

## CHAPTER I

### Introduction

#### *Background*

The primary goal shared by everyone faced with having to solve complex and important problems is a desire to make and execute the best possible decision. While decision making is a practice that everyone is familiar with to varying degrees from daily life experience, it is a process in which most individuals rely on informal versus formal systematic strategies to solve complex problems (Fox & Kolcaba, 1995; Tagliere, 1992). The decision-making process can be performed at either an individual or group level. Individual-level decision making is best suited for problems (a) which have few viable alternatives, (b) are noncomplex, and (c) the individual making the decision has all the knowledge and skill needed to solve the problem. Group-level decision making is best when (a) the problem is complex in nature, (b) when there are multiple alternatives from which to select to solve the problem, and (c) decision quality is of paramount importance (Robbins, 1997).

The current trend in organizational decision making is focused on the use of groups, rather than solo individuals, to make and execute important and complex organizational decisions (Caudron, 1998; Garmston, 1999; McEwan, 1997; Putnam & Stohl, 1996; Tubbs, 1996; Williams, 1993; Vann, 2000). The reliance on groups to make important high stakes decisions found is not only in business and industry, but is popular as well in all types of organizations from healthcare to public schools (e.g., Shared Decision Making or SDM committees) (Vann, 2000). The focus of this investigation is to compare three group-level decision strategies and the impact these techniques have on

the group decision-making process. Specifically, the dependent variables (a) decision quality, (b) cognitive conflict, (c) affective conflict, and (d) decision commitment are examined in this study.

The underlying reason for the trend in group decision making found in all types of organizations stems from the belief that groups better utilize the diverse talents, skills, and knowledge of organizational members, thus groups lead to more informed and higher quality decisions when solving complex problems (Bolman & Deal, 1992; Eisenhardt, 1989; Nemeth, 1997; Robbins, 1997; Sniezek & Henry, 1989; Sniezek & Henry, 1990). While this belief is grounded in empirical research (e.g., Sniezek and Henry, 1990), there is a problem associated with group decision making in that few people have had training in structured decision-making techniques (Byrnes, 1998; Kolb, 1989; Tagliere, 1992). Many people find themselves in groups with little to no formal exposure to group decision-making techniques. In fact, advocates for teaching decision-making techniques argue that these skills are learned therefore they should be taught in public schools so that students will be better prepared to make important decisions throughout life (Craycraft, 1988; McNairy, 1985). In addition, students that learn group decision-making skills will be better prepared for today's workforce due to the growing popularity in all types of organizations to use this type of decision-making approach (Tubbs, 1992). In order to enhance the probability of making good group decisions, group members need to be aware of the various decision processes available to them for making informed decisions (McEwan, 1997).

An often-used group decision-making approach is consensus. Consensus is a process by which group members seek to arrive at a final decision which they can support. While this approach appears to be straightforward on the surface, it is frequently misunderstood and misapplied (McEwan, 1997; Napier & Gershenfeld, 1993; Welch, Walsh, & Associates, 1994). Regularly, groups using consensus believe it means unanimous agreement on a final decision when in actuality it means support or acceptance for a final group decision. Frequently, groups who use consensus seeking as part of their group decision-making strategy do not follow any structured decision-making process. Structured techniques are claimed to infuse the decision-making process with increased levels of constructive conflict. However, members in unstructured consensus groups often refrain from offering dissenting opinions as well as seek to avoid confrontation out of fear of disrupting group harmony. Consensus that is reached before competing ideas and alternatives are fully addressed can have negative consequences for the decision-making process (e.g., lower quality decisions). When group members refrain from offering different points of view on an issue, then the decision process is affected by a phenomenon called “groupthink”. This problem increases the probability for low quality and ill-advised decisions to be made and executed (Janis, 1982; Napier & Gershenfeld, 1993). There are many examples of the negative consequences associated with the groupthink phenomenon such as the Vietnam War (Janis, 1982).

In addition to groupthink, groups can also suffer from a phenomenon referred to as “social loafing”, which means group members often exert less effort than they would if they were acting alone (Robbins, 1997). Group members affected by this problem simply avoid responsibility and participation due to a “safety in numbers” mentality.

In the presence of this problem, decisions can suffer due to a lack of idea sharing and full participation on the part of all group members.

To help alleviate problems such as groupthink and/or social loafing, while at the same time maximizing the diversity of input from group members, it is recommended that a degree of cognitive conflict be incorporated into the group decision-making process. The use of structured decision-making techniques like Dialectical Inquiry and Devil's Advocacy purport to raise cognitive conflict levels within group decision-making bodies. Cognitive conflict is considered to be a healthy form of group conflict, according to an interactionist perspective (Robbins, 1997), and it purportedly offers an effective antidote against groupthink because it seeks a diversity of input from group members on an issue(s) before a final decision is reached (Amason & Schweiger, 1994; Amason, Hochwarter, Thompson, & Harrison, 1995). This form of conflict focuses on specific issue-related differences between group members during the decision-making process. These differences are manifested in a positive and constructive manner and are void of negative personal/emotional attacks. Conversely, affective conflict focuses on personal, negative, and emotional attacks directed at specific individuals. This form of conflict is often hostile, divisive, and combative in nature. Also, it has the potential to breed resentment and distrust among group members. Affective conflict is a destructive form of group conflict and should be avoided (Amason et al., 1995).

While cognitive conflict is designed to improve group interaction and decision quality, affective conflict on the other hand has been shown to actually lower the quality of group decisions (Amason, 1996; Jehn, 1994). The key to promoting and using conflict within a group is to encourage cognitive conflict while at the same time eliminating

affective conflict (Amason & Schweiger, 1994). Incorporating the right amount of cognitive conflict within groups during the decision-making process is reported to lead to better quality decisions (Schweiger & Sandberg, 1989; Schweiger, Sandberg, & Ragan, 1986; Schweiger, Sandberg, & Rechner, 1989). In addition, it is reported that cognitive conflict can lead to more creative and innovative solutions for solving problems (Dyer & Song, 1998).

Two popular group decision-making strategies designed to provide higher levels of cognitive conflict as well as structured paths for reaching consensus on a final decision are Dialectical Inquiry (DI) and Devil's Advocacy (DA). Both of these strategies are designed to provide groups with specific procedural steps to use in the decision-making process. These steps, if properly followed by the group members, are intended to enhance participation, which in turn leads to a greater diversity of shared ideas and opinions among group members. The greater the discussion among group members, the higher the probability that more hidden assumptions underlying an issue will be revealed and consequently higher quality decisions reached. The result of using a formal structured approach such as DI or DA for reaching consensus should ultimately lead to more informed, thus higher quality final decisions.

The DI and DA decision-making approaches have received considerable attention in organizational behavior and management practices literature (Chanin & Shapiro, 1985; Churchman, 1971; Cosier, 1981; Cosier & Aplin, 1980; Cosier & Rechner, 1985; Devine, 1999; Mason, 1969; Mason & Mitroff, 1981; Priem, Harrison, & Muir, 1995; Priem & Price, 1991; Schweiger et al, 1986; Schweiger et al., 1989; Schweiger & Sandberg, 1989; Schwenk, 1990; Schwenk & Valacich, 1994; Schwenk & Cosier, 1980; Schwenk &

Cosier, 1993). A number of research approaches have been used to examine these techniques. While there has been a good deal of interest in these techniques over the past thirty years, the overall findings reported in a variety of different studies have, to an extent, been inconsistent. Some of the inconsistencies in the findings may be attributed to problems related to the operationalization of the techniques as well as instrumentation issues, both of which are addressed in this study.

### Statement of the Problem

There is a growing popularity within all kinds of organizations for the use of groups to make and implement organizational decisions (Caudron, 1998; Williams, 1993). Research has been consistent in showing that groups make more informed and higher quality decisions than lone individuals on complex problems. However, experimental research has not been consistent with regard to which group decision-making approaches have the most beneficial impact on the group decision-making process. The specific problem under investigation in this study is to compare if two popular structured cognitive conflict enhancing group decision-making techniques (either DI or DA) are as effective as an unstructured, non-directed (Unstructured Consensus Seeking or UCS) approach with regard to their measured impact on (a) decision quality, (b) cognitive conflict, (c) affective conflict, and (d) decision commitment.

### Need for the Study

Organizations interested in maximizing the quality of decisions made by groups within their given structure need to seek and implement group decision-making approaches that have consistently been shown through empirical research to be useful and effective. Two structured methods for reaching group consensus, Dialectical Inquiry (DI) and Devil's Advocacy (DA), have received considerable attention in the decision-making literature as being effective group decision-making strategies. Both of these cognitive conflict-inducing techniques claim to offer structured step-by-step paths for groups to follow in an effort to make a final group decision. These processes are designed to reveal hidden assumptions concerning an issue(s) as well as aid in the consensus-building process. These procedures ultimately are designed to enhance the overall quality of the group's decisions.

The research surrounding these techniques has often been conflicting with regard to their overall effectiveness. In some research literature, DI has been claimed to be the more effective and comprehensive approach (Mason, 1969; Mason & Mitroff, 1981), while in other articles and studies the DA approach has been reported to be the more beneficial (Schwenk & Valacich, 1994). Additional experimental research into these two approaches is warranted in an effort to further understand and explain their measured impact on the group decision-making process. The ultimate goal is to determine if structured group decision-making approaches such as DI and DA do, in fact, offer more tangible benefits (e.g., higher quality decisions, etc.) in the decision-making process compared to a non-directed, unstructured approach.

This study explored the effects these techniques had on the group decision-making process, while at the same time avoiding experimental design problems of previous studies identified by this researcher as well as others (Chanin & Shapiro, 1985; Priem, Harrison, & Muir, 1995; Priem & Price, 1991; Schweiger & Sandberg, 1989). Those design problems are: (a) operationalization of DI and DA as an individual vs. group process, (b) small group size, (c) subjective measurement of decision quality, and (d) lack of intra-group conflict measurements. These issues, along with how they were addressed in this study, are explained in greater detail in chapter two. The bottom line for the use of group decision-making techniques is how well any given approach impacts the quality of the final group decision. Organizations may expend considerable time and money implementing a particular decision-making technique only to find the approach has little impact on the quality of the decisions made by the group. This study sought additional knowledge and understanding on how structured and unstructured techniques impact the decision-making process.

### Hypotheses

The following non-directional hypotheses were examined in this investigation:

H<sub>1</sub>: There will be a difference in decision quality between the DI, DA, and

Unstructured Consensus Seeking (control) groups.

H<sub>2</sub>: There will be a difference in the observed cognitive conflict levels between the DI, DA, and UCS groups.

H<sub>3</sub>: There will be a difference in the observed affective conflict levels between the DI, DA, and UCS groups.

H<sub>4</sub>: There will be a difference in decision commitment between the DI, DA, and UCS groups.

### Limitations

This study, like all experiments, had limitations. Each limitation is addressed separately. Included in this discussion is how these limitations impacted this study. Implications of this study follow this discussion.

### Ad Hoc Groups

This study relied on the formation of ad hoc groups to compare the effects of DI, DA, and UCS on the decision-making process. Ad hoc groups do not possess all of the characteristics of mature working groups (e.g., cohesiveness, trust, etc.). From a group life-cycle perspective, these groups were in the earliest stage of development (Napier and Gershenfeld, 1993) therefore certain elements associated with mature groups such as cohesiveness and trust may not have had enough time to manifest.

