these monetary incentives were sufficiently motivating.

Table 23 lists the means and standard deviations for the following two questions: 1) Did you try to obtain the \$10 reward individually and 2) Did you try to obtain the \$10 reward jointly as a group. Table 22 shows, on average, males scored higher than females on all categories. In the group incentive setting, males and females felt equally strong about trying to receive money either individually or as a group; whereas, in the individual incentive condition, males scored one point higher on the perception of obtaining the reward individually.

**Table 23: Means and Standard Deviations for the MANOVA of 'Desire to Obtain the \$10 Individually or as a Group'**

Level: Ctype	Level: Gender	N	Obtain \$10 Reward INDIVIDUALLY		Obtain \$10 Reward as a GROUP	
			Mean	SD	Mean	SD
GIS	MALE	32	5.719	1.350	5.719	1.250
GIS	FEMALE	28	5.179	1.588	5.286	1.630
IIS	MALE	32	5.156	1.710	4.125	1.581
IIS	FEMALE	28	4.250	2.102	4.107	1.931

The results of the MANOVA in Table 24 are more explicit. Neither gender ( $F = 5.42, p > .01$ ) nor incentive structure ( $F = 5.60, p > .01$ ) encouraged significant changes in the desire to attain the reward individually. However, incentive structures contributed significantly to the groups' effort in trying to obtain the monetary reward jointly as a group ( $F = 22.85, p < .01$ ) (Table 25). Also, Table 25 illustrates that gender didn't contribute significantly to attempting to obtain the \$10 reward individually ( $F = 5.42, p > .01$ ).

**Table 24: Analysis of Variance on Desire to Obtain \$10 Individually**

Dependent Variable: Obtain \$10 individually					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	16.133	16.133	5.60	0.0196
GENDER	1	15.621	15.621	5.42	0.0216
CTYPE * GENDER	1	1.000	1.000	0.35	0.5567
Model	3	32.755	10.918	3.79	0.0123
Error	116	334.045	2.880		
Corr. Totl.	119	366.800			

**Table 25: Analysis of Variance on Desire to Obtain \$10 as a Group**

Dependent Variable: Obtain \$10 as Group					
Source	DF	Sum of Sq.	Mean Square	F Value	Prob > F
CTYPE	1	58.800	58.800	22.86	0.0001
GENDER	1	1.518	1.518	0.59	0.4439
CTYPE * GENDER	1	1.287	1.287	0.50	0.4807
Model	3	61.605	20.535	7.98	0.0001
Error	116	92.951	0.801		
Corr. Totl.	119	117.373			

This analysis on the motivational aspect of the monetary incentive could have been a very helpful manipulation check. However, the flaw is that using the data I have, I can't evaluate the effect the non-shareable grade incentives had on the decision making process. Since I used both shareable and non-shareable incentives to motivate individuals to collaborate and to compete, both incentives should be in such a

manipulation check. If the results of the same analysis including both incentives were to show significant results at a lower p-value, it would mean a non-shareable incentive increases the motivational aspect over just using monetary incentives. This is another interesting factor that should be studied.

## **WEAKNESSES AND RECOMMENDATIONS FOR FUTURE RESEARCH**

The results of this study are encouraging and have confirmed my belief that collaborative conflict management should be considered the primary conflict management strategy for the purpose of achieving a strong perception of consensus and high perceptions of decision quality in decision making groups. However, there are several weaknesses in the study. I attempt to capture them and introduce possible improvements for future research concerned with similar dependent and independent variables as those used in this research. Some of the weaknesses are in the initial design of the study, others lie in the actual execution of the experiment.

- 1) *Type of incentive structure*: I used two types of incentive structures, which were quite different in nature. I used a monetary incentive as well as extra credit points toward the class grade. I believe the incentives are different, since money is a shareable incentive while extra credit is non-shareable. Proctors who ran and observed the groups, reported several groups decided to split the money among the group members no matter who would win the reward. They shared the incentive, changing the individual incentive basically into a group incentive. Everyone in the group would receive money. Since this problem had also occurred during the pilot study, I had decided to include a non-shareable incentive--the extra credit. However, in this study, I wasn't able to discriminate the effects of shareable versus non-shareable incentives, and which incentive caused the primary motivation. In future studies, I believe the monetary incentive needs to be replaced with a non-shareable, yet desirable reward. The idea was brought up to use T-shirts with a special visually-attractive design, for example.

- 2) *Source of incentive:* In my experiment, an outsider provided incentives to the decision making group. The outsider was a common authority figure to all group members who was not partisan to any individual. How would the outcomes of the incentive be changed if its source came from inside the group rather than outside? An example might be a situation of a conflict between three group members. One of the members involved offers an incentive to the other two members in an effort to resolve the conflict in their behalf. How would the other two members perceive and react to such an incentive. My notion is that incentives from a group member involved in the dispute creates a bargaining situation. The source of the incentive will reduce consensus and decision quality.
- 3) *Conflict management results:* According to the results of this study, collaboration in decision making groups is the desirable conflict management style. However, after having observed some of the groups and having talked to their proctors, I have the suspicion that collaborative groups didn't care as much about the task as did the competitive groups. If group members in collaborating groups had reduced buy-in or stake in the task over competitive group members, can I still support my view that collaboration is the better conflict management approach with respect to the outcome of the group process? If individuals in the collaborative groups had lower buy-in than those in the competitive environment, I believe collaborative groups in my study could have been prone to the groupthink phenomena, producing objectively lower-quality decisions.

To escape this dilemma, the questionnaire should not only test for either collaborative or competitive conflict management, but also for avoidance, accommodation, and compromise--Thomas and Kilmann's (1973) other three

conflict management styles. For example, if group members score higher on avoidance or accommodation, characterized by passivity, than on competition or collaboration, characterized by activity, I believe the fear of groupthink may be substantiated.

- 4) *Behavioral analysis*: To create more reliable behavioral data, I believe all groups would have had to have been video taped. Viewing tapes in retrospect allows raters to count more than just verbal behaviors. The analysis of the tapes should be undertaken by two or three raters at the same time. This provides better opportunities for a true measure of interrater reliability. In case of questionable behaviors, a tape always permits the proctors to evaluate the behaviors a second time.
- 5) *Add group facilitators*: The study is intended to help facilitators improve group processes. However, in my experiment, I omitted the facilitator. A future study might look at a facilitator's effectiveness in increasing or decreasing the amount of conflict in a meeting or regulating the type of conflict management style. For example, facilitators may press group members to examine their assumptions to avoid a groupthink decision.
- 6) *Use real-world groups*: In this research, I've focused my attention on perceived consensus and perceived decision quality. I believe it is important to test objective decision quality. I believe it is difficult in a laboratory experiment to test groups decisions on their objective quality. Therefore, I propose the use of real-world groups. I wonder if perceived decision quality is a good predictor variable for actual decision quality? In real world situations, decision quality can be assessed

after the decision was made and implemented. Therefore, a study using real-world groups may have to be a longitudinal study.

When real-world groups convene for a meeting, I believe their degree of buy-in or stake in the decision may be much higher than laboratory decision making groups who are paid to partake in an experiment they know little about. What effects will increased stake have on the effectiveness of incentive structures to produce collaborative or competitive conflict management?

- 7) *Discriminate according to personality:* Are male subjects more competitive by nature than females and are female subjects more collaborative by nature than males? If this assumption is correct, I would be interested in the difference in perceived consensus and decision quality scores of the two conditions--one consisting of natural collaborators, the other consisting of natural competitors. How will the incentive structures used in this experiment have an impact on their natural conflict management modes?
- 8) *Different types of conflict:* In this study, the conflict driving the discussion was the disagreement on the rankings of the 12 jurors. Another driving force may have been the frustration that someone else may be getting a reward other than oneself. I wonder how the incentives to collaborate and compete would have worked if the nature of the conflict in the meeting had been social conflict? Social conflict is a conflict resulting from emotionally charged interactions including, for example, direct accusations and threats.

## CONCLUSIONS

The findings in this study were encouraging. Group incentives encouraged collaborative conflict management and an increased perception of decision quality and perceived consensus. Individual incentives on the other hand encouraged competitive conflict management and a reduced perception of decision quality and perceived consensus. Also collaborative conflict management was positively correlated with consensus and perceived decision quality, while competitive conflict management was negatively correlated with the same variables.

I failed to show the hypotheses relating to the actual consensus at the group level. The limited sample size of groups was probably the reason for this failure. However, I still believe perceived consensus can be used as a predictor for actual consensus if the statistical power of the test is increased through sample size.

The exploratory analysis section yielded interesting results on group members' perceptions of participatory influence on the group decision and their actual behaviors, which were highly correlated. Occasionally, people raise questions concerning the validity or usefulness of small-group research basing its results solely on questionnaire measures and trying to infer something about the actual group behaviors. While this research has shown that perceptions of group influence were able to predict the individuals' behaviors in the group process, I have become more aware of the transferability problem of perceptual measures to behaviors. I've come to believe many more behavioral studies in small group decision processes need to be undertaken to gain insight into the physique of group dynamics. Perceptual measures are helpful to create a fundamental understanding of group processes. However, when I propose

steps for facilitators in decision making groups, these steps will be implemented as a result of group behavior. Therefore, to fine tune the effectiveness of these steps, we need to measure individuals' behaviors in groups, draw conclusions from the behaviors, cross check them with our knowledge from perceptual measures and cyclically improve the instruments we provide to managers.