### Decision Task

The “Adventure in the Amazon” (Ukens, 1998) decision-making exercise was selected for this study because it provided an objective measure of decision quality. While this instrument provided an interactive group decision task, it may not have contained all of the elements associated with high-stakes decisions because no personal consequences were at risk such as grades, promotions, recognition, etc. for the participants.

### Small Number of Participants

The lack of power due to the small sample size was the most important limitation of this study. The DI and DA methods, as reported in a meta-analysis by Schwenk, (1990) have a small effect size ( $d = .12$ ). In order to establish the necessary power needed to detect an effect size this small an enormously large sample (over 400) would have been required (Hopkins, Coulter, & Hopkins, 1981). A sample that large was beyond the resources of this lone researcher. One way to increase power, which this researcher did not use, is to relax the alpha level. The alpha level used in this study was set at a conventional .05 level. Negative consequences from committing a Type 1 error were low for this investigation. In retrospect, a relaxed alpha should have been considered as an approach to enhance power. The unit of comparison for this study was groups, not individuals, thus the small  $n = 12$  used for this study made it difficult to detect any statistical differences between the three conditions.

### Time Frame

The actual implementation phase of the techniques compared in this study was conducted on one day for a period of 3 hours. High stakes strategic decisions are often more involved, thus requiring the decision-making process to transpire over a much longer period of time. Also, group characteristics (e.g., cohesion, trust, etc.) tend to develop over longer period of times as well. However, based on the resources available as well as the use of volunteers, this time frame was realistic and achievable.

## Volunteers

Volunteers have been shown to have different characteristics compared to the non-volunteer population. Volunteers were used in this study because they were realistically attainable compared to working professionals. In addition, the researcher for this study did not have access to large intact groups from which these techniques could be compared.

## Delimitations

### Practice with the Strategies by Participants

The design used for this study was an experiment and the sample was comprised exclusively of volunteers therefore this researcher determined that repeated meetings with the participants were simply not feasible. Each treatment condition was tested on the first (and only) meeting with the participants. Thus, the participants did not have opportunities for repeated practice with these decision strategies prior to the treatment phase of this study. Research has shown that with repeated exposure and practice, participants become more efficient with the DI and DA decision techniques (Schweiger et al., 1989).

### Observer Training

Thirty-six volunteer observers were used for this study to assess how well groups followed their assigned decision techniques as well as to observe intra-group conflict. The observers received between 1 - 3 hours of training. Because they were all volunteers and had to be trained (some in groups and others individually) based on their availability to meet, they received only one training session prior to the investigation. It was determined by this researcher that repeated meetings with these individuals was not practical due to the complexity of scheduling conflicts with so many different people.

Thus, the lack of opportunities for repeated observer training was a delimiting factor for this study.

#### Implications of this Study

This study, while not finding any statistically significant differences between treatment conditions, did provide some intriguing insights into the group decision-making process. Organizational management research is full of articles and studies examining group decision-making techniques. However, the benefits of group decision making may have less to do with specific decision-making processes and more to do with the mere fact a group versus a lone individual assembled to solve a problem. The results of a group decision, regardless of the application of a technique or not, will normally be better over a lone individual. The results of this small study indicate that, at least for newly formed groups, structured techniques versus an unstructured technique offer no appreciable difference with regard to the quality of the decision, commitment to the decision and observed intra-group conflict. Thus, the group decision process may be more directly impacted and influenced by other factors, which was not the focus of this study, such as group composition.

The often-cited benefits of structured decision-making techniques, based on the findings of this study, may potentially be overstated at least for the purposes of newly formed groups. While this study had limitations, most importantly a lack of statistical power, it still brings into question whether the often-cited benefits (e.g., increased cognitive conflict, higher quality decisions, greater commitment, etc.) of structured decision making are in fact weaker than commonly thought. The implications of this study for future research indicate that more time is warranted in investigating the effects

structured decision-making techniques have on more mature (from a group lifecycle viewpoint) groups versus newly formed ad hoc groups. A definition of terms is offered next.

### Definition of Terms

- Affective Conflict:** disagreements that occur between group members which are hostile, personal, and based on negative emotional attacks (Amason et al., 1995).
- Cognitive Conflict:** disagreements that occur between group members, however, these disagreements do not deal with personal and emotional attacks. Rather, these disagreements address substantive, factual, and task specific information (Amason et al., 1995).
- Group:** “Two or more freely interacting people with shared norms and goals and a common identity” (Kreitner & Kinicki, 1998, p. 652).

### Summary

Group decision making is a commonly applied practice performed within all different types of organizations. While this type of decision making is popular, it is not uncommon for groups to make decisions without the use of a given technique. While it has been shown through research that groups tend to outperform lone individuals with regard to decision quality, it is less clear, in the estimation of this researcher, which group decision-making technique, if any, offers the best approach for a group to reach a final decision. This study compared two structured cognitive conflict-enhancing techniques to an unstructured, non-directed approach in an effort to learn more about how these

approaches impact the decision-making process. The next chapter provides the reader with the salient background and research information on these techniques to help provide the context for the current investigation.

## CHAPTER II

### Review of the Literature

#### *Introduction*

This study was concerned with comparing three group-level decision strategies and the impact these techniques have on the decision-making process. Two of the three strategies compared were highly structured while the third, which served as the control condition, was non-directed, thus unstructured. This chapter addresses the following areas related to this study: (a) group decision strategies, (b) previous research findings and limitations, (c) improvements made in this study, and (d) rationale for selected variables.

#### Group Decision-Making Strategies

All types of organizations are tending toward the use of groups or teams to make important strategic decisions. The review of literature on this topic revealed several aspects of the group decision-making process that are associated with better quality group decisions. These include: (a) the importance of cognitive or constructive conflict (e.g., greater commitment), (b) the benefits of active participation, and (c) the need for open communication and idea sharing. Structured decision-making techniques such as Dialectical Inquiry and Devil's Advocacy have been suggested to positively affect the aforementioned aspects of the group decision-making process. However, previous research on these techniques has not been consistent with regard to the impact these procedures have on the group decision-making process. To provide a better understanding of the approaches examined in this study, a brief overview of each is provided next.

### Unstructured Consensus Seeking (UCS)

Many people find themselves serving on group decision-making committees or teams, but are not familiar with the true meaning of how consensus seeking should be applied in the decision-making process (Napier & Gershenfeld, 1993). As a result, they often misinterpret the true meaning of what constitutes consensus. For instance, groups often rely on majority rule or a dominant group leader(s) to reach a final decision (Kochery, 1993). When consensus is used properly, everyone serving on the committee has equal power. Unfortunately, many people define consensus to mean unanimous agreement when in actuality it simply means the ability to support or live with a final decision (McEwan, 1997; Napier & Gershenfeld, 1993; Welch et al., 1994).

While people may claim to know what consensus is, the reality is that few people actually do. In addition, they often have received little or no real formal training in consensus seeking (Napier & Gershenfeld, 1993). In this investigation, the researcher refers to the commonly misunderstood and often misapplied form of consensus seeking as Unstructured Consensus Seeking or UCS. This condition, which served as the control group for this study, was operationalized so that no directions or explanations (hence non-directed) were provided to the participants regarding what constituted consensus. It was up to each group in this condition to determine and apply what it believed consensus to be during their group's decision-making process.

Previous experimental investigations (e.g., Schweiger et al., 1986; Schweiger et al., 1989; Priem et al., 1995) into DI and/or DA have compared these approaches against a Consensus (C) approach. Consensus in these past studies was considered an unstructured approach to group decision making. However, consensus was

operationalized in these studies in a way that provided subjects with specific guidelines on how to achieve consensus. Priem et al., (1995) expressed that the Consensus condition required just as much training time and involvement as did the structured DI condition, which it was compared against in their study. Thus, despite the claims made by previous investigators that the C approach was unstructured, this researcher contends that it did provide groups with, while perhaps low compared to DI and DA, some formal structure. The intent of this investigation was to compare two highly structured approaches with a non-directed unstructured control condition in order to determine if applied techniques, when compared to no technique, have measurable effects on the decision-making process. The control condition used in this study more closely resembled what might be typically found in a normal group decision-making approach used by organizations.

A potential problem associated with using consensus, especially without any formal structure, is that it does not provide people with a method from which to systematically address conflict (Napier & Gershenfeld, 1993). People by nature seek to avoid conflict and instead prefer to maintain a state of harmony (Moscovici & Doise, 1994). This avoidance of conflict may plant the seed for the previously mentioned phenomenon called groupthink (Janis, 1982). This phenomenon is a process that restricts group members from expressing dissenting or minority views explicitly for the purpose of maintaining group harmony. Groupthink may be a problem associated more often with cohesive (Napier & Gershenfeld, 1993), mature, and power-dominated (e.g., groups made up of superiors and subordinates) groups. When group members are unable to express different points of view, then the status quo remains intact, and creativity, innovation, and

ultimately decision quality are put at risk. Thus, groupthink can lead to early consensus on a decision before relevant hidden assumptions and competing ideas can be explored.

Research has consistently shown that better quality group decisions are the result of members being exposed to more, not less, information (Eisenhardt, 1999; Eisenhardt, Kahwajy & Bourgeois, 1997; Nemeth, 1997; Sniezek & Henry, 1989; Sniezek & Henry, 1990). Thus, the more open group members are with one another, the greater the probability exists for revealing hidden assumptions and ultimately making better quality decisions. In this investigation, two of the three approaches used are designed to specifically enhance participation as well as promote manifestations of cognitive conflict all for the purpose of enhancing the quality of the final decision.

In this study, Unstructured Consensus Seeking served as the control group for the following reasons. First, it represented a common form of group decision making that might typically be found in an average group decision-making situation. In other words, groups often are charged with making a decision using consensus, but no directions and guidelines (e.g., structure) are provided to help them in this endeavor. Thus, it is often the case that other processes (e.g., majority voting, dominant leaders, etc.) rather than consensus are actually used by these groups. Second, because no formal structure was provided to the UCS groups in this study, it provided a very distinct contrast to the two formally structured systematic approaches examined in this investigation. A brief review is provided next of the benefits of structured decision-making approaches and followed by an overview of each structured technique examined in this study.

## Overview of Two Structured Decision-Making Techniques

Both Dialectical Inquiry and Devil's Advocacy provide systematic steps for group members to follow in an effort to make a final decision. Participation and cognitive conflict are purported to increase when these methods are used because group members are divided into subgroups and each subgroup has defined roles in the decision-making process. In contrast, the UCS condition offers no defined roles (no formal structure), thus there exists a greater opportunity for group members not to participate as fully. As a result, the control condition offers a greater potential for the manifestation of groupthink and consequently lower quality decisions.

In structured approaches such as DI or DA, as participation increases, more discussion on given issues is reported to occur and this leads to a greater evaluation of hidden assumptions and a more thorough review of the problem (Schweiger et al., 1989). Eisenhardt (1989) reported from a study on fast strategic decisions among top-level executives that group decisions that relied on structured consensus techniques (e.g., consensus with qualification) were of higher quality than those lacking structure. Several studies have reported that better group decisions are made with structured approaches (e.g., DI and DA) versus unstructured strategies (Schweiger & Sandberg, 1989; Schweiger, et al., 1986; Schweiger et al., 1989). An overview of each structured approach examined in this study is provided next.

Overview of Devil's Advocacy. Irving Janis (1982) expressed how the use of Devil's Advocacy (DA) could have possibly prevented disasters like the Vietnam War by providing leaders (e.g., President Johnson) with feedback and new insights that might have made these key decision makers reevaluate their assumptions prior to committing to

action. The DA process is designed to force a group to challenge given positions and ideas on a topic in an effort to reveal hidden assumptions and provide more thorough evaluations of ideas for the purpose of improving the overall quality of the final decision. DA is a group decision-making approach that relies on a step-by-step process to reach a final decision. It relies on the development of two equal subgroups, one subgroup that develops a plan and the other subgroup that offers a formal critique of the plan. The cornerstone of this approach is the use of a formal critique. The critique is designed to challenge ideas in a constructive manner, aid in revealing hidden assumptions, and prevent the status quo from negatively affecting a group's decision. Whereas people have a natural tendency to not be confrontational (Moscovici & Doise, 1994), the DA approach systematically builds constructive conflict into the decision-making process. The basic assumption becomes "...that truly good plans [decisions] will survive the most forceful opposition..." (Mason, 1969, p. B407). The presence of constructive conflict is considered to be beneficial for group decision making (Amason et al., 1995; Robbins, 1997).

In group practice, the DA approach is applied as follows: one subgroup is assigned the role of developing a plan and the other subgroup the role of critiquing the plan. The DA process follows a plan-critique-revision-critique etc., decision-making process for groups to follow in the pursuit of a final decision (Schweiger et al., 1986; Schweiger et al., 1989; Priem et al., 1995). The effectiveness of the DA method has been experimentally tested in a variety of comparative studies and has been reported to yield higher quality decisions and more complete recommendations when compared to an

unstructured consensus only type approach (Schweiger et al., 1986; Schweiger et al., 1989).

For example, the first group level comparative study of DI, DA, and C (Consensus) was conducted on 120 MBA students by Schweiger et al., (1986). Participants in this study were randomly assigned to work in groups of 4. The subjects were all assigned a decision case study (e.g., Leitch Drug Company) to complete. The nature of the task was for the groups, using one of the assigned techniques, to develop recommendations and suggestions to help a small chain of troubled drug stores. Two judges were used to rate the groups' performance by the (a) number of assumptions offered, (b) the validity of the assumptions, and (c) the importance of the assumptions. The results showed DI and DA yielded significantly higher quality recommendations and assumptions compared to the Consensus only condition. This study helped provide empirical support for the proposition that structured decision-making techniques are beneficial for the group decision-making process.

Despite the potential benefits the structured DA approach offers, it does have several reported limitations. First, unlike the DI approach, DA does not offer a counter-proposal or alternative plan. If consensus is not reached, there is no alternative plan from which to select. Second, there is a greater possibility when using the DA approach that the critique may digress into the negative affective form of conflict (Mason, 1969). Often, a thin line exists between cognitive and affective forms of conflict (Amason & Schweiger, 1994). Depending on the individuals involved, a critique may be perceived incorrectly by members of subgroup one, and/or subgroup two may use the critique as a platform from which to launch personal attacks against members of subgroup one with

whom they dislike on a personal/emotional level. When too much affective conflict is present, there exists a greater chance for lower decision quality as well as overall member satisfaction (Amason, 1996). The DA approach does appear to offer some benefits, however, it also harbors the potential (e.g., increased affective conflict) for problems if not used properly. Another structured group decision strategy which incorporates the use of cognitive conflict is Dialectical Inquiry.

Overview of Dialectical Inquiry. Dialectical Inquiry (DI), like Devil's Advocacy, is a structured decision strategy designed to provide members with a systematic decision-making process designed to enhance expressions of cognitive conflict which leads to stronger group consensus and ultimately higher quality decisions. DI gained popularity (Schwenk & Cosier, 1980) as an organizational decision-making strategy as a result of Mason's (1969) study of RMK Abrasives. DI is a decision strategy designed to address "ill-structured" or "messy" problems (Mason & Mitroff, 1981). Ill-structured problems are ones that cannot be solved effectively by one person and are deemed important because they possess important consequences (Mitroff & Emshoff, 1979). In addition, DI is the most effective when all group members have access to the same information used to solve the problem (Sussman & Hernden, 1982).

The DI approach, like DA, relies on purposively engineered increases in cognitive conflict during the decision process as a means to enhance the final group decision. In addition, it is designed to systematically increase participation, similar to DA, by providing group members with clear roles in the decision-making process. DI also utilizes a subgroup format and follows a plan-counter plan-formal debate of the two plans-synthesis (consensus) approach for making a decision (Schweiger & Finger, 1984).

The cornerstone of the DI approach is the formal debate between the two plans. The debate provides a format from which two opposing views ultimately converge into a final solution or new understanding (“Weltanschauung”) of an issue (Churchman, 1971; Mason, 1969). Theoretically, it stands to reason that cognitive conflict levels increase as members become more personally vested in their respective positions during the debating process. In fact, Amason and Sapienza (1997) found in a survey study involving 94 corporate CEOs that teams (groups) who openly communicate and use debate as part of the decision-making process have higher levels of cognitive conflict and lower levels of affective conflict. While their study did not specifically examine the DI and DA approaches, it does indicate that the debating process, which is a critical component of the DI method, is associated with generating higher cognitive conflict levels.

The debate, similar in function to the critique in the DA method, is designed to help ferret out hidden assumptions on an issue, which ultimately should improve the overall quality of the final decision (Mason, 1969). DI supporters (Churchman, 1971; Mason, 1969; Mitroff, 1982; Mitroff & Emshoff, 1979) have long considered this approach to be a more comprehensive method to decision making than DA because it develops two distinct plans that are debated and ultimately synthesized into a final plan. While the DI approach may appear, according to its supporters, to be more comprehensive, its effectiveness when experimentally compared to DA has not held up well. As indicated in an article by Chanin and Shapiro (1985), two distinct sides emerged over the efficacy of the DI decision strategy when compared to DA. One side argued that DI was more complex and complete, thus better, while another side contended DI was at best only equal to DA and in most cases, less effective. The next section will highlight

several of the major studies on DI and DA as well as address the limitations associated with them.

### Previous Research

Investigations into the potential benefits of the Dialectical Inquiry and Devil's Advocacy approaches as organizational decision-making strategies began in the late 1960's with a qualitative study by Mason, (1969). Several additional qualitative studies (Lourenco & Glidewell, 1975; Mitroff, Barabba, & Kilmann, 1977) followed, however, these studies only addressed the DI approach and not the DA method. Researchers (Chanin & Shapiro, 1985; Schweiger et al., 1989; Schwenk & Cosier, 1980) have argued that these qualitative studies, while intriguing and providing some support for the potential use and benefit of DI, were limited because they failed to provide comparisons to other techniques and were potentially influenced by experimenter bias. The late 1970's through the mid 1980's experienced a number of studies (Cosier & Aplin, 1980; Cosier & Rechner, 1985; Schweiger & Finger, 1984; Schwenk & Cosier, 1980;) that used an experimental approach to investigating the comparative effectiveness of the DI, DA, and E (Expert) decision approaches. These initial experiments relied on operationalizing the DI and DA methods as individual versus group processes.

Schweiger et al., (1986) began a series of comparative investigations beginning in the mid-1980's which operationalized DI, DA, and C as group-level decision strategies. Schweiger and his associates argued that these techniques were originally conceived as group-oriented techniques and not as individual approaches. A small amount of experimental research since the 1980's has compared these techniques using a similar group-level approach, like that offered by Schweiger et al., (1986). To help provide

background for the present investigation, a number of examples of previous research are discussed.

### Qualitative Research on Dialectical Inquiry

The qualitative research on this topic began in the late 1960s and continued through the late 1970's. Mason's (1969) field study at RMK Abrasives (pseudonym for actual company name) helped establish DI as a potential strategy for improving strategic group decisions. RMK Abrasives identified two corporate goals: (a) increase after-tax earnings by 10% and (b) increase ROA to a level of 8%. To meet these two goals, an in-house planning department developed a strategic plan for the top management of RMK to consider. Mason took this plan and applied the DI strategy to it. He developed a list of ten assumptions (plan) for the top management to consider and then developed a counter list of ten assumptions (counter plan). Mason then created a written and oral debate to address points raised by both plans. This debate was presented to the top management at RMK.

The primary purpose for this approach was to test the hypothesis that the recipients of this debate would develop new insights and understanding (synthesis) of the direction the company should take. Mason confirmed his hypothesis through interviews and questionnaires with top-level executives who claimed the debate made them challenge their own assumptions and form new ones which they had not previously considered. This study, while supportive of Mason's hypothesis, had several limitations. First, it lacked comparisons to other strategies such as DA (Schwenk & Cosier, 1980). Second, it was operationalized as an individual (e.g., Mason played all parts in the process: subgroup one, two, debater, etc.) versus a group process. The design problems

associated with this study are prevalent also in other qualitative studies on the DI method (Lourenco & Glidewell, 1975; Mitroff, Barabba, & Kilmann, 1977).

The most comprehensive of the qualitative field studies (Mitroff et al., 1977) involved an investigation into the DI method which was conducted over a period of two and one-half years at the National Bureau of Census Office. This study relied on volunteers who worked for the Census Bureau and were challenged to develop a plan that showed what the Bureau might look like downrange in the year 2000. The volunteer participants were divided into smaller working groups and given lectures on how to use the DI method. Groups of volunteers devised their own plans as to how the Bureau was going to look in the year 2000. They submitted their plans to a designated project director. The project director was assigned the task to review these reports and look for ones that truly challenged the status quo. An executive group, comprised of members from the original working groups, was formed to review these plans and synthesize them into a new worldview to be presented to the executive board at the Census Bureau. The final analysis of this process was deemed a success by the board because the synthesized report challenged old ways of operating and presented new and innovative approaches for their organization to consider for the future. The authors of this study attributed the plan-counter plan-synthesis approach offered by the DI method as the reason for the innovative solutions offered in the final plan.

The limitations of this study are similar to those already discussed which include (a) a lack of comparison to other strategies, and (b) the potential for experimenter bias. In regard to experimenter bias, after an organization (e.g., Census Bureau) has invested staff, time, and resources, a certain degree of pressure likely exists to make supportive

conclusions of the technique examined. This may or may not have been the situation with this study, however, the potential for experimenter bias does have a greater possibility of existing in this type of study, from the perspective of this researcher as well as others (Schweiger et al., 1989). Finally, this study appeared to leave out the most crucial part of the DI approach, which was a formal debate between competing plans. It was vague to this researcher how exactly the final plan was determined. Thus, improper operationalization of DI may have also been a factor in this study.

#### Summary of Qualitative Research on DI

These qualitative studies provided some support for the possible benefits of the DI approach, however, these studies appeared to have had similar limitations such as (a) a lack of comparisons to other approaches (Chanin & Shapiro, 1985; Schwenk & Cosier, 1980; Schwenk, 1982) and (b) a greater potential for experimenter bias (Schweiger et al., 1989), which makes it difficult to discern if the DI approach was actually responsible for the outcomes or if perhaps some other phenomenon might have been the cause. The main benefit of these studies was that they were all conducted in real-world settings, which provided evidence that DI could possibly be implemented and carried out with an effect in actual organizational settings.