## REFERENCES

- Blake, R.R., Mouton, J.S. (1964). *The Managerial Grid*. Houston: Gulf Publishing.
- Brubaker, D.M. (1991). *Predicting Strength of Consensus in Small Groups*.  
Unpublished master's thesis, Virginia Polytechnic Institute and State University,  
Blacksburg, VA.
- Coser, L.A. (1956). *The Functions of Social Conflict*. New York, The Free Press.
- Deutsch, M.A. (1949). A Theory of Cooperation and Competition. *Human Relations*,  
Vol.2, 129-152.
- Deutsch, M. (1969). Conflicts: Productive and Destructive. *Journal of Social Issues*,  
Vol.25, 7-41.
- Deutsch, M. (1973). *The Resolution of Conflict*. New Haven: Yale University Press.
- Deming, W.E. (1988). *Out of the Crisis*. Cambridge: MIT Center of Advanced  
Engineering Study >
- DeStephen, R.S. (1983). High and Low Consensus Groups: A Content and Relational  
Interaction Analysis. *Small Group Behavior*, 143-162.
- Forsyth, D.R. (1983). *Group Dynamics*. 2nd ed Pacific Grove, CA: Brooks/Cole  
Publishing Company.
- Gibb, J. (1961). Defensive Communication. *Journal of Communication*, Vol.11, 141-  
149.
- Hall, J. (1971). Decisions, Decisions, Decisions. *Psychology Today*, Vol.51-54, 86,  
88.
- Hegel, G.W.F. (1974). *The Essential Writings*. New York, Harper & Row.

- Henderson, R.I. (1989). *Compensation Management: Rewarding Performance*. 5th ed, Prentice Hall, INC.
- Hirokawa, R. Y. (1985). Does Consensus really Result in Higher Quality Group Decisions? In G.M.Phillips & J.T.Woods (Eds.), *Emergent Issues in Human Decision Making*. Carbondale: Southern Illinois University Press.
- Hoffman, L.R., Harburg, E., & Maier, N.R.F. (1962). Differences and Disagreements as Factors in Creative Group Problem Solving. *Journal of Abnormal and Social Psychology*, Vol.2, 235-244.
- Holder, J.J. (1972). Decision Making by Consensus. *Business Horizons*, Vol.4, 47-54.
- Janis, I. (1972). *Victims of Groupthink*. Boston: Houghton-Mifflin.
- Johnson, D.W., Johnson, R.T. (1974). Instruction Goal Structure: Cooperation, Competitive, or Individualistic. *Review of Educational Research*, Vol.44, 213-240.
- Johnson, D.W. (1975). *Joining Together*. Englewood Cliffs, NJ: Prentice Hall.
- Johnson, D.W, Maruyama, G., Johnson, R, Nelson, D., & Skon, L. (1981). Effects of Cooperative, Competitive, and Individualistic Goal Structures on Achievement: A Meta-Analysis. *Psychological Bulletin*, Vol.89, No.1, 47-62.
- Kaprzyk, J., & Fedrizzi, M. (1988). A Soft Measure of Consensus in the Setting of partial (fuzzy) Preferences. *European Journal of Operational Research*, Vol.34, 316-325.
- Katz, D., Kahn, R.L. (1972). *The Social Psychology of Organizations*. 2ed. John Wiley & Sons, INC, New York.
- Leedy, D. P. (1989). *Practical Research: Planning & Design*, 4ed. Maccmillan Publishing Company.

- Love, R.L., Rozelle, R.M., Druckman, D. (1983). Resolving Conflicts of Interests and Ideologies: A Simulation of Political Decision Making. *Social Behavior and Personality*, Vol.11, No.2, 23-28.
- Maier, N.R.F., & Solem, A.R. (1952). The Contribution of the Discussion Leader to the Quality of Group Thinking. *Human Relations*, Vol.3, 155-174.
- Miner, F.C. (1979). A Comparative Analysis of Three Diverse Group Decision Making Approaches. *Academy of Management Journal*, Vol.22, 81-93.
- Nelson, R.E. (1989). The Strength of Strong Ties: Social Networks and Intergroup Conflict in Organizations. *Academy of Management Journal*, Vol.32, 377-401.
- Nutt, P.C. (1989). *Making Tough Decisions: Tactics for Improving Managerial Decision Making*. San Francisco: Jossey-Bass Publishers.
- Pettigrew, A. (1973). *The Politics of Organizational Decision Making*. London: Tavistock.
- Pfeffer, J. (1981). *Power in Organizations*. Boston: Pittman.
- Polk, J. W. (1991), *The Effects of an Expert on the Small-Group Consensus Process*. Unpublished master's thesis, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Polk, J. W., Koball, E. (1991), *Factor Analysis of MSL's Consensus Questionnaire*, Unpublished pilot study, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Pood, E.A. (1980). Functions of Communication: An Experimental Study in Group Conflict Situations. *Small Group Behavior*, 76-87.

- Rabbie, J.M., Wilkens, G. (1971). Intergroup Competition and its Effects on Intra- and Intergroup Relations. *European Journal of Social Psychology*, Vol.1, 215-234.
- Scheff, T.J. (1984). Toward a Sociological Model of Consensus. *American Sociological Review*, 32-46.
- Schmidt, S.M., Kochan, T.A. (1972). Conflict: Towards Conceptual Clarity. *Administrative Science Quarterly*, Vol.17, 359-370.
- Sherif, M., Harvey, O.J., White, B.J., Hood, W.R., Sherif, C.W. (1961). *Intergroup Conflict and Cooperation: The Robber's Cave Experiment*. Norman, Oklahoma: University of Oklahoma Press.
- Simmle, G. (1955). *Conflict and the Web of Group-Affiliation*. New York: Free Press.
- Stone, E.F. (1981). *Research Methods in Organizational Behavior*. Glenview, IL.: Scott Foresman
- Thomas, W.K., Kilmann, R.H. (1974). Thomas-Kilmann Conflict Mode Instrument. Tuxedo, New York: XICOM, INC.
- Thomas, K. (1976). Conflict and Conflict Management. In M. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology*, 889-935. New York: Rand McNally & Co.
- Tjosvold, D., Field, R.H.G. (1983). Effects of Social Context on Consensus and Majority Vote Decision Making. *Journal of Social Psychology*, 500-506.
- Tjosvold, D., Andrews, I.R., Jones, H. (1983). Cooperative and Competitive Relationships between Leaders and Subordinates. *Human Relations*, 36, 1111-1124.
- Tjosvold, D. (1984). Cooperation Theory and Organizations. *Human Relations*, 743-767.

- Tjosvold D. (1987). Making Conflict Productive. In R.W. Beatty, H.J. Bernstein, & J.E. Nickel (Eds.), *The Productivity Handbook* (184-189). Amherst, MA: Human Resource Development Press.
- Wall, V.D., Nolan, L.L. (1986). Perceptions of Inequity, Satisfaction, and Conflict in Task-oriented Groups. *Human Relation*, 1033-1052.
- Wall, V.D., Galanes, G.J., & Love, S.B. (1987). Small, Task-Oriented Groups: Conflict, Conflict Management, Satisfaction, and Decision Quality. *Small Group Behavior*, Vol.18, No.1, 31-55.
- Walker, O. (1970). *An Experimental Investigation of Conflict and Power in Marketing Channels*. unpublished Ph.D. thesis, University of Wisconsin.
- Waltman, D. (1989). *How to Manage Conflict, Criticism & Anger*. Seminars International, Kansas City.
- Wolfe, R.N., Kasmer, J.A. (1988). Type Versus Trait: Extraversion, Impulsivity, Sociability, and Preferences for Cooperative and Competitive Activities. *Journal of Personality and Social Psychology*, Vol.54, No.5, 864-871.
- Yukl, G. (1989). Managerial Leadership: A Review of Theory and Research. *Journal of Management*. Texas: Southern Management Association, Vol.15, No.2, 251-280.
- Zalaznik, A., & Moment, D. (1964). *The Dynamics of Interpersonal Behavior*. New York, Wiley.

## **APPENDIX A: SCENARIOS**

### **Scenarios Addressed by my Research:**

- 1) If the purpose of a DOE meeting is to make a decision, a group will be convened with group members of varying degrees of power within the organization, different opinions and personalities, etc. All of the above provide antecedents to cause group conflict naturally. How can the group facilitator and the group members make sure the conflict is managed properly? My research will address interventions necessary for a facilitator to modify the group process to instigate effective conflict management.