#### Experimental Research on DI, DA, and Consensus

While the early qualitative researchers were more supportive of the DI approach (e.g., Mason, 1969), claiming that it was more complex and comprehensive than other strategies such as DA, the experimental research which has followed has not been as supportive of their contentions. This section provides an overview of several pertinent experiments, which will be followed by a discussion of the common design limitations

associated with them. As mentioned, the first type of experiments conducted on these approaches began in the late 1970's and early 1980's. These studies compared DI and DA as individual-level versus group-level decision strategies. Critics (Chanin & Shapiro, 1985) argued that these types of studies left out critical elements in the process such as the debate (e.g., DI), as well as not requiring active participation from the subjects.

An example of this type of research is represented by a study by Schwenk and Cosier (1980). Their study compared the effectiveness of the following decision strategies (a) Expert, (b) Dialectical Inquiry, and (c) Devil's Advocacy on prediction performance. The findings of this study reported that the DA method was overall as good if not better than DI or E approaches. Ninety-six undergraduate business students were challenged with making financial predictions on three cue values: (a) current ratio, (b) inventory turnover, and (c) debt to equity ratio. Participants were asked to predict P/E ratios for ABC Electronics Company. Subjects were randomly assigned to one of four treatment conditions: (a) DI, (b) DA<sub>1</sub>, (c) DA<sub>2</sub>, and (d) Expert. Results showed that DA<sub>1</sub>, which was the standard operational condition for DA (e.g., plan/critique) was as effective as DI in one world state and superior to DI in another world state. The DA<sub>2</sub> condition, which was represented by an affective conflict style critique, was deemed the least effective approach to prediction performance.

This study had limitations associated with it, which persisted in similar types of experiments into the DI and DA approaches. These limitations included: (a) the operationalization of DI and DA as individual decision processes versus group ones and (b) failure to require participants to actually carry out the steps associated with these methods (Chanin & Shapiro, 1985). For example, in the DI condition participants did not

have to debate between two opposing positions, thus lacking a personal involvement and investment in a particular stance on an issue. Not having subjects actually carry out the steps associated with the techniques brings into question how much the technique actually contributed to the results. It is conceivable that neither a DI or DA approach was actually applied in these investigations, thus the results could possibly have been attributed to other factor(s) such as individual ability versus systematic decision processes.

In a study by Cosier and Aplin (1980), DIS (DI), DA, Expert, and a Control approach were compared using a group of 32 United Way Planners from across the country as subjects. The participants were randomly assigned to one of the four aforementioned treatment groups. They were all provided with a case study concerning a troubled fictitious United Way location in Bakersville, Ohio. The premise of the case study involved how the Bakersville location was not meeting its targeted fund raising goals. The Bakersville location had hired a new planning director named Bill Walker. Each participant in this study was asked to play the role of Bill Walker. Each treatment was operationalized as follows. Participants in the DIS condition received two reports (plans) prepared by two different advisory groups Bill Walker had hired to help him with planning recommendations. The plans were conflicting (e.g., plan/counter-plan). The DA condition also received two reports, one that was a plan and the other a critique of the plan. The Expert (E) condition received one plan prepared by a planning expert and the control condition received only instructions on how to develop a planning report but provided no outside information. In all conditions, individuals not groups, submitted a planning document. There were specific elements required in the planning document

(e.g., mission statement, specific recommendations, etc.). The planning reports that were submitted were reviewed by two judges who evaluated them on six criteria: (a) internal consistency, (b) consistency with the environment, (c) appropriateness of resources, (d) satisfactory degree of risk, (e) appropriate time frame, and (f) workability. The judges rated the recommendations offered from the DA condition as superior to the other conditions.

While this study provided support for the contention that the DA strategy was more effective than the DI condition, it once again operationalized the techniques as individual, versus group, processes. These methods are more appropriately designed as group, not individual, decision processes (Mitroff & Mason, 1981; Schweiger & Sandberg, 1989). It is hard to imagine that substantive debate and relevant critiques occur inwardly as a result of subject's merely reading pre-prepared reports (DI) and/or critiques (DA) (Chanin & Shapiro, 1985). Expert judges were also used to evaluate the plans and recommendations made by the individual participants.

The use of expert judges has been a common method used to assess decision quality in many of the comparative studies of the DI and DA techniques. This author does not believe that expert judges should be excluded from comparison studies concerning these or other group decision-making approaches. However, this practice has been the predominant approach used by researchers for measuring decision quality, especially in the group level investigations of the DI and DA approaches (Priem, Harrison & Muir, 1995; Schweiger & Sandberg, 1989; Schweiger et al., 1986; Schweiger et al., 1989). More objective approaches to measuring decision quality need to be considered and implemented in new investigations.

Schweiger and his associates addressed a number of the earlier experimental design problems in a series of experiments in the 1980's (Schweiger & Sandberg, 1989; Schweiger et al., 1986; Schweiger et al., 1989). For example, Schweiger et al., (1989) conducted an experiment involving 120 middle and upper-middle level managers from three divisions of a Fortune 500 company. These subjects were randomly assigned to three treatment conditions: (a) DI, (b) DA, and (c) C (Consensus). Treatment conditions were operationalized as group-level versus individual-level decision strategies. Subjects were randomly assigned to work in groups of four which allowed for the creation of equal subgroups of two to be formed. Participants were provided with two case studies, (a) Leitch Quality Drug and (b) Hudepohl Brewing Company, to analyze and present recommendations for improvement.

The following variables were examined in this study: (a) decision quality, (b) group member reactions (measured by a 12 item self-report scale), (c) meeting time (e.g., measured length of time needed to complete the task under each condition), and (d) experience. Expert judges were once again used to judge the recommendations submitted by each group under the following criteria: (a) number of assumptions made, (b) validity of assumptions, (c) importance of assumptions, and (d) quality of assumptions. The authors of this study predicted that DI groups would yield higher quality decisions than DA groups, however, no significant difference was reported. While this study found no statistically appreciable difference in decision quality between DI and DA, it did find both structured approaches to be superior to the Consensus condition. This study provided support for the contention that structured cognitive conflict-enhancing group decision strategies are better than unstructured types (e.g., Consensus).

Schweiger's et al., (1989) study offered major design improvements upon earlier works (e.g., Schweiger & Finger, 1984) by operationalizing DI and DA as group-oriented decision strategies versus individual ones. In addition, the participants were working professionals versus students and were required to carry out the steps associated with each given decision strategy. These design improvements were needed in order to provide more accurate comparisons of the DI and DA approaches. However, this study as well as others (e.g., Priem et al., 1995; Schweiger & Sandberg, 1989; Schweiger et al., 1986; Schwenk & Cosier, 1993) all relied on expert judges to rate decision quality. In addition, the group size of four (subgroups of two) was the only group size reported and used in these investigations. A group size of 4 is not considered the optimal group size (Tubbs, 1992). As will be discussed later in this paper, out of the few experiments that have operationalized DI and DA as group processes, all of them but one, Schwenk & Valacich, (1994), relied on the same group size of four. While the experimental research has been less supportive of the DI approach, the reason may be more attributed to possible experimental design limitations than to the technique itself. In fact, in a meta-analysis by Schwenk (1990), it was reported that the majority of the experimental studies had operationalized DI and DA as individual versus group strategies.

By 1990, only four studies, which had directly compared the DI and DA approaches, had operationalized these techniques as group decision processes. The author of this study located four additional studies (Devine, 1999; Priem et al., 1995; Schwenk & Cosier, 1993; Schwenk & Valacich, 1994) after 1990, which operationalized DI and/or DA as group-oriented decision techniques. However, not all of these studies directly compared the DI and DA approaches. Interestingly, Schwenk's (1990) meta-analysis

reported that DI was shown to have a slight advantage over DA when operationalized as a group process but DA had a clear advantage over DI when operationalized as an individual process. Schwenk and Valacich (1994) reported different results from Schwenk's (1990) meta-analysis in an experiment that compared the effects of DI and DA at both individual and group levels. DA was shown to be more effective as an individual decision process as well as (but not statistically) a group-oriented process.

The small amount of experimental research, which directly compares and operationalizes DI and DA as group processes, has been limited in quantity, thus necessitating the need for further investigations. At the same time, attempts need to be made for improvements over previous design limitations. Many of the group level studies (Schweiger et al., 1986; Schweiger et al., 1989) to date have reported that structured approaches such as DI and/or DA are more effective than unstructured ones such as consensus (C). However, the overall small number of group-oriented comparative studies on DI and DA, along with the subjective nature used to measure decision quality, makes it difficult for this researcher to conclude the overall superiority of structured approaches versus unstructured ones with regard to their effects on decision quality.

In fact, Schwenk & Cosier (1993) reported no difference in decision quality between a structured DA approach and a Consensus approach. In addition, Priem et al., (1995) reported no difference in decision quality between a structured DI approach and a Consensus method. Finally, Stasser, Taylor, and Hanna (1989) concluded in a study, which examined information sharing in groups of 3 and 6 who were exposed to structured and unstructured decision-making conditions, that structured decision making may actually lead to a lower sharing of unique (e.g., hidden) information. The reduction in the

sharing of unique information may contribute to less informed and lower quality decisions. Thus, it is not clear how effective structured decision-making processes such as DI and DA are with regard to their outcomes on decision quality. While a number of limitations from previous studies have been mentioned, the next section explores the most prevalent design problems associated with past research and how this current investigation addressed them.

#### Previous Design Limitations and Improvements Offered for this Study

Examining the experimental research on the DI and DA approaches revealed several reoccurring problems. Many of these problems (e.g., operation, group size, etc.) have been previously mentioned. The following section is designed to break each of these design problems down in a more in-depth manner as well as identify how this study addressed these limitations.

#### Individual versus Group

The majority of comparative experimental research on DI and DA has operationalized these decision processes as individual versus group techniques (Cosier & Aplin, 1980; Cosier, Ruble & Aplin, 1978; Schwenk, 1982; Schwenk, 1984; Schwenk & Cosier, 1980; Schweiger & Finger, 1984). For example, Schweiger and Finger (1984), in a study involving 270 business students (both graduate and undergraduate), compared the effects of DI, DA, and E (Expert) approaches. Students were asked to make financial predictions concerning a fictitious company, ABC electronics. Participants were provided with three sources of information, one of which was planning information prepared by an expert, to help them make their predictions. Subjects were randomly assigned to one of the three conditions. For the DI condition, participants were given a plan prepared by

“Expert A” (plan) and a counter plan by “Expert B”. Under the DA condition, subjects were provided with a plan prepared by “Expert A” and a critique prepared by “Expert B”. Under the E condition subjects were provide with a report prepared by an expert. The subjects were required to use this information to help them make their financial predications about ABC Electronics.