### **Scenarios not Addressed by my Research:**

- 1) Individual group members tend to have their own preferred ways of dealing with conflict (Thomas, 1976). This knowledge could be used by the group convenor to pick and choose individuals for a meeting. The convenor could form a group made up only of collaborators, competitors, or a balanced mix of the two. I won't address this scenario.
- 2) To manage conflict successfully and to be prepared for many diverse conflict situations, a facilitator must have a large variety of strategies available. In addition to dealing with conflict through collaboration and competition, facilitators should also be aware when and how to use conflict avoidance, accommodation, and compromise. This research doesn't address these three conflict management strategies experimentally.

## APPENDIX B: RESOURCE SCHEDULING

### **Subjects:**

- 120 students from the psychology pool plus 10% slack for no-shows.

### **Groups:**

- 30 four-person groups in two conditions.

### **Proctors:**

15 proctors for two nights plus 10% slack for no-shows. Use possibly graduate students, MSL co-ops, and runners.

Names of possible proctors:

Martin	Jennifer	John P.
Jason (co-op)	John M.	Joe (co-op)
Jeff	Shane	Michele
Andrea	Jim	Jerry
Christy	Tim	George
Mary Lynn	Cindy	Jana
Leslie	John C.	Betty
Rikki		

### **Proctor Training:**

- Go over directions/script.
- Show training movie to teach proctors how to use the behavioral data form.
- Have them go through one practice run with behavioral analysis.
- Teach proctors how to calculate the group's or the individual's rank .

### **Proctor Availability:**

- 11/7: Training from 5pm-7pm at MSL (alternative: Tuesday).
- 11/11-11/12: Experiment from 8pm-10pm.

### **Running Groups:**

- One session per night of 60 subjects.
- 15 groups per session.
- Two nights (11/11-11/12).

### **Rooms:**

- Room requirements are: movable chairs, overhead projectors, and in vicinity of the large room.
- One large room: McBryde 118 (Monday), Patton Hall 215 (Tuesday).
- 14 small rooms: McBryde 233, 316, 322, 202, 204, 226, 230, 231, 238, 304, 307, 308, 318, 329.

**Money needed**

**Subjects:**

8 competitive groups on Monday ----->	\$80 (\$10 for best group member per group)
7 collaborative groups on Monday --->	\$40 (\$10 a group member from best group)
7 competitive groups on Tuesday ----->	\$70
8 collaborative groups on Tuesday --->	\$40
	-----
	<u>\$230</u>

**Proctors:**

Maher	----->	\$20
Rick	----->	\$20
John C.	----->	\$30
Shane	----->	\$30
Leslie	----->	\$30
Willi	----->	\$30
Cindy	----->	\$20
Mary Lynn	----->	\$20
		-----
		<u>\$200</u>

**Grand Total:**

Subjects:	\$230
Proctors:	\$200
potential last proc.	\$30
	-----
	<u>\$460</u>

## APPENDIX C: INVITATION FOR EXPERIMENT

### The "12 Angry Men" Experiment

To: Geller's Psychology students  
From: Martin Grunau  
Date: 11/5/91

I'm looking for students to take part in an experiment helping me with my graduate research concerning decision making. **If you have ever seen the movie or the play or read the book "12 Angry Men", you may not take part in this experiment.**

*Date:* Monday, 11/11/91 and Tuesday, 11/12/91  
*Time:* 8pm - 10pm  
*Place* Monday ---- > McBryde 118  
Tuesday ---- > Patton Hall 215  
*Duration:* 2 hours  
*Preparation:* Nothing, just bring yourself  
*Questions?* Call 552-1462, or 231-3501 and leave a message

If you are interested in being a part of this study, please sign the sign-up sheet. If you can't show up for the experiment, and you signed up, please let me know 2 days in advance.

**SIGN-UP SHEET FOR "12 ANGRY MEN" EXPERIMENT**

Date: \_\_\_\_\_

<i>FEMALES</i>		<i>MALES</i>	
<b>NAME:</b>	<b>PHONE#:</b>	<b>NAME:</b>	<b>PHONE#:</b>
1.		34.	
2.		35.	
3.		36.	
4.		37.	
5.		38.	
6.		39.	
7.		40.	
8.		41.	
9.		42.	
10.		43.	
11.		44.	
12.		45.	
13.		46.	
14.		47.	
15.		48.	
16.		49.	
17.		50.	
18.		51.	
19.		52.	
20.		53.	
21.		54.	
22.		55.	
23.		56.	
24.		57.	
25.		58.	
26.		59.	
27.		60.	
28.		61.	
29.		62.	
30.		63.	
31.		64.	
32.		65.	
33.		66.	

## SIGN UP SHEET FOR PROCTORS

TRAINING: Thursday (11/7/91), 5pm-7pm at MSL

### EXPERIMENT:

Monday (11/11/91)		Tuesday (11/12/91)	
Name	Phone#	Name	Phone#
John P	*	John P.	*
Christy	*	Christy	*
Jennifer	*	Jennifer	*
John M.	*	John M.	*
Mary Lynn	*	Tim	*
Tim	*	Betty	*
Maher	*	Riki	*
Betty	*	George	*
Jim	*	Jim	*
Willi	*	Willi	*
John C.	*	John C.	*
Leslie	*	Leslie	*
Jana	*	Cindy	*
Andrea	*	Stephanie	*
Shane P.	*	Shane P.	*
Martin	*	Martin	*

\* Note: This information is omitted to protect the privacy of the people involved.

## APPENDIX D: INFORMED CONSENT FORM

### Informed Consent

*Project Title:* The "12 Angry Men" decision making experiment

*Researchers:* Martin Grunau, Scott Geller

The purpose of this experiment is to study group decision making. You will watch the beginning of the movie "12 Angry Men". You will work as individuals and as groups to complete a decision-making task based on the movie. You will also be asked to complete two questionnaires. Participants in this experiment will receive **TWO** credits.

Should you decide to participate in this study, please know that:

- You will not be exposed to any psychological or physical harm as a result of your participation in this study.
- The experiment should last no more than two hours.
- All data collected from this experiment is intended for research purposes only. Therefore, it will be treated confidentially. All identifiers will be removed as soon as all responses are combined.
- Your participation in this experiment is voluntary and may be discontinued at any time. No penalty will be imposed.
- If you have any problems with or questions about the experiment, please contact Martin Grunau at 552-1462, or Scott Geller at 231-6223.
- If you have questions about your rights as a participant or the evaluation process, you may contact Dr. Helen Crawford (Chair HSC) at 231-6520, or Dr. Ernie Stout, (Chair IRB) at 231-9359.
- This research has been approved by the Human Subjects Committee of the Department of Psychology and by the Institutional Review Board of Virginia Tech.

If you consent to participate voluntarily and with an understanding of the conditions outlined above, please **PRINT** and sign your name below.

\_\_\_\_\_  
NAME (Please Print)

\_\_\_\_\_  
DATE

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
STUDENT ID

## APPENDIX E: GUIDELINES FOR BEHAVIORAL OBSERVATION

Guidelines for categorizing verbal information:

### 1. Who speaks?

- a. The speaker number is the number on the person's name tag on their clothes. For your group, fill in the first number in the top right corner of the behavioral data collection form.
- b. Check whenever a subject speaks using the following criteria:
  - Statement needs to be more than 1 word. "Yes", "no", "well", "ahm", etc. does not count.
    - Examples: 1) #1 "I think a rifle is important...."
    - #2 "Yes..."
    - #1 "...because it is more powerful than a knife."
    - Only #1 gets a check.
  - 2) #1 "How old are you?"
  - #2 "Twenty."
  - Only #1 gets a check.
- When more than one person speaks, mark person speaking *first*, and *last*. If they all started at the same time, and stopped at the same time, no one gets a check.
- Look only at what they say verbally, not what they say through body language.
- If you get behind in the categorization process, focus on "who speaks" (first column). This is the most important information to me. The second most important information are the questions.
- If you fall behind in the categorization of "who speaks," try to leave as many rows blank as you believe you've missed and resume with the present group conversation.

### 2. Task-relevant question

- a. Any verbal question related to the "Lost in the Cascades" exercise.
  - Examples: "Do you really think the knife is important?"
  - "What is your opinion?"
  - "How can we get quicker agreement on this item?"
  - "Don't you think there is a lake?"
- b. Repeating another persons' question is considered a question.
  - Examples: "Do you mean 'how far is it to reach safety'?"

### 3. Task-relevant information

- a. Any verbal statement related to the "Lost in the Cascades" exercise.

Examples: "I believe the knife is most important."  
"I don't have an opinion on this matter."  
"I don't like the approach you take to making this decision."

#### 4. Non-task-relevant information

- a. Any verbal statement not related to the "Lost in the Cascades" exercise or the decision making process.

Examples: "Talking about rifles, I saw a nice gun a couple of days ago."  
"Did you hear agree with the Brady-bill?"  
"I would like to hurry up with this decision to get home."  
"This experiment is boring....."

#### General notes:

- 1) If one verbal statement fits the description of more than one category, all applicable categories must be checked.  
Example: "You disagree with my view--what is your suggestion?"  
Check "I" and "?".
- 2) Please do not view jokes or sarcasm always as off-task behavior. They may very well contribute to the immediate solution of the problem.
- 3) If one individual speaks, pauses, then speaks again only count one verbal statement. In other words, you shouldn't have two consecutive equal speaker numbers.

## APPENDIX F: EXPERIMENTAL PROCEDURE AND PROCTOR TEXT

- 0) As proctors walk into the room, they are handed a folder with the following content:
  - a. Proctor "name tag" (Please add your name to it on the bottom and wear visibly. It will tell you the # of the group you will be proctoring.)
  - b. The inside cover of the folder tells you the room number you have been assigned to.
  - c. A copy of this document with the 'experimental procedure and proctor text'
  - d. A copy of the guidelines for the "Behavioral Data Form" (just as a reminder)
  - e. One overhead with subjects' task and their incentive structures.
  - f. "Questionnaire #1"
  - g. "Behavioral Data Form"
  - h. "Ranking Sheet #2" plus "Questionnaire #2"
  - i. Key of the correct solution (only for collaborative condition)
- 1) Martin, the experimenter, hands out pencils and a seating charts (Ranking Sheet #1) for each subject. Have subjects sign the consent forms.
- 2) Experimenter gives a number randomly to each subject as they walk into the room. The proctor uses this number to assign the subjects to conditions and groups later. The last digit of the ID# ranges from 1 to 4 indicating the number of the individual within the group. The first number before the dash identifies the group the individual belongs to.
- 3) After all the subjects have been seated, the experimenter says:

**"You are about to watch the first half of a jury drama produced in the late fifties called '12 Angry Men.' It features Henry Fonda in the leading role. If any of you have seen this movie or the play before please let me know now. Your objective is to predict the sequence in which all jurors change their verdict from guilty to not guilty. So pay particular attention to the characters. The seating charts I handed out will help you visualize who sits where. Feel free to write comments on them. You'll be able to use them later in the exercise. Please don't speak to one another during or after the movie."**

Experimenter starts the movie, which lasts 30 min.
- 4) After the movie is over, the experimenter states:

**"As you can see, one of the jurors in addition to Henry Fonda has switched his vote to "not guilty." On the basis of what you've seen of the men—their occupations, their backgrounds, their apparent biases, and personalities—I now want you to predict by yourself the order in which all jurors will change their votes. So you would rank Henry Fonda as juror #1, since he was the first to vote not guilty, etc. You have two copies of the ranking sheet. Please copy the ranking over to the second sheet and hang on to one of the copies. I'll give you 10-15 minutes for the ranking."**

Collect one of the two copies of the "Ranking Sheet #1" after they are done with the exercise. Make sure the copy subjects keep for reference has the ranking as well.
- 5) The experimenter says:

**"I would like all individuals whose first digit is a "1" on their tag to follow proctor1,**

those whose first digit is a "2", follow proctor2. etc."

*(The following verbal remarks are all made by you, the proctors)*

- 6) Once you're in the room, the proctor makes sure the subjects sit in a circle and hands out "Questionnaire #1" and says:  
**"Here is the first of two questionnaires for you to fill out. Please make sure your entire experimental ID# is visible on the questionnaire's top right corner. Your experimental ID# is the number on your sticker."**  
After subjects are finished with "Questionnaire #1", the proctor collects them.

- 7) Put the overhead on the overhead projector and read it to the subjects.  
The proctor for the individual incentive condition says:  
*"As a group, you will make the same decision you made earlier as an individual.  
You are in a contest with other individuals in this group doing the same experiment. The person in this group whose individual ranking is closest to the group ranking is rewarded with \$10 and one extra class credit.  
(Note: In case of a tie, the money will be split.)"*

- The proctor for the group incentive condition says:  
*"As a group, you will make the same decision you made earlier as an individual.  
You are in a contest with other groups doing the same experiment. The group having the most correct answer according to the ranking in the movie is rewarded with \$10 per group member and one extra class credit. "  
(Note: In case of a tie, the money will be split.)"*

(Note: In case they ask, this extra class credit is in addition to the other 2 class credits they receive for being involved in this experiment)

- 8) Leave the overhead on the overhead projector throughout the experiment.
- 9) Group members begin the discussion of the task. Be ready to:
- Observe verbal behaviors
  - Fill in the time the group started and finished the decision making process in top right corner.
- 10) When the group has reached a group decision, the proctor says:  
**"Please check to make sure that the group ranking is the same on all four copies of your ranking sheet."**  
The proctor collects the second copy of Ranking Sheet #1, which now has the individual as

well as the group decision on it.

- 12) Now the proctor distributes the next package containing the Ranking Sheet #2 and Questionnaire # 2. The Proctor says:

**"This is the last package you have to fill out as individuals. I ask you to do the ranking exercise one more time. If you did not agree with the group ranking, this is the time to voice your difference in opinion. The following questionnaire #2 should take about 15 minutes to fill out. Let me know when you are done."**

- 13) The proctors begins to calculate the scores to determine who receives the reward.

For groups exposed to the *group incentive structure*, the group ranking is compared to the ranking in the film. Use the key provided in the proctor package, and calculate the absolute difference in the ranking for each character in the movie. The sum of these absolute differences represents the score. Fill-in the score on the bottom right of one of the group members' forms. The lowest score among all groups wins.

For groups exposed to the *individual incentive structure*, the individual rank is compared to the group rank on Ranking Sheet #1 for each individual. The sum of the absolute differences represents the score. Fill-in the score for each subject in the lower right corner of Ranking Sheet #1. The individual with the lowest score wins.

- 14) When subjects are finished filling out their last package, the proctor collects it and debriefs the subjects. However, they are not given the correct answer or told the purpose of the experiment, since other groups will do the same experiment the next day. The proctor says: **"Thank you for your participation in this experiment. Please do not talk about the content of this experiment to your fellow students, because they may be involved in the same experiment throughout the following days. If you have any further questions about the experiment, Martin will be happy to discuss them with you."**

*(for the individual incentive condition)* From the scores I have calculated, it looks like (subject#) has won the incentive, congratulations. To pick up your reward, please go to the room where you watched the movie. You will receive your reward from Martin. If you need me to sign your attendance form let me know. As you leave, please leave the pencils I have handed out.

*(for the group incentive condition)* If you are interested in finding out which group won the reward, we have to wait until the last group is done and I receive their score. If you don't want to stay and you happen to win, Martin will give you the reward in class. If you need me to sign your attendance form let me know. As you leave, please leave the pencils I have handed out."

APPENDIX G: RANK-ORDER FORMS

**RANKING SHEET #2**

Number: \_\_\_\_\_

CLOSET

	Rank: ___	Mr. Foreman		
Rank: ___	Mr. Invention	TABLE	Mr. Nerd	Rank: ___
Rank: ___	Mr. Foreign		Mr. Big	Rank: ___
Rank: ___	Mr. Cold		Mr. Wallstreet	Rank: ___
Rank: ___	Mr. Old		Mr. Quiet	Rank: ___
Rank: ___ 1	Henry Fonda		Mr. No-tie	Rank: ___
	Mr. Baseball			
	Rank: ___			

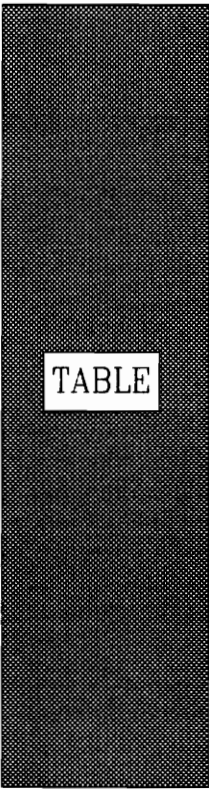
WINDOWS

# RANKING SHEET #1

Number: \_\_\_\_\_

CLOSET

Individual Rank _____ Group Rank _____	Mr. Foreman	Individual Rank _____ Group Rank _____
Individual Rank _____ Group Rank _____	Mr. Invention	Mr. Nerd
Individual Rank _____ Group Rank _____	Mr. Foreign	Mr. Big
Individual Rank _____ Group Rank _____	Mr. Cold	Mr. Wallstreet
Individual Rank _____ Group Rank _____	Mr. Old	Mr. Quiet
Individual Rank _____ Group Rank _____	Henry Fonda	Mr. No-tie
Individual Rank _____ Group Rank _____	Mr. Baseball	



SCORE: \_\_\_\_\_





## APPENDIX I: QUESTIONNAIRES

Number \_\_\_\_\_

### QUESTIONNAIRE #1

Listed below are some questions relating to your present "state of mind". By circling one number between 1 and 7, I want you to tell me how you feel right now (i.e., 1 = completely satisfied, 7 = completely frustrated). Please do not discuss this questionnaire until the end of the experiment.