The DI and DA conditions, as evident by this example, were operationalized as individual processes. Each subject had to internalize the information provided to him or her in order to make financial predictions. This type of design, while representative of earlier investigations, still represents the majority of experimental investigations into the DI and DA techniques. The process in these types of investigations followed a similar methodology. For instance, subjects in these types of studies were provided with previously prepared written reports from which they were to read, internalize the information, and finally make predictions and recommendations based on these reports. This type of design presented two problems. First, participants were not required to take an active role in the process. They were merely responding to information that was provided to them from an outside source. There was no opportunity for the subjects to inquire and question what was provided to them in the reports. In other words, there was a lower chance for personal stakes or positions to be taken on a given topic. Second, this approach eliminated an important component of the DI process, the debate (Chanin & Shapiro, 1985). As an individual process, the debate between the two sides had to occur as an internal process for each person. Thus, all the elements associated with the DI method were not present in these types of studies.

When these techniques are operationalized in this manner, it has been reported from a meta-analysis that the DA method has been more effective (Schwenk, 1990). However, when operationalized as group processes (Schweiger et al., 1986; Schweiger et al., 1989; Schweiger & Sandberg, 1989) DI has shown a slight advantage. The cornerstones for each approach include the following two elements (a) debate (DI) and (b) critique (DA). Under an individualized operation of DI, the debate component is eliminated, thus the overall effects of DI are potentially attenuated. The DI process, because it was not fully represented in these previous studies, provides at least a partial explanation as to why DA works better than DI under individualized operations. In order for hidden assumptions to be revealed and new understanding surrounding an issue discovered during the decision-making process, an interaction and exchange of ideas between people is beneficial. Thus, in order to accurately compare DI and DA, more experimental research needs to be conducted which operationalizes these techniques as group-level procedures versus individual ones (Schweiger & Sandberg, 1989). As called for by Schwenk (1990), the addition of more experimental investigations will allow for more accurate and powerful future meta-analyses to be conducted on the DI and DA techniques.

This research operationalized DI and DA as group processes versus individual ones. Applying a similar approach introduced and used by Schweiger et al., (1986) and Schweiger et al., (1989), participants in the current study in both the DI and DA conditions were assigned to groups and instructed to carry out the major steps associated with each technique. The group size used for this study was increased from 4 to 6. This allowed for the creation of equal subgroups of three. Subjects were instructed to solve the

assigned problem using all of the steps (e.g., plan-counter plan-debate) associated with their assigned condition. In doing so, participants were able to take active parts in the development of their group's final plan.

### Group Size

All of the previous group-oriented experimental comparisons of DI and/or DA (Devine, 1999; Priem et al., 1995; Schweiger & Sandberg, 1989; Schweiger et al., 1986; Schweiger et al., 1989; Schwenk & Cosier, 1993) reviewed by this author, with the exception of one (Schwenk & Valacich, 1994), relied on the same group size of four. The use of groups was clearly a major improvement over previous investigations. However, subgroups of two are considered too small to generate large numbers of ideas (Tubbs, 1992). In addition, they lack a diversity of input, which can often lead to less informed decisions (Napier & Gershenfeld, 1993). Thus, it was determined by this researcher that increasing the group size to six (subgroups of three) would offer a greater possibility for a diversity of ideas to be shared among the groups and subgroups (only in DI and DA conditions), thus potentially resulting in better quality group decisions.

While small groups are associated with (a) the ability to reach consensus quickly, (b) improved communications, (c) greater commitment, and (d) greater satisfaction (Welch et al., 1994), groups of four, especially when divided into subgroups of two, may have been too small to fully benefit from the DI or DA techniques. The literature suggests that groups of five are the optimal size for generating sufficient quantities of ideas and higher quality decisions, thus the best size for problem solving (Kreitner & Kinicki, 1998; Tubbs, 1992). However, six was selected for the study over the number of five in order to establish equal subgroups of three each in the DI and DA conditions. In addition,

three people per subgroup compared to only two increases the potential for more unique idea generation. The intent behind using larger groups was to examine if the effects of the DI and DA techniques were magnified. Larger group sizes potentially offer more opportunities for a diversity of ideas to be generate and shared, which could have an impact on expressions of cognitive conflict, commitment, and ultimately decision quality.

### Expert Judges

The majority of the group-oriented experimental research on DI and DA has relied on expert judges to rate decision quality (Priem et al., 1995; Schweiger & Sandberg, 1989; Schweiger et al., 1986; Schweiger et al., 1989; Schwenk & Cosier, 1993). For example, Schweiger and Sandberg (1989) used expert judges to rate the quality of assumptions and recommendations provided by 120 MBA students in response to a decision task exercise (e.g., The Leitch Quality Drug Company), which they participated in, both individually and as a group. The expert judges rated the (a) overall quality, (b) number of assumptions offered, (c) validity of assumptions, and (d) the importance of the assumptions. This study reported that both DI and DA groups performed better compared to the average individual within their own group compared to a Consensus only approach. In other words, the DI and DA approaches enhanced the capabilities of its group's members more than did the Consensus approach.

This example, along with the other experimental studies that operationalized DI and DA as group processes, relied on only one type of decision quality assessment, expert judges. In addition, these studies all relied on the use of business focused case-study decision tasks (e.g., The Harvey Wallbanger, The Leitch Quality Drug Company, etc.). Participants were required to develop, using their assigned group technique (e.g., DI), a

list of underlying assumptions and recommendations on how to solve these case study problems. However, the best answer to the problem was not always clear, which could have made assessing decision quality a more subjective endeavor (Priem et al., 1995).

This present study relied on a decision task group exercise called Adventure in the Amazon, by Lorraine Ukens (1998), which offered an objective measure of group decision quality. To assess the overall effects these techniques had on decision quality, an objective measure designed to rate decision quality without relying on expert judges was determined by this researcher to be a better approach. The exercise used in this study required groups to rank order fifteen items (e.g., one being the most important and fifteen the least important) by level of importance for survival. There is a correct answer to the overall ordering of the responses which was validated by survival experts. Thus, the group scores provided an objective measure for how well the techniques impacted the final decision.

### Conflict Levels

A great deal of literature on group decision making claims cognitive conflict is beneficial to group performance (Amason, 1986; Amason & Sapienza, 1997; Napier & Gershenfeld, 1993; Robbins, 1997). Both DI and DA are considered cognitive conflict enhancing group decision techniques. Of the few studies which have compared DI and DA under group-oriented operations, the ones that have attempted to measure cognitive conflict have relied primarily on one approach (Schweiger et al., 1986; Priem et al., 1995). Both Schweiger et al., (1986) and Priem et al., (1995) measured for the expression of cognitive conflict by using a two-item scale, which measured "...how much critical evaluation of assumptions and recommendations occurred during decision making"

(Priem et al., 1995, p. 699). Based on this scale, Schweiger et al., (1986) reported that subjects in both the DI and DA conditions experienced higher levels of critical evaluation compared to a consensus only approach. It was determined by Schweiger et al., (1986) that higher expressions of critical evaluation were manifestations of cognitive conflict. The contention that structured approaches such as DI and DA are cognitive conflict enhancing are based primarily on the results of these experiments. No measures were taken in these studies to assess the level of affective conflict. The scale was administered to the participants post-task.

Priem and Price (1991) examined individual expectations related to conflict outcomes when using the DI, DA, and C approaches. Participants were provided with an overview of the strategic decision-making process and type of people within organizations that would make these decisions. Subjects were also given a written overview of each technique, DI, DA, or C. They were then asked to answer a series of questions related to their expectations concerning these techniques. These questions were designed to assess factors such as: “cognitive conflict, social conflict, decision quality, decision acceptance, and group affect...” (p. 213). No significant difference was found in reported expectations concerning cognitive conflict. While this study was interesting with regard to individual expectations related to conflict, it did not directly measure conflict levels during a group interaction using these techniques. Schweiger and Finger (1984) first called for the need to measure cognitive conflict under group-level conditions. They measured cognitive conflict with a post-task questionnaire using a two-item cognitive conflict scale. However, Schweiger and Finger’s (1984) study operationalized DI, DA, and E as individual processes versus group processes. Under this operation, no significant

difference was reported concerning perceived cognitive conflict between the participants in each condition. Their study did not attempt to measure affective conflict levels.

The literature consistently states DI and DA are cognitive conflict enhancing techniques, however, the small amount of available data that exists along with the majority of studies using the same two-item instrument, necessitates the need for new approaches and measures to be taken. It is possible that these techniques do in fact raise cognitive conflict levels as many researchers have suggested, however, DI and DA may possibly raise affective conflict levels as much, if not more than cognitive conflict levels. In order to know how DI and DA affect conflict levels, additional studies need to measure under group level operations the presence of both forms of conflict. This study attempted to improve upon previous research by using trained observers in real-time to assess the amount of both affective and cognitive conflict within the groups they observed. Previous experiments (e.g., Priem et al., 1995) relied on participants within treatment groups to complete a short post-task questionnaire to measure the cognitive conflict variable. It was decided by this researcher that trained observers watching decision groups of six engage in a group decision task in real-time would offer a more accurate approach for measuring this variable. Thus, a seven question, five point rating scale (e.g., 1=none and 5=great deal), measuring both affective and cognitive conflict, was completed by each observer post-decision task.

Three of the questions measured cognitive conflict and four questions measured affective conflict. The literature consistently states the importance and value cognitive conflict provides in the group decision-making process. Researchers claim (Schweiger et al., 1986) that the DI and DA techniques do in fact increase expressions of this form of

conflict. However, it is not clear to this researcher if this phenomenon was actually occurring as a result of the application of structured decision-making techniques in the previous studies reviewed, because the instrument developed by Schweiger et al., (1986) was reported to have low internal consistency. Plus, the scale measured individual critical evaluation, which may be a result of other processes other than the presence of cognitive conflict. Thus, an approach that attempted to more directly measure the manifestation of cognitive conflict as well as affective conflict was deemed important to measure in this study. Other researchers (e.g., Priem & Price, 1991; Priem et al., 1995) have called for further measures of this variable as well.

#### Accuracy of Applying the Decision Process

The DI and DA decision-making processes are not familiar techniques to most people. To determine if participants used the techniques properly, previous investigations relied on the following manipulation checks. Schweiger et al., (1986) and Schweiger et al., (1989) used tape recordings of each group during the decision-making process as a check to see if the techniques were followed. Judges then independently classified the recordings as DI, DA, or C. In addition, Schweiger and Sandberg (1989) used a post-task questionnaire to measure how well participants understood and followed the procedures.

Participants in this research study received 30-45 minutes of training prior to engaging in the assigned decision task. To assess how well each group followed the procedures after receiving training, three trained observers per group of six students (36 total observers) were utilized. These observers watched their assigned groups during the decision task exercise to determine how well the participants followed their assigned decision-making strategies. Observing actual groups in real-time may provide a better

and more accurate approach for assessing how well subjects are able to apply these techniques after training.

### Summary of Improvements Over Past Research

While no study is perfect and this one is certainly no exception, attempts must be made in new investigations to improve upon previous research. The present study sought to improve upon previous research in the following ways. First, the decision techniques employed in this study were operationalized as group versus individual processes, which was similar to the approach begun by Schweiger et al., (1986). This required groups to be actively involved in the decision-making process by having them carry out (e.g., debate, critique, etc.) each step in their assigned decision technique. Second, a larger group size was used in this study in an attempt to improve the diversity of input within groups and subgroups in order to learn if larger group size magnifies the effects of these techniques. No rationale for group sizes of four was provided in previous investigations.