- |    |   |   |   |   |   |   |   |   |               |
|----|---|---|---|---|---|---|---|---|---------------|
| 1) | Satisfied   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Frustrated    |
| 2) | Stressed  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unstressed    |
| 3) | Comfortable   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Uncomfortable |
| 4) | Relaxed   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Tense         |
| 5) | Bored   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Interested    |
| 6) | What is your age? _____   |   |   |   |   |   |   |   |               |
| 7) | What is your gender?   ___Male                   ___Female              |   |   |   |   |   |   |   |               |
| 8) | What year are you?   ___Freshman   ___Sophomore   ___Junior   ___Senior |   |   |   |   |   |   |   |               |
| 9) | What is your major? _____   |   |   |   |   |   |   |   |               |



2) All members in the group had sufficient opportunities to express their views.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

3) I sought the other's help in working out the solution.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

4) I am willing to accept the group's solution as my own.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

5) If the other group members were asked, to what degree do you think they are satisfied with the group decision?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

6) If asked to defend my group's solution, I would be willing to do so.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

7) I was firm in pursuing my goals.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

8) The final group ranking was the best decision we could make.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

9) I attempted to get all concerns and issues out in the open.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

10) I disagree with the group decision.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

11) Your group did not produce enough alternative solutions to choose from.?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

12) I pressed to get my points made.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

13) Some of us did not understand all the information that was shared?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

14) My group's ranking is correct.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

15) If asked to defend my group's solution, I believe the other group members would do so.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

16) I tried to show the other group members the logic and benefits of my position.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

17) The final group ranking does not represent the preferences of everyone in my group.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

18) I am dissatisfied with the decision my group reached.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

19) I attempted to work through all the differences immediately.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

20) My group reached agreement on the topic we discussed.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

21) I told other group members my ideas and asked for theirs.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

22) I understood all the information that was shared.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

23) I don't think my group arrived at a good decision

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

24) I tried to convince the other group members of the merits of my position.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

25) I did not have sufficient opportunity to make my views known.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

26) I tried to win my position.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

27) Do you believe the group generated sufficient alternative solutions?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

28) I was concerned with satisfying all our wishes.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

29) My group members did not listen to what I had to say.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

30) I tried to win the \$10 and the extra class credit.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

31) As a group, we tried to win the \$10 and the extra class credit.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

32) My views were given full consideration by my group members.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
strongly disagree	disagree	moderately disagree	neither agree nor disagree	moderately agree	agree	strongly agree

---

### OPEN-ENDED QUESTIONS

1) The advantages of coming to a group decision the way we did were:

2) The disadvantages of coming to a group decision the way we did were:

3) What influence do you think did the incentive structure have on your decision making process?

## **APPENDIX J: HYPOTHESES AND RESULTS OF THE PILOT STUDY**

### **Hypotheses**

Based on my model for meetings, I formulated expected relationships in a set of five hypotheses. I formally state two assumptions that provide the foundation for investigating these hypotheses.

- A1: An individual incentive structure causes competitive conflict management during the group process (Manipulation check).
- A2: A group incentive structure causes collaborative conflict management during the group process (Manipulation check).
- H1: Collaborative conflict management is positively correlated with consensus.
- H2: Competitive conflict management is negatively correlated with consensus.
- H3: Collaborative conflict management is positively correlated with the perception of high decision quality.
- H4: Competitive conflict management is negatively correlated with perceived high decision quality.
- H5: The perception of decision quality is positively correlated with the perception of strength of consensus.

The two assumptions are a manipulation check to see if the two different incentive structures are able to produce the desired collaborative and competitive behaviors in the group process. Hypotheses 1 through 4 show the relation between the perceived behaviors of the group process and the group products of consensus and perceived decision quality. Hypothesis 5 is the result of the continuous debate over what consensus is. Possibly, the perception of having a good solution may be a part of the perception of having good consensus and should be measured as a part of the consensus scale. All data will be collected through questionnaires.

## **Results**

Due to the very small sample size (12) in two groups per condition, the findings of this pilot study are not generalizable. However, results indicate that the type of questions I used to measure the various constructs have high internal reliability. The Cronbach's alpha values for the different scales were:

Collaboration:	alpha = 0.66
Competition:	alpha = 0.79
Consensus:	alpha = 0.84
Perceived Decision Quality:	alpha = 0.88

I used a t-test to test if assumptions 1 and 2 were supported. The effects of the incentive structures to either produce competition collaboration were not supported ( $t = 0.79, p > .1; t = 0.76, p > .1$ ). This means the manipulation did not work. It turned out both groups collaborated strongly. There are several possibilities why this occurred. In the experimental procedure, all groups were told they were consensus groups. This statement and the individual incentive structure may have had a confusing effect on the subjects. They might have focused on being a consensus group rather than on the individual incentive structure. Another reason may have to do with the sample of students I had in the study. All students were senior engineering students. Seniors may have known each other for four years reducing the possibility they were willing to compete against one another. Further, engineering students are taught to be problem solvers. One characteristic of a problem solver in my opinion is a collaborative orientation to gather as much valuable information as possible. Another reason for the failure of the manipulation may have been methodological. It is possible that the incentive of \$10 was too low for them to risk being competitive, or money was simply not an incentive for people to compete.

Hypotheses 2 and 4 are related to the effects of competition and were not supported since none of the groups competed. However, hypotheses 1 and 3 were supported at an alpha level of 0.1 ( $r = .55, p = .07; r = .55, p = .07$ ). An increase in sample size will increase the power in the statistical test and may result in statistical significance for these two hypotheses. These findings indicate collaborative conflict management is positively related to the perception of consensus and decision quality. However, these findings aren't indicative that collaborative conflict management is the only conflict

management strategy encouraging high scores on perceived consensus and decision quality.

Hypothesis 5 stated there was a positive correlation between perceived decision quality and consensus. This correlation was found to be significant ( $r = .93, p = .0001$ ). This result indicates that it may be necessary to look at the phenomenon of perceived consensus again and rethink if it includes the elements used to measure perceived decision quality. These elements are "perception of opportunity to express views" and the "perception of generating sufficient alternatives."

### **Exploratory data**

During the pilot study, proctors collected additional data, for which no specific hypotheses were formulated. These data were collected for exploratory reasons. For example, proctors collected behavioral data on the group interactions. Proctors were given a form and asked to log how long the group process lasted, who spoke, did the speaker agree or disagree with the previous statement made, or did the speaker change the subject. After I conferred with the proctors from the pilot study, we jointly came to the conclusion that the agree/disagree categories were not adequate to classify the groups interaction. Further, we noted it was difficult to keep up with the pace of the conversation when choosing the interaction categories because individual interpretation needed to be applied for the categorization of the interactions. To collect meaningful and accurate data for the full study, I plan to focus the measurement on who spoke. Interesting findings might result especially with respect to gender. Do men speak more often than women in competitive environments?

The questionnaire of the pilot study also included a scale measuring the degree to which subjects felt uncomfortable (Martin's Index of Discomfort) before the group process had begun and after it was concluded. Although the value for Cronbach's alpha on the SID scale was acceptable, I did not pursue the evaluation of these scales, since my manipulation check had indicated all groups had collaborated.

### **Summary**

I have presented a model relating individual and group incentive structure to conflict management, perceived consensus, and decision quality. I believe the methodology

attempting to test this model in a laboratory experiment worked well with the exception of the individualistic incentive structure itself. Modifying the experimental procedure by not pressuring the subjects into consensus roles and changing the sample to include younger subjects who don't know each other might also help me in a large scale study to test my hypotheses better.

However, this study has indicated that collaborative conflict management may influence the strength of consensus and the perception of the decision quality. Furthermore, the question must be raised to what extent the construct of consensus and perceived decision quality are really different. The results might suggest to measure perceived decision quality as part of the construct of consensus.