A third improvement was the measure of conflict levels, both affective and cognitive, by trained observers. The intention was to determine if these techniques did in fact positively affect cognitive conflict levels as suggested by the literature or if they adversely affected groups with increased levels of affective conflict. Fourth, trained observers were used, in real-time, to examine each group in the DI and DA conditions in an effort to determine if the groups followed the procedures properly. Fifth and most importantly, decision quality was measured objectively using scores generated by the Adventure in the Amazon (Ukens, 1998) decision task. Because increased decision quality is the ultimate goal of group decision making, this variable was considered to be

the most important, thus necessitating the need for an objective group measure. The next section provides an overview of the variables selected for this investigation.

### Rationale for Selected Variables

#### Independent Variable

The independent variable for this study is group decision-making strategy. This variable is categorical and these categories include (a) Dialectical Inquiry, (b) Devil's Advocacy, and (c) Unstructured Consensus Seeking (control condition). A brief rationale for each of these variables is provided next.

Dialectical Inquiry. DI was selected because it represents a highly structured group decision-making approach designed to increase cognitive conflict levels while at the same time providing a clear path for groups to follow in order to reach consensus on a final decision. In addition, it purports to effuse the decision-making process with higher levels of cognitive conflict. The DI method is considered to be a comprehensive approach to group decision-making. However, results from previous investigations are conflicting with regard to its overall effectiveness when compared to other structured and unstructured approaches. Many of the prior investigations had consistently reoccurring design limitations, which bring into question just how effective this DI technique is for group decision making. Thus, additional group-oriented comparative experimental research on these techniques was considered warranted by this researcher.

Devil's Advocacy. Like DI, the DA approach also relies on cognitive conflict to improve group performance in the decision-making process. This approach is also highly structured and relies on a subgroup format like the DI method. Many of the earlier investigations claimed that this approach was more effective as well as easier to implement than DI (Schwenk, 1982). In order to establish a fair assessment of the effectiveness of this approach compared to DI and UCS, it has to be operationalized as a group-level decision technique.

Unstructured Consensus Seeking. The author of this study refers to the control condition used in this investigation as Unstructured Consensus Seeking (UCS) because no consensus guidelines and/or steps were provided to the participants. This condition was operationalized as a non-directed group decision-making approach. It was up to the participants within each group to determine what consensus was and how to use it. Many people claim to use consensus, however, in reality they often end up using other methods to reach a group decision.

In the UCS experiment control condition, participants were not provided with any specific steps and instructions to reach consensus. In several previous experiments (see Priem et al., 1995; Schweiger et al., 1986; Schweiger et al., 1989), the C (consensus) condition was operationalized by the researchers as unstructured, yet participants were provided with specific guidelines and instructions for reaching consensus. This approach, in the estimation of this researcher, still provided (perhaps at a much lower level than DI and DA) some level of formal structure for the group to follow in the decision-making process. The researcher of this study refrained from providing participants in this condition with any consensus guidelines that might have provided formal structure for the

group to use. Instead, groups were asked to use consensus, but the interpretation was left up to each group to decide what constituted consensus to them. This type of control condition attempted to the degree possible approximate how typical groups might go about making a decision (no formal structure / specific procedures).

### Dependent Variables

The four dependent variables under investigation in this study are (a) decision quality, (b) cognitive conflict, (c) affective conflict and (d) decision commitment. A brief discussion of each level will be provided next.

Decision Quality. Organizations that use group decision making need to employ strategies that have been consistently shown through research to enhance the quality of the decision rendered by these groups. The primary goal of decision-making groups should be to make the best quality final decisions possible. Decision quality was selected because it represents the most important aspect of the group decision-making process, in this view of this researcher. There is little purpose behind spending time and money on training people on techniques, if the techniques in question do not offer tangible benefits (e.g., better quality decisions). It is important that decision-making groups get along well and enjoy working together, however, these considerations are secondary in importance to decision quality. Organizations should seek to use strategies that improve the quality of group made decisions. Therefore, this researcher felt it was important to measure this aspect of the group decision-making process as objectively as possible.

Cognitive and Affective Conflict Levels. Both DI and DA claim to increase the level of cognitive conflict experienced by the group members, thus improving performance namely in the area of decision quality. Despite the beneficial claims of cognitive conflict, few studies (e.g., Amason, 1996; Devine, 1999; Priem et al., 1995; Priem & Price, 1991; Schweiger et al., 1986) have attempted to measure both affective and cognitive conflict levels in groups using these or other group decision techniques. It is important to determine if the claims made for DI and DA as cognitive conflict increasing decision strategies are substantiated through additional experiments that measures this variable. There is always the possibility that these techniques do not have measurable affects on cognitive conflict levels. It is possible these structured approaches might even potentially increase the negative affective form of conflict. Therefore, it is important that both forms of conflict are measured when examining these techniques in an effort to provide either support or nonsupport for these claims.

Decision Commitment. Commitment to the final decision is an important aspect of group decision making. The more committed a group is to a final decision, the greater the likelihood is that the decision will be implemented. If consensus is reached correctly, members should report strong support for the final decision. Both DI and DA, when operationalized as group processes, require members within the group to take more active personal involvement, hence greater personal stakes in the decision. Thus, DI and DA group members should, according to theory, have a stronger commitment to their decision due to the increased expression of cognitive conflict (Amason, 1996). Previous findings have not been consistent with this claim.

For example, Amason (1996) posited in a survey of top management teams contacted in both the food processing and furniture industries that there would be a positive correlation between cognitive conflict and decision commitment and a negative correlation between affective conflict and decision commitment. However, no relationship was found in this investigation. Schweiger et al., (1986) reported higher levels of decision acceptance in Consensus groups compared to DI and DA groups. Priem et al., (1995) reported the opposite of Schweiger et al., (1986) in that higher levels of decision acceptance were reported in DI groups compared to Consensus only groups. Thus, it is unclear from previous research whether decision commitment is enhanced by greater expressions of cognitive conflict resulting from the application of structured decision-making approaches. Therefore, this study seeks to further investigate this relationship.

### Summary

The practice of group decision making has grown in popularity as well as in importance within many types of organizations (e.g., schools, hospitals, corporations, etc.). An area of group decision-making research that has received attention concerns the use of structured techniques in the group decision-making process. DI and DA provide two structured approaches to group decision making that are designed to increase cognitive conflict levels and consequently decision quality. Both the formal structure of these processes as well as the increased presence of cognitive conflict are claimed to benefit the group decision-making process by improving decision quality.

As this chapter has illustrated, previous research on these techniques, when operationalized as group processes, is limited in quantity and inconsistent with regard to

the reported findings. This study sought to further expand understanding surrounding these techniques and the impact, if any, these processes have on (a) decision quality, (b) intra-group conflict levels, and (c) decision commitment. It is important for organizations to train people and implement group decision-making strategies that research has consistently been able to show are beneficial, thus worthy of the time and financial resources. This has not been the case with regard to DI and DA. Which type of group decision strategy, if any, is more effective to the decision-making process has yet to be convincingly determined. The next chapter will address the specific mechanics of this proposed study.

## CHAPTER III

### Method

#### *Introduction*

This experiment compared the effects of three group decision-making strategies on the outcomes of (a) decision quality, (b) cognitive conflict, (c) affective conflict, and (d) decision commitment. A posttest-only control group design was used for this study. The rationale for selecting an experiment was based on three reasons. First, it allowed the researcher to infer causality. Second, it controlled for most threats to internal validity such as history, maturation, testing, and instrumentation. This approach did not control for mortality/attrition, however, due to the short duration of this study, mortality was not a serious threat (Gay, 1996). Third, the small number of experiments, which have compared these approaches from a group-level perspective, warranted the need for additional research. The participants used in this study were undergraduate students from various academic disciplines who were randomly assigned to one of three treatment conditions: Dialectical Inquiry (DI), Devil's Advocacy (DA), or Unstructured Consensus Seeking (UCS). This chapter will address the following: (a) population and sample, (b) measures, (c) procedures, and (d) statistical analysis used in this investigation.

## Population and Sample

The population for this study was undergraduate male and female students from any academic discipline (of study). Nationally, this is an enormous population therefore the accessible population used was 72 volunteer undergraduate students from a large public co-educational land grant state university located in Virginia. The rationale for selecting undergraduate students in all academic majors was based on two reasons. First, undergraduate students were more accessible than working professionals therefore they were the most realistic group for this researcher to target for this study. Second, regardless of the field in which one works, the likelihood of being part of a decision-making group is high, thus this study was open to all academic areas. Previous investigations have relied heavily on samples consisting only of business students (e.g., Schweiger et al., 1986; Priem et al., 1995). However, this researcher believed the process needed to be applied and tested in a sample consisting of more diverse majors. If the structured processes themselves are effective, they should benefit people from all majors versus just business backgrounds. The recruitment process used to obtain these volunteer students will be addressed next.

### Volunteer Recruitment Process for Participants

The volunteer recruitment process used in this study relied on the following methods. First, a variety of student organizations were contacted. Second, advertisements in the form of table cards (used in two dining locations) and posters (see appendix A and B) were utilized. Third, a website (see appendix C) was created to allow all potential participants an opportunity to learn more about this study as well as to sign up for it online. Fourth, incentives were offered to all participants as well as to student

organizations. The study's design mandated that 72 student volunteers were needed. The recruitment strategies mentioned above resulted in over 140 participants signing up for the study. A more specific overview of this recruitment process is provided in Chapter four.

#### Observer Recruitment Process

The design of this study also required the need to recruit 36 additional volunteers to serve in the capacity of trained observers. The observer's potential pool consisted of a combination of current undergraduate and graduate students along with individuals who possessed a bachelor's degree. The graduate student volunteers were recruited primarily from the graduate listserv. In addition to the listserv group, graduate and undergraduate students enrolled in training and development class were used. Also, several additional graduate students were recruited. A group of undergraduates from a small 4-year Liberal Arts College was recruited and finally several colleagues from the researcher's place of work were recruited. The observers were provided with incentives (e.g., sweatshirt, cap and attaché bag) for their time and participation. A more detailed account of the observer recruitment process is provided in chapter four.

#### Differences Related to Volunteers vs. Non-Volunteers

This researcher is cognizant that volunteers often differ from the non-volunteer population in a number of ways. The following characteristics of volunteers, which can be viewed with high degrees of confidence, according to Rosenthal & Rosnow (1975), include (a) more arousal seeking, (b) more sociable, (c) in greater need of social approval, and (d) less authoritarian. The differences attributed to volunteers versus non-volunteers may have had the following impacts on this study. First, individuals who are

more motivated often take assigned tasks more seriously than less motivated people. Thus, it is likely that the volunteers in this study took the assigned strategy and decision task more serious than would have non-volunteers. Several observers used in this study commented on how the students appeared to “really get into the process” which seemed to support the idea that these participants took the process seriously. The impact volunteers had on this study, however, may have resulted in a sample with increased motivation, thus possibly resulting in increased performance in all conditions. A second characteristic of volunteers that might have impacted this study was the increased social nature of the sample. This could have translated into increased participation by the members in all conditions. Again, increased participation may lead to more informative discussions among group members, thus higher performance across all conditions.

The need for social approval was a third characteristic that could have impacted the study by having groups of people who were more prone to conflict avoidance. People who are more in need of social approval may be more willing to conform to the opinions of others out of the fear of losing the group’s approval. Finally, the fourth characteristic of volunteers is they tend to be less authoritarian which may have contributed to lower levels of affective conflict because group members were more willing to hear the ideas and opinions of others.

### Treatment Condition Assignments

The volunteers used in this study were randomly assigned to one of the three treatment conditions examined in this investigation. All 72 undergraduate participants were randomly assigned to groups of six. In addition, participants in the structured DI and DA conditions were randomly assigned to subgroups within their assigned groups of six. Random assignments were made prior to the day of the actual study. A total of 12 groups, each consisting of six participants, were formed for this investigation. The 36 trained observers used in this study, were also randomly assigned to one of the three treatment conditions prior to the study. A detailed accounting of the random assignment procedures is offered in the next chapter.

### Measures

#### Instruments

There were four dependent variables in this study, which included: (a) decision quality, (b) cognitive conflict level, (c) affective conflict level, and (d) decision commitment. The measures for each of these instruments are reviewed in detail in the next section. Following the overview of these measures is a section on the actual procedures used in this study.

Decision Quality. Decision quality was objectively measured using the Adventure in the Amazon by Lorraine L. Ukens (1998) group decision-making exercise. The scenario involved a hypothetical situation where a group of people on an expedition in South America crash-landed in a plane in the Amazon jungle. As a result of the crash, the travelers were able to use fifteen items found in the plane to enhance their chance for rescue and survival. The goal of the group in this task was to rank order from one (most

important) to fifteen (least important) the level of importance of each item as it related to their survival. The instrument was scored by subtracting the difference of each item selected from the correct ranking and totaling the score. Lower total scores represent higher quality decisions (see appendix D for the correct rankings). This instrument produced a score for each group.

The content validity (Gall et al., 1998) of this instrument is based on expert opinions (Ukens, 1998). Thus, because this instrument provides a correct ordering of the answers, it provided an objective approach for measuring decision quality. This instrument has two sections, one that allows for an individual to record their ranking of the fifteen items and a second section, which provides a place for a group of people to solve the problem and record their group rankings. The purpose of these two sections is to illustrate how group decisions normally result in better scores than individuals. In as much as the focus of this study was only concerned with group performance and not individual performance, the individual component of this instrument was not used in this study. Omitting the individual component of this exercise did not (a) alter or change the correct order of the established answers, or (b) alter the content validity of the answers.

Cognitive Conflict. A few of the experiments (Priem et al., 1995; Schweiger et al., 1986) that have compared both the DI and DA decision strategies have attempted to measure cognitive conflict. One comparative study of the DI approach attempted to measure both cognitive and affective conflict levels (Devine, 1999) and only a few studies overall have attempted to measure both of these variables in group decision-making research (Amason, 1996; Jehn, 1994). Both DI and DA purport to raise the cognitive conflict levels in individuals during the decision process, thereby improving

overall decision quality. However, this contention may be steeped more in theoretical claims than in actual reality. The only way to determine if this claim can be substantiated is to measure for its existence in experimental studies. Thus, this study used a cognitive conflict scale created and used by Jehn (1992, 1994) and Amason (1996). This post-task instrument uses a rating scale and questions that gives participants a choice from 1 (none) to 5 (great deal) to report perceived cognitive conflict levels during group discussions.

The questions are (Amason, 1996):

1. How many disagreements over different ideas about this decision were made?
2. How many differences about the content of this decision did the group have to work through?
3. How many differences of opinion were there within the group over this decision?

Using a factor analysis, Amason (1996) scored the reliability of this instrument a .79. While it is desirable to obtain the highest possible reliability scores, instruments that measure psychological properties tend to have reliabilities lower than .90, whereas achievement and aptitude tests typically have higher reported reliabilities (e.g., .90 and higher). In addition, tests that are composed of subtests, as is the case with this instrument, tend to report lower reliabilities for each subtest due to the reliability score being based on overall test length (Gay, 1996). This instrument was used post-task and completed by the trained observers based on their observations of the group they were assigned to observe during the decision exercise. The three individual observer scores (per group) were calculated into a mean group score and used as the basis of comparison for this study.

Affective Conflict. The negative form of group conflict is called affective conflict. Using the same scale developed by Jehn (1992; 1994), affective conflict was also measured post-task for each treatment condition based on the observations of the trained observers. This scale is based on the same rating format ranging from 1 (none) to 5 (great deal) (Jehn, 1994). The four questions are (Amason, 1996):

1. How much anger was there among the group over this decision?
2. How much personal friction was there in the group during this decision?
3. How much were personality clashes between group members evident during this decision?
4. How much tension was there in the group during this decision?

The subscale reliability reported by Amason (1996) for this instrument is .86. For both the cognitive and affective conflict scales, Jehn (1994) reported the validity as a measure of conflict by comparing responses on the scales to written responses provided by the participants who experienced actual conflicts within their respective groups. The written descriptions were used "...to validate the type and level of conflict within the group" (Jehn, 1994, p. 229). The 3 individual observer scores, per group of 6 participants, were converted to group scores for comparison.

Decision Commitment. Decision commitment was measured post-task by a slightly modified version of Dooley and Fryxell's (1999) decision commitment scale (see appendix E). This scale was originally used for workers within a hospital. This six-question instrument used a Likert format from one (strongly disagree) to seven (strongly agree). The wording in the questions was modified to reflect student versus healthcare workers. The brackets indicate where the original wording was modified. The asterisks

shown on items five and six indicate that these items had to be reverse coded in to keep the scale values in agreement. The questions are as follows:

1. [I am] proud to tell others [I was] involved in making this decision.
2. [I was] willing to put in a great deal of effort to see this decision be successful.
3. [I was] willing to talk this decision up with [fellow students] as being a good decision for the [group].
4. [I] really care about seeing this decision be successful.
5. A change in present circumstances would have [caused me] to reduce support for this decision. \*
6. [I] feel there [was] not much to be gained by sticking with this decision.\*

The interrater reliability coefficient for these six items reported by Dooley and Fryxell (1999) was .85. The six individual scores per group were converted to a mean group score to be compared across conditions.

### Procedures

#### Prior Preparation

Prior to conducting the experimental portion of the study, participants, trained observers, rooms, and materials were prepared as follows. First, prior to arriving to the site of the experiment, participants and observers were randomly assigned to one of the three treatment conditions (DI, DA, & UCS). Participants were notified several times via email prior to the study phase of the time, date, and location to report to on the day of the study. Second, when students arrived at their assigned room for the study, they found seats in the room arranged into four groups (six students per group). Third, there was a folder of material related to each particular treatment condition on each desk with the

participants name on it along with their group (and when applicable, subgroup) assignment, and the room number for their group to report to after the training. The contents of the folders included: (a) an overview of their assigned technique (see appendix F), (b) instructions on how to apply their assigned strategy to the decision task (see appendix G), (c) the Adventure in the Amazon (Ukens, 1998) scenario, (d) a post-task decision commitment questionnaire, (e) written rationale response sheets (DI and DA only), and (f) score sheets. Fourth, each group was provided with only one red folder, which contained an answer sheet for their group to record their final answers (e.g., rank ordering). Prior to conducting the actual experimental phase of this study, all participants were asked to sign an informed consent form.

#### Facilitation Phase for all Three Conditions

This phase of this experiment took approximately 45 minutes to complete. The participants in the three conditions were provided with the following information: (a) an informed consent form to read and sign, (b) an overview of the technique assigned (no technique training was provided for the control group), (c) nature of the assigned group problem, (d) specific steps (DI and DA only) required to apply the technique to the assigned problem, (e) the room assignment for the group to report to complete their group decision task, (f) instructions on when and how to complete a six-item decision commitment questionnaire, (g) notification that three trained observers would be in their room to observe them during the task, and (h) where to report to in order to turn in all materials when finished with the assignments. The researcher for this study served as the DI facilitator. Two assistants facilitated the other two conditions (e.g., DA and UCS). The

facilitation occurred at the same time for all three conditions. A detailed account of the specific steps for each condition is provided in chapter four.

### Manipulation Checks

Manipulation checks were put in place to ensure that each group properly followed both the DI and DA methods. First, participants were required to use written rationale sheets in only the DI and DA conditions for each item in the subgroup rank ordering process. Second, trained observers for both the DI and DA conditions, 3 observers per group of 6 students, observed the entire process during the decision task phase. Their role served two specific functions: (a) to record on a checklist (see appendix H) how well the group used their assigned technique, and (b) to observe and record on a post-task questionnaire their impression of the amount of affective and cognitive conflict (see appendix I) present in the group during the decision task. A more detailed discussion of the trained observers is offered next.

The Role of the Trained Observers. The role of the trained observers in this study was to provide a manipulation check to ensure that the groups correctly followed their assigned decision-making technique in both the DI and DA conditions. While the use of trained observers was intended to positively aid this experiment, there are potential problems associated with their use such as (a) observer bias, (b) observer contamination, and, (c) observer omission (Gall et al., 1996). To help alleviate any negative effects from these phenomena, the following steps were taken. First, trained observers were provided with no information claiming superiority of one approach over another. Second, to guard against observer contamination, all trained observers received no knowledge as to the correct ordering of the answers in the Adventure in the Amazon (Ukens, 1998)

decision task. Third, to help guard against observer omission, all observers were trained in what to look for among the participants during the decision exercise. The training included the following elements: (a) overview of the DI and DA techniques, (b) overview of the checklist used for each condition, (c) viewing of two training videos showing the techniques being used and, (d) an overview of affective and cognitive conflict. A more detailed overview of this training is provided in chapter four.

### Data Analysis

This study involved a comparison of groups (e.g., 6 participants per group) under three different treatment conditions, thus a one-way analysis of variance (ANOVA) at .05 alpha was used to test each hypothesis. This analysis was selected to determine if the treatments had an effect on the four dependent variables measured in this investigation. Variance can be determined from one of two sources "...variance between groups (variances caused by the treatment) and variance within groups (error variance)" (Gay, 1996). The homogeneity of variance assumption was tested using a Levine's test. The reliability of the observation checklist for both the DI and DA condition was assessed with a KR-20 alpha coefficient. Interrater reliability was assessed using a percent of agreement approach (Gall, et al., 1996; Howell, 1997; Pedhazur & Schmelkin, 1991).

## Summary

This chapter outlined the methodology used for this investigation. The intent of this chapter was to provide the reader with an overview of the sample along with the procedures used to test the hypotheses in this investigation. Due to the nature of three treatment conditions being compared, analysis of variance was determined to be the most logical statistical procedure to use for analyzing the data for this study. The next chapter provides a detailed account of the specific procedures used in this experiment.

## CHAPTER IV

### Experimental Procedures

#### Introduction

This chapter is designed to provide a detailed account of the specific procedures used in the experimental phase of this investigation. Included are the following sections: (a) details and results of the recruitment process for both participants and observers, (b) observer training, (c) random assignment procedures, (d) room arrangement, and (e) facilitation. The information provided in this chapter is to give the reader the specific item level detail required to conduct this study.