## APPENDIX K: SAS AND SPSS PROGRAMS FOR DATA ANALYSIS

### 1) Main SAS-program for the data evaluation

```
OPTIONS LS=121 NODATE NUMBER MISSING = ' ';

* PART1;
* DEFINE TITLES FOR ALL PRINTED OUTPUT;
TITLE1 'MARTIN"S DATA ANALYSIS';
TITLE3 'NOVEMBER, 1991';

* PART2;
* INFILE DATAFILE FINAL.DATA;
CMS FI RAW DISK FINAL DATA A;
DATA SURVEY1.DATA;
INFILE RAW FIRSTOBS=5 OBS=124;

* PART 3;
* DEFINE INPUT VARIABLES;
* 1ST THREE ROWS REFER TO THE 3 RANKINGS: INDIVIDUAL, GROUP, INDIVIDUAL;
* 4TH ROW REFERS TO QUESTIONNAIRE #1;
* 5TH-8TH RWO REFER TO QUESTIONNAIRE #2;
INPUT IDNO$
      SID11 SID12 SID13 SID14 SID15 AGE GENDERS QO8
      SID21 SID22 SID23 SID24 SID25 GA1 GA2 GA3 GA4 GA5 GA6 GA7 GA8
      QT1A QT1B QT1C QT1D QT2 QT3 QT4 QT5 QT6 QT7 QT8 QT9 QT10 QT11
      QT12 QT13 QT14 QT15 QT16 QT17 QT18 QT19 QT20 QT21 QT22 QT23
      QT24 QT25 QT26 QT27 QT28 QT29 QT30 QT31 QT32
      TIME CTYPE GROUP AC1 AC2 SUBJECT QU INFO OFFT COLLMEAN COMPMEAN;
* PRINT THE DATA SET;
PROC PRINT DATA = SURVEY1.DATA;
TITLES5 'ORIGINAL TOTAL DATA SET';

* PART 4;
* CALCULATE SCALES, REVERSE DATA, ETC.;
DATA TEMP.DATA;
SET SURVEY1.DATA;
* DATA WITH INVERSE QUESTIONS HAVE BEEN REVERSED IN THIS PROCEDURE;
COLLAB = (QT3+QT9+QT19+QT21+QT28+8-GA8)/6;
  INVG8 = 8-GA8;
COMPETE = (QT12+QT26+QT24+QT16+QT7+8-GA5)/6;
  INVG5 = 8-GA5;
CONSENS = (16+QT5-QT13+QT15-QT17+QT20)/5;
  INVQT13 = 8-QT13;
  INVQT17 = 8-QT17;
PDQ = (24+QT4+QT6+QT8-QT10+QT14-QT18+QT22-QT23)/8;
  INVQT10 = 8-QT10;
  INVQT18 = 8-QT18;
  INVQT23 = 8-QT23;
GA = (GA1+8-GA2+GA3+GA4+8-GA5+8-GA6+GA7+GA8)/8;
  INVG2 = 8-GA2;
  INVG5 = 8-GA5 ;
  INVG6 = 8-GA6 ;
SID1 = (24-SID11+SID12-SID13-SID14)/4;
  INVSID11 = 8-SID11;
```

```

        INVSID13 = 8-SID13;
        INVSID14 = 8-SID14;
        SID2 = (24-SID21+SID22-SID23-SID24)/4;
        INVSID21 = 8-SID21;
        INVSID23 = 8-SID23;
        INVSID24 = 8-SID24;
        SID = SID2-SID1;
        AC = AC2-AC1;
* KEEP COLLAB COMPETE PDQ SID CTYPE CONSENS QT5 QT15 QT17 ;
*   QT20 QT13 GENDER INVQT13 INVQT17 INVQT10 INVQT18 INVQT23 ;
*   INVSID11 INVSID13 INVSID14 INVSID21 INVSID23 INVSID24;
* PROC PRINT DATA = TEMP.DATA;
* TITLE5 'MODIFIED TEMPORARY DATASET';

* PART 5;
* CRONBACH ALPHA OF MY SCALES (ONLY RUN ON TECH MAINFRAME);
* FOR CONSENSUS SCALE;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR QT5 INVQT13 QT15 INVQT17 QT20;
TITLE5 'CRONBACH ALPHA FOR CONSENSUS SCALE';

* FOR PDQ SCALE;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR QT4 QT6 QT8 INVQT10 QT14 INVQT18 QT22 INVQT23;
TITLE5 'CRONBACH ALPHA FOR PDQ SCALE';

* FOR COLLABORATION SCALE;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR QT3 QT9 QT19 QT21 QT28;
TITLE5 'CRONBACH ALPHA FOR COLLABORATION SCALE';

* FOR COMPETITION SCALE;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR QT12 QT26 QT24 QT16 QT7;
TITLE5 'CRONBACH ALPHA FOR COMPETITION SCALE';

* FOR SID1;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR INVSID11 SID12 INVSID13 INVSID14;
TITLE5 'CRONBACH ALPHA FOR SID1 SCALE';

* FOR SID2;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR INVSID21 SID22 INVSID23 INVSID24;
TITLE5 'CRONBACH ALPHA FOR SID2 SCALE';

* FOR GROUP ATMOSPHERE;
PROC CORR DATA= TEMP.DATA ALPHA;
VAR GA1 INVGA2 GA3 GA4 INVGA5 INVGA6 GA7 GA8;
TITLE5 'CRONBACH ALPHA FOR GROUP ATMOSPHERE';

* PART 6;
* CORRELATION OF COMP, COLLAB, CONSENSUS, PDQ, SID;
PROC CORR DATA = TEMP.DATA;
VAR COLLAB COMPETE CONSENS PDQ SID;
TITLE5 'CORRELATION OF COLLAB, COMPET, CONSENS, PDQ, TIME & SID';

* REGRESSION OF DEPENDENT VARS. (C, PDQ, SID) ON INDEPEN VAR. (C.MGMT.);
PROC REG ;
MODEL CONSENS = COLLAB COMPETE / STB;

```

```

MODEL PDQ = COLLAB COMPETE / STB;
MODEL SID = COLLAB COMPETE / STB;
TITLE5 'REGRESSION OF D.V. (C, PDQ, SID) ON I.V. (COLLAB, COMPET)';

```

```

* PART 7;
* MANOVA (MULTIVARIATE ANALYSIS OF VARIANCE);
* FOR MORE THAN ONE DEPENDANT VARIABLE;
PROC ANOVA DATA = TEMP.DATA;
CLASS CTYPE GENDER;
MODEL PDQ CONSENS COLLAB COMPETE = CTYPE GENDER CTYPE*GENDER;
MEANS CTYPE GENDER CTYPE*GENDER;
MANOVA H=CTYPE / PRINTE PRINTH;
TITLE5 'MULTIVARIATE ANOVA FOR VARIOUS SCALES';
RUN;

```

```

* MANOVA (EXPERIMENTAL I);
* FOR MORE THAN ONE DEPENDANT VARIABLE;
PROC ANOVA DATA = TEMP.DATA;
CLASS CTYPE GENDER;
MODEL SUBJECT SID GA = CTYPE GENDER CTYPE*GENDER;
MEANS CTYPE GENDER CTYPE*GENDER;
MANOVA H=CTYPE / PRINTE PRINTH;
TITLE5 'EXPLORATORY MULTIVARIATE ANOVA (IND. LEVEL) SUBJECT, SID GA';
RUN;

```

```

* MANOVA (EXPERIMENTAL II);
* FOR MORE THAN ONE DEPENDANT VARIABLE;
PROC ANOVA DATA = TEMP.DATA;
CLASS CTYPE GENDER;
MODEL TIME QU INFO OFFT = CTYPE GENDER CTYPE*GENDER;
MEANS CTYPE GENDER CTYPE*GENDER;
MANOVA H=CTYPE / PRINTE PRINTH;
TITLE5 'EXPLORATORY MULTIVARIATE ANOVA (GROUP LEVEL)';
RUN;

```

```

* REGRESSION OF BEHAVIORAL CATEGORIES ON TIME, COLLAB, COMPETE;
PROC REG ;
MODEL QU INFO OFFT = TIME COLLMEAN COMPMEAN / STB;
TITLE5 'REGRESSION OF BEHAVIORAL STUFF ON TIME, COLLAB, AND COMPETE;;

```

```

*****;
*   GROUP MEASURES OF CONSENSUS      **;
*****;
*DESIGN2 FOR GROUP - LEVEL ANALYSIS;
*SPEARMAN ROH CORRELATION BETWEEN COLLAB & COMPETE AND ACTUAL CONSENSUS;
PROC CORR DATA=TEMP.DATA SPEARMAN;
VAR COLLMEAN COMPMEAN AC2 AC;
TITLE5 'SPEARMAN CORRELATION BETWEEN COLLAB & COMPET AND ACTUAL
CONSENS';

```

```

* REGRESSION OF ACTUAL CONSENSUS ON CONFLICT MANAGEMENT CONDITIONS;
*PROC REG ;
*MODEL AC2 =COLLMEAN COMPMEAN / STB;
*MODEL AC =COLLMEAN COMPMEAN / STB;
*TITLE5 'REGRESSION OF AC ON CONFLICT MANAGEMENT CONDITIONS';

```

```

* MANN WHITNEY U-TEST FOR INCENTIVES AND ACTUAL CONSENSUS;
PROC NPAR1WAY WILCOXON;

```

```

CLASS CTYPE;
VAR AC2 AC;
TITLES5 'MANN WHITNEY-U T-TEST. CONSENSUS FOR BOTH INCENT COND';

*****;
* HOW MOTIVATING IS MONEY????? **;
*****;
* T-TEST FOR DESIRE TO GET $10 ACCORDING TO INCENTIVES;
PROC TTEST DATA=SURVEY1.DATA;
CLASS CTYPE;
VAR QT30 QT31;
TITLES5 'T-TEST AS MANIPULATION AS TO HOW HARD THRY TRIED TO GET $10';

* MANOVA (EXPERIMENTAL III);
* FOR MORE THAN ONE DEPENDANT VARIABLE;
PROC ANOVA DATA = TEMP.DATA;
CLASS CTYPE GENDER;
MODEL QT30 QT31 = CTYPE GENDER CTYPE*GENDER ;
MEANS CTYPE GENDER CTYPE*GENDER;
MANOVA H=CTYPE / PRINTE PRINTH;
TITLES5 'EXPLORATORY MULTIVARIATE ANOVA (INDIV. LEVEL) ON $ MOTIVATION';
RUN;

* CORRELATION BETWEEN DESIRE TO GET $10 AND INITIAL CONSENSUS SCORE;
PROC CORR DATA=TEMP.DATA ;
VAR QT30 QT31 AC1;
TITLES5 'CORRELATION INITIAL CONSENS. AND DESIRE TO GET $10';

```

## 2) Second SAS program for the evaluation of the Spearman rho correlations using the group as unit of analysis.

```
OPTIONS LS=121 NODATE NUMBER MISSING = ' ';

* PART1;
* DEFINE TITLES FOR ALL PRINTED OUTPUT;
TITLE1 'MARTIN"S DATA NO.II ANALYSIS';
TITLE3 'NOVEMBER, 1991';

* PART2;
* INFILE DATAFILE FINAL1.DATA;
CMS FI RAW DISK FINAL1 DATA A;
DATA SURVEY2.DATA;
INFILE RAW FIRSTOBS=1 OBS=121;

* PART 3;
* DEFINE INPUT VARIABLES;
INPUT IDNO$ QT1A QT1B QT1C QT1D
      TIME CTYPE GROUP RANK SUBJECT QU INFO OFFT P1 B1;
* PRINT THE DATA SET;
PROC PRINT DATA = SURVEY2.DATA;
TITLE5 'ORIGINAL TOTAL DATA SET';

* DESIGN2 FOR GROUP - LEVEL ANALYSIS;
*SPEARMAN ROH CORRELATION FOR BEHAVIORAL STUFF: PERCEPTION VS BEHAVIOR;
PROC CORR DATA=SURVEY2.DATA SPEARMAN;
BY GROUP;
VAR RANK SUBJECT;
TITLE5 'SPEARMAN CORRELATION BETWEEN THE UNMANIPULATED NUMBER';

*SPEARMAN ROH CORRELATION FOR BEHAVIORAL STUFF: PERCEPTION VS BEHAVIOR;
PROC CORR DATA=SURVEY2.DATA SPEARMAN;
BY GROUP;
VAR P1 B1;
TITLE5 'SPEARMAN CORRELATION BETWEEN THE HAND CALCULATD RANKS';
```

### 3) Third SAS program for the evaluation of the collaborative and competitive group scores.

```
OPTIONS LS=121 NODATE NUMBER MISSING = ' ';

* PART1;
* DEFINE TITLES FOR ALL PRINTED OUTPUT;
TITLE1 'MARTIN'S DATA ANALYSIS III';
TITLE3 'NOVEMBER, 1991';

* PART2;
* INFILE DATAFILE FINAL.DATA;
CMS FI RAW DISK FINAL DATA A;
DATA SURVEY3.DATA;
INFILE RAW FIRSTOBS=5 OBS=124;

* PART 3;
INPUT IDNO$
      IO1 IO2 IO3 IO4 IO5 IO6 IO7 IO8 IO9 IO10 IO11 IO12
      G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12
      IT1$ IT2$ IT3$ IT4$ IT5$ IT6$ IT7$ IT8$ IT9$ IT10$ IT11$ IT12$
      SID11 SID12 SID13 SID14 SID15 AGE GENDER$ QO8
      SID21 SID22 SID23 SID24 SID25 GA1 GA2 GA3 GA4 GA5 GA6 GA7 GA8
      QT1A QT1B QT1C QT1D QT2 QT3 QT4 QT5 QT6 QT7 QT8 QT9 QT10 QT11
      QT12 QT13 QT14 QT15 QT16 QT17 QT18 QT19 QT20 QT21 QT22 QT23
      QT24 QT25 QT26 QT27 QT28 QT29 QT30 QT31 QT32
      TIME CTYPE GROUP AC1 AC2 SUBJECT QU INFO OFFT;

* PART 4;
* CALCULATE SCALES, REVERSE DATA, ETC.;
DATA TEMP.DATA;
SET SURVEY3.DATA;
  COLLAB = (QT3+QT9+QT19+QT21+QT28+8-GA8)/6;
  COMPETE = (QT12+QT26+QT24+QT16+QT7+8-GA5)/6;
  DUMMY = GROUP;
KEEP GROUP COLLAB COMPETE;
PROC PRINT DATA = TEMP.DATA;

* PART 5;
* MEANS FOR COLLABORATION AND COMPETITION;
PROC MEANS DATA = TEMP.DATA MEAN;
VAR COLLAB COMPETE;
BY GROUP;
TITLE5 'MEANS OF COLLAB AND COMPET BY GROUP';
*PROC PRINT DATA=TEMP.DATA;
```

#### 4) SPSS program for the calculation of Kendall's W.

TITLE 'KENDALL W FOR ALL GROUPS ON PRE-, AND POST-GRP PROC. IND. RANK.'  
 DATA LIST FREE /ID (A4) RO1 TO RO12 RT1 TO RT12 CTYPE GROUP

begin data

```

01-1 8 5 11 9 3 6 12 1 4 10 2 7 6 5 11 10 3 9 8 1 2 12 4 7 1 1
01-2 6 4 12 10 3 5 9 1 2 11 8 7 6 4 11 10 3 9 8 1 2 12 5 7 1 1
01-3 4 3 12 9 2 6 11 1 5 10 7 8 6 5 11 10 3 9 8 1 2 12 4 7 1 1
01-4 9 3 11 10 4 8 5 1 2 12 6 7 6 5 11 10 3 9 8 1 2 12 4 7 1 1
02-1 7 6 8 10 2 5 11 1 3 12 4 9 9 4 8 10 2 7 11 1 3 12 5 6 1 2
02-2 5 4 3 8 2 7 12 1 9 10 11 6 9 3 7 10 2 8 12 1 4 11 5 6 1 2
02-3 6 2 11 10 4 8 9 1 3 12 7 5 8 4 12 10 5 3 9 1 2 11 6 7 1 2
02-4 9 2 8 10 4 7 11 1 6 12 5 3 9 2 8 10 3 7 11 1 4 12 5 6 1 2
03-1 8 4 12 10 2 7 9 1 5 11 3 6 6 3 10 11 2 8 7 1 5 12 4 9 1 3
03-2 5 4 12 10 2 9 7 1 3 11 6 8 7 3 10 11 2 6 8 1 4 12 5 9 1 3
03-3 6 2 11 9 3 4 10 1 8 12 5 7 6 3 10 11 2 6 7 1 5 12 4 5 1 3
03-4 8 2 9 10 4 6 11 1 3 12 5 7 6 5 4 11 2 8 7 1 3 12 9 10 1 3
04-1 10 8 7 9 2 3 12 1 4 11 5 6 9 8 7 11 2 3 10 1 4 12 5 6 1 4
04-2 6 4 2 8 3 7 9 1 5 12 11 10 7 9 8 11 2 4 10 1 3 12 5 6 1 4
04-3 6 5 10 11 2 4 9 1 3 12 7 8 7 9 8 11 2 4 10 1 3 12 5 6 1 4
04-4 8 4 10 9 2 5 11 1 3 12 6 7 7 9 8 11 2 4 10 1 3 12 5 6 1 4
05-1 7 5 12 10 3 4 11 1 2 9 6 8 7 4 12 10 2 5 9 1 3 11 6 8 1 5
05-2 6 2 7 10 3 9 8 1 5 12 4 11 8 4 7 11 2 6 9 1 3 12 5 10 1 5
05-3 6 3 12 10 2 7 5 1 4 11 8 9 7 4 12 10 2 5 9 1 3 11 6 8 1 5
05-4 7 4 9 10 2 3 11 1 5 12 6 8 7 5 12 10 2 3 9 1 4 11 6 8 1 5
06-1 8 3 11 9 2 5 10 1 4 12 7 6 8 4 12 9 3 5 10 1 2 11 7 6 1 6
06-2 6 2 9 10 3 7 11 1 4 12 8 5 7 4 12 9 3 5 10 1 2 11 8 6 1 6
06-3 5 3 11 10 2 7 9 1 4 12 6 8 9 4 12 8 3 5 10 1 2 11 7 6 1 6
06-4 9 4 12 8 3 5 10 1 2 11 7 6 9 4 12 8 3 5 10 1 2 11 7 6 1 6
07-1 6 2 11 12 3 8 9 1 5 7 4 10 8 2 10 9 3 6 11 1 5 12 4 7 1 7
07-2 7 2 10 11 3 4 9 1 6 12 5 8 7 2 10 11 3 6 8 1 5 12 4 9 1 7
07-3 8 2 11 6 3 7 10 1 4 12 5 9 6 2 10 11 3 7 9 1 4 12 5 8 1 7
07-4 6 2 11 9 3 5 12 1 7 10 4 8 7 2 9 11 3 6 10 1 5 12 4 8 1 7
08-1 8 6 12 9 2 5 10 1 3 11 4 7 9 6 12 10 2 4 11 1 3 8 5 7 2 8
08-2 7 4 9 11 3 6 10 1 2 12 5 8 7 4 9 11 3 5 10 1 2 12 6 8 2 8
08-3 9 3 8 12 5 4 7 1 10 2 6 11 9 3 7 11 4 5 8 1 2 12 6 10 2 8
08-4 8 2 11 9 4 5 10 1 3 12 7 6 6 2 10 11 4 5 9 1 3 12 7 8 2 8
09-1 5 4 9 10 2 7 11 1 3 12 6 8 7 4 9 10 2 5 11 1 3 12 6 8 2 9
09-2 11 3 5 12 2 6 9 1 7 10 4 7 9 3 7 11 2 6 10 1 5 12 4 8 2 9
09-3 9 4 10 11 3 6 8 1 2 12 7 5 8 4 12 11 3 7 9 1 2 10 5 6 2 9
09-4 6 4 10 9 3 5 12 1 8 11 2 7 6 4 10 9 2 7 11 1 3 12 5 8 2 9
10-1 9 4 3 11 6 2 5 1 10 12 7 8 9 3 10 7 2 6 11 1 4 12 5 8 2 10
10-2 10 3 8 9 2 5 12 1 4 7 6 11 10 3 6 7 2 4 12 1 8 11 5 9 2 10
10-3 7 5 12 9 4 8 10 1 2 11 3 6 7 3 10 9 2 6 11 1 4 12 5 8 2 10
10-4 6 3 8 10 2 7 11 1 4 12 5 9 7 3 8 10 2 6 11 1 4 12 5 9 2 10
11-1 4 8 2 5 3 7 12 1 6 11 9 10 6 5 3 8 2 7 11 1 4 12 9 10 2 11
11-2 11 3 4 9 2 6 10 1 5 12 7 8 7 5 3 9 2 6 11 1 4 12 10 8 2 11
11-3 7 4 5 10 3 9 12 1 2 11 6 8 7 5 4 10 3 6 11 1 2 12 9 8 2 11
11-4 6 3 11 9 2 5 10 1 4 12 8 7 7 5 3 9 2 6 11 1 4 12 10 8 2 11
12-1 7 9 3 11 4 8 6 1 2 12 5 10 7 9 8 11 2 6 5 1 3 12 4 10 2 12
12-2 7 6 9 11 2 4 12 1 5 10 3 8 7 6 10 12 2 5 9 1 4 11 3 8 2 12
12-3 5 2 11 8 3 9 10 1 4 12 7 6 6 11 10 8 3 7 9 1 2 12 5 4 2 12
12-4 7 3 10 9 2 5 11 1 4 12 6 8 7 6 4 11 2 5 10 1 3 12 8 9 2 12
13-1 8 4 6 11 2 7 9 1 5 12 3 10 3 4 7 11 2 8 10 1 5 12 6 9 2 13
13-2 5 7 9 10 4 8 11 1 3 12 2 6 5 9 7 10 2 8 11 1 3 12 4 6 2 13
13-3 10 4 7 11 2 5 9 1 3 12 6 8 5 3 6 11 2 8 10 1 4 12 7 9 2 13
13-4 4 3 10 12 2 8 5 1 9 11 6 7 4 3 9 11 2 8 10 1 9 12 5 6 2 13
14-1 6 5 9 10 2 7 10 1 3 12 4 8 6 5 9 11 2 7 10 1 3 12 4 8 2 14
14-2 4 5 9 11 3 7 10 1 2 12 6 8 8 5 9 12 2 7 10 1 3 11 4 6 2 14
14-3 6 2 12 9 3 11 10 1 5 7 4 8 6 3 10 12 2 5 7 1 9 11 4 8 2 14

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14-4 6 4 3 12 2 7 8 1 9 10 5 11 7 6 4 12 2 8 9 1 3 11 5 10 2 14  
15-1 9 4 7 10 3 5 11 1 2 12 6 8 8 4 10 9 3 5 11 1 2 12 6 7 2 15  
15-2 5 4 6 9 2 8 11 1 3 12 7 10 7 4 12 5 2 8 11 1 3 10 6 9 2 15  
15-3 7 4 12 8 5 6 11 1 3 10 2 9 7 4 12 8 3 6 11 1 5 10 5 9 2 15  
15-4 8 3 12 7 2 5 9 1 6 11 4 10 7 3 12 9 2 5 10 1 6 11 4 8 2 15  
16-1 9 4 3 12 7 5 8 1 2 11 6 10 6 7 12 11 2 5 9 1 4 12 3 8 1 16  
16-2 5 9 12 10 3 4 11 1 7 8 2 6 4 8 10 11 2 6 9 1 7 12 3 5 1 16  
16-3 6 3 10 9 2 7 11 1 4 12 5 8 6 7 10 11 2 5 9 1 4 12 3 8 1 16  
16-4 8 5 11 10 2 6 9 1 4 12 3 7 8 7 10 11 2 5 9 1 4 12 3 6 1 16  
17-1 9 6 10 11 2 5 7 1 3 12 4 8 7 4 12 9 3 5 10 1 2 11 8 6 1 17  
17-2 7 4 12 9 3 5 10 1 2 11 8 6 7 4 12 9 3 5 10 1 2 11 8 6 1 17  
17-3 6 2 12 11 5 10 9 1 8 3 4 7 6 4 12 9 3 5 10 1 2 11 8 7 1 17  
17-4 6 10 7 11 2 9 12 1 3 8 4 5 8 4 11 9 3 5 10 1 2 12 7 6 1 17  
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END DATA
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SELECT IF (GROUP=1)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=2)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=3)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=4)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=5)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=6)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=7)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=8)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=9)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=10)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=11)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=12)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=13)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=14)
NPAR TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=15)

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NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=16)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=17)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=18)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=19)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=20)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=21)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=22)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=23)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=24)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=25)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=26)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=27)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=28)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=29)
NPART TESTS KENDALL=RO1 TO RO12

TEMPORARY
SELECT IF (GROUP=30)
NPART TESTS KENDALL=RO1 TO RO12
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TEMPORARY  
SELECT IF (GROUP=1)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=2)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=3)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=4)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=5)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=6)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=7)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=8)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=9)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=10)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=11)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=12)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=13)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=14)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY  
SELECT IF (GROUP=15)  
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY

```
SELECT IF (GROUP=16)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=17)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=18)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=19)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=20)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=21)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=22)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=23)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=24)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=25)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=26)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=27)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=28)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=29)
NPAR TESTS KENDALL=RT1 TO RT12

TEMPORARY
SELECT IF (GROUP=30)
NPAR TESTS KENDALL=RT1 TO RT12
```















## APPENDIX M: DEFINITION OF TERMS

*Convenor:* A person who brings a group together for a purpose.

*Consensus:* A state where a common judgment has been reached by most of those concerned. Consensus exists when a group makes and supports a decision. I believe consensus consists of the following subcomponents: agreement, acceptance, commitment, satisfaction, and understanding.

*Conflict:* Communicated disagreement.

*Conflict management:* Any type of behavior that results from an attempt to change an existing conflict.

*Collaborative conflict management:* An individual's endeavor together with other group members for a goal object of which all group members hope to be joint possessor (adapted from Maller, 1929).

*Competitive conflict management:* An individual's endeavor against other members of the group for a goal object of which he hopes to be the sole principal possessor (Maller, 1929).

*Facilitator:* A third party aiding the group process.

*Frustration-aggression hypothesis:* 1) Frustration always leads to some form of aggression, 2) Aggression always stems from frustration. (Dollard *et al.*, 1939)

*Group cohesion:* The strength of the relationships linking the members of a group to one another and to the group as a whole.

*Groupthink:* A deterioration of mental efficiency, reality testing, and moral judgment that results from in-group pressures (Janis, 1971). Groupthink can be viewed as consensus associated with a low quality decision.

*Perceived decision quality:* The degree to which a group perceives their decision matches an accepted standard or the "correct answer."

*Perceived individual consensus:* An aggregate of individual consents.

*Perceived group consensus:* An aggregate of individual perceptions of other group members' consents.

*Reinforcement:* Anything affecting the frequency of a given behavior or response when that response is made contingent on it.

*Strength of consensus:* The level at which group members are willing to go along with the decision. The strongest level of consensus would be unanimity, or complete agreement. The weakest level of consensus would have no agreement from any group member.

*Social conflict:* Frustration directed toward another person.

*Superordinate goal:* Goals only attained if the members of two or more groups work together by pooling their efforts and resources (Sherif, 1958).

*Task Conflict:* Frustration centered around the problem to be solved during the meeting.

## VITA

Martin H. Grunau was born on March 7, 1967 in Sindelfingen, Germany. He attended schools in Germany, Belgium, and the USA before attending Virginia Tech in 1985. Martin received his B.S. degree in Mechanical Engineering in 1989. During the summers, Martin worked for IBM, Mercedes-Benz, and consulted independently on software education. In the fall of 1989, he joined the Industrial and Systems Engineering department at Virginia Tech for a Masters degree.

While working on his Master of Science degree, Martin worked as a graduate research assistant at Management Systems Laboratories of Virginia Tech, working on a government sponsored research project.

Starting in March, 1992, Martin will move to France to improve his French and to be involved as a Mechanical Engineer in CAD/CAM projects with IBM and Dassault INC.