#### Volunteer Recruitment Process

The recruitment process of the undergraduate student volunteers began in the fall of 2001. The first phase of this process involved contacting on-campus student organizations (see table 1 on page 64 for complete listing). The organizations were identified using the university's website which provided a detailed listing of recognized (on campus) student organizations. This online listing provided the names of the organizations, the total number of members, the purpose of the organizations, and the email addresses and phone numbers for the organizations' presidents. These organizations were first contacted via email to learn if there was any interest on their part in participating in this study. The researcher was able to meet directly with several organizations, which included: (a) Alpha Kappa Psi, Beta Xi, (b) Delta Sigma Pi, (c) German Club, and (d) Psychology Club. The Wesley Foundation and Student Government Association also participated in this study, and all communications and arrangements were made with these two groups via email.

Table 1

*Student Organizations Contacted for Recruitment Purposes*

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Student Organization

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Alpha Kappa Psi, Beta Xi  
American Advertising Federation  
American Marketing Association  
Association for Early Childhood Education  
Association for Student Development (ASD)  
College Republicans  
Delta Sigma Pi  
Educational Society for Resource Management (APICS)  
Fellowship of Christian Athletes  
German Club  
Leadership Experiences for Achievement and Development (LEAD)  
Management Society  
Marketing Club  
Psychology Club Psi Chi  
Public Relations Student Society of American (PRSSA)  
Social Entrepreneurs  
Student Government Association (SGA)  
Wesley Foundation

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The second approach used to recruit volunteers involved appealing directly to the individual students via table card advertisements in two campus residential dining halls. The campus residential dining services office was contacted to obtain permission to place small 4"x5" table card advertisements on tables in approved dining locations. Prior to the end of the 2001 fall semester, table cardholders in two dining locations, with a total seating capacity of 500, were reserved for the first week students returned from a holiday break. The cards were allowed to remain on the tables for one week. The third approach used to obtain volunteers involved placing poster advertisements in several buildings on campus. Only bulletin boards approved for student use were used for these posters. A fourth approach involved placing advertisements in student organization mailboxes located in the student center.

Fifth, a website was created that provided an overview of the study along with an online signup form (see appendix J) which was designed to get needed descriptive data on the participants. These descriptive data included: (a) age, (b) gender, (c) major, (d) class, (e) exposure to the Adventure in the Amazon decision task, (f) prior exposure to group decision-making techniques (e.g., DI & DA), (g) email address, (h) phone number, and (i) how they learned of the study. Only those people who signed up online by the cutoff date of February 11<sup>th</sup> 2002 were allowed to participate in the study. The online data form allowed the researcher to review the descriptive data of all participants. Anyone who had indicated that they had been exposed to the Adventure in the Amazon (Ukens, 1998) group decision exercise and/or the DI and DA techniques were excluded from this study. The reason for this decision was for the researcher to assess whether the DI and DA approaches could be taught to a group unfamiliar with these techniques for

the purpose of seeing whether the groups could successfully apply these procedures to solve an assigned group problem shortly after the training. This allowed the researcher to better determine if the short-term facilitation they received could be carried over effectively from a training phase to an actual application phase.

All of the advertisements used for the recruitment of volunteers provided the web address for potential participants to sign up. Finally, the sixth approach involved the use of incentives. These incentives were offered at both the individual participant level (e.g., sweatshirts, caps, and a chance in a drawing) and organizational level. The following three items were used in the drawing: (a) an overnight stay at a local resort, (b) a compact stereo system, and (c) a backpack. At the organizational level, student associations were offered cash incentives in return for volunteers. The results of the recruitment procedures resulted in over 140 participants signing up for this study.

Communication in the Recruitment Process. The response to the recruitment efforts resulted in initially over 140 volunteers being signed up online. However, as the result of exclusion and attrition, the researcher ended up with 124 subjects. The researcher relied on a number of electronic communications with the participants to keep these individuals committed to the study. Once volunteer participants signed up online, the researcher reviewed their descriptive data form and notified them within 24 hours of their acceptance or rejection status. The researcher personally thanked each of them for their interest in the study. The cutoff date to sign up to participate in this study was February 11<sup>th</sup>, 2002. After the cutoff date of February 11<sup>th</sup>, the researcher sent a second email to all participants as a reminder of the commitment they had made to participate in this study as well as the date of the study.

Approximately one week prior to the event, participants were sent a third email assigning them to a specific on-campus building and room, and they were asked to report to their assigned location by 12:50 PM on the day of the study. They were also asked to bring a pen to write with during the study. Finally, to ensure this information was accurately communicated, all participants were contacted a fourth and final time two days prior to the study as one last reminder. The multiple communications with these participants resulted in an excellent turnout. Of the 124 subjects signed up, 115 (93%) actually showed up the day of the study, resulting in only a 7% attrition rate. The combination of incentives, commitments made from student organizations, and multiple emails to the students contributed to a good participant turnout for this study.

#### Observer Recruitment Process

Observers were recruited in a number of ways. First, an announcement was sent through the graduate listserv, which explained the study and the need for volunteers. Six graduate students replied to this announcement. Second, the researcher recruited three graduate students he had met while enrolled in the graduate program. Third, a mixed class of graduate and undergraduate students enrolled in a training and development class was used. Fourth, a group of undergraduate students from a Virginia 4-year Liberal Arts College were recruited as well. Finally, two educators and several colleagues, who all had bachelors degrees, from the researcher's place of employment were recruited and used for this study. The use of incentives in the form of a sweatshirt, cap, and attaché bag were used to reward these observers for their time and help.

Communication in the Recruitment Process for Observers. The trained observers were communicated with regularly via email. After all observers had been recruited and trained on the nature of what they were going to be observing, random assignments were conducted which produced their assignments to a particular treatment condition. They were notified via email approximately 2 weeks prior to the study regarding the treatment condition they were assigned to observe as well as the building, room number, and time to report on the day of the study. They were sent a reminder email several days before the study, which again provided them with the pertinent information (e.g., building, room, etc.) they needed concerning this study. These efforts produced 49 trained observers for this study. On the day of the study, 45 out of the 49 observers (92%) showed up to participate. Thus, only 4 people (8%) did not show. Again, being able to communicate on a regular basis along with the offer of incentives resulted in a strong turnout on the part of these observers.

### Observer Training

Each observer was provided with one of three forms of training (a) large group training (10 or more), (b) small group training (less than 10), and (c) individual training (e.g., one-on-one). The three forms of training were necessary since all observers were volunteers and consequently training had to be conducted at times that were convenient for them. Observers received training in both the DI and DA techniques as well as the two different types of intra-group conflict (e.g., affective and cognitive). The first step of this training provided observers with a verbal, written, and visual (e.g., PowerPoint) overview of the study and techniques they would be witnessing. Written handouts (see appendix K) were provided that contained information on: (a) an overview of the

techniques, (b) the steps involved in each technique, (c) the different types and characteristics of conflict, (d) copies of the DI and DA observer checklists, and (e) copies of the affective and cognitive conflict questionnaires.

Second, a PowerPoint presentation was given which provided an overview of the DI and DA techniques as well as the two types of conflict they would be observing. The DI technique was covered first, followed by an overview of the DI checklist created for this study. Each of the 20 items on the checklist was read to the observers and clarifications provided as to the meaning of each question. Also, questions related to this checklist were discussed and answered during this process. Third, observers watched a video prepared for this study, which showed the DI technique in action. The video was of a group of six people using the DI technique to solve a decision task (e.g., Lost at Sea). The group of six people they observed in the film was solving a group problem using the DI process as the students in this treatment condition would use on the day of the study. The video was edited so as to include subtitles, which highlighted each step in the decision process (e.g., subgroup one develops their plan, etc.). The observers were encouraged to follow along on their checklist as they watched the film. The DI video, after editing, was approximately 20 minutes long.

Fourth, after reviewing the video, observers were encouraged to ask questions about anything they did not understand on regarding the information presented to them. Fifth, the same steps outlined in items 3-5 above were implemented for the DA condition. Sixth, the final phase of the training provided observers with an overview of the characteristics of cognitive and affective conflict. Seventh, the scale used to measure these techniques was distributed and each question was read to the observers. The

observers were also instructed about the meaning of the scale (e.g., 1 = none, 5 great deal). At the end of the training, observers were again encouraged to ask questions about anything related to the information covered. All of the forms of training were delivered and each observer received the same written materials and watched the same PowerPoint presentations and videos. Depending on the form used, training required approximately 1 1/2 to 2 1/2 hours to complete per session. The next section addresses how the participants and observers used in this study were randomly assigned.

#### Random Assignment of Participants

The random sort function of Microsoft's Excel software program was used to randomly assign the participants to one of the three treatment conditions. The entire list of 124 participants was randomly shuffled using this feature. Next, four pieces of paper were placed in a bag each marked as follows (a) slip one DI, (b) slip two DA, (c) slip three UCS, and (d) slip four alternate. These slips were then individually drawn from the bag in the following order: (a) DA, (b) DI, (c) UCS, and (d) alternate. This procedure determined how the participants on the randomized list would be assigned by condition. For example, the first person on the list was assigned DA, the next DI, the third UCS, and the fourth as an alternate. This process was continued until all participants had been assigned. A coin flip procedure was used to determine which end of the list to start the assignment. A coin toss of heads meant beginning at the top and tails the bottom of the list. The coin toss resulted in tails, thus the assignments were made beginning from the bottom of the randomized list and moving to the top.

Once each participant had been assigned to one of the 4 conditions, each group of participants within their treatment condition was again randomized. For example, the

names of all those participants assigned to DI were again entered into Excel and randomly shuffled. The researcher next wrote one number on four slips of paper and placed the four slips in a bag. The number on each slip of paper represented the group number assignment. These slips were consecutively pulled from the bag and the order of withdrawal was noted (e.g., DI was 3, 2, 4, & 1). Next, a coin toss was again used to determine where to start on the list to make the group assignments. In the DI condition, the coin toss resulted in heads, thus participants in this condition were assigned starting from the top of the list and moving to the bottom. The first person on the list was in group 3, the next person group 2, the third person group 4, and the fourth person group 1. The process was repeated every fifth person until all group assignments had been made. Once group assignments were made, a coin toss was again used in the DI and DA conditions to assign people within their group to their subgroups. Heads equaled subgroup 1 and tails subgroup 2. This process allowed all of the participants to have an equal chance of being assigned to a given condition, group and subgroup (were applicable).

#### Random Assignment of Observers

The 49 trained observers in this study were also randomly assigned to treatment conditions in a similar fashion used for the participants. All observer names were entered into Microsoft Excel and randomly shuffled. On 3 separate slips of paper, the following conditions were written down and placed in a bag (a) slip one DI, (b) slip two DA, and (c) slip three UCS. The following order was selected: UCS, DA, and DI. Thus, the first person on the list was assigned to UCS, the second DA, and the third DI. This process continued until all observers had been assigned to a condition. Once all assignments by condition had been made, observer names were again separated by condition into Excel

and randomly shuffled. Four slips of paper, each with a group number written on it (e.g., 1, 2, 3, & 4), were placed in a bag. The numbers reflected which group within their condition they would be assigned. For example, in the DA condition the following order was pulled from the bag: 1, 2, 3, and 4. Next, a coin was tossed to determine the direction to begin the assignments. In the DA condition the coin landed on heads, thus assignments began at the top of the list and moved to the bottom. The first person was assigned to group 1, the second person to group 2, and so forth until all observer assignments within each condition had been completed. This process was the same for the other conditions.

Forty-nine observers were selected and only 36 total were needed for all three conditions, thus there were thirteen alternates available. Any people remaining after the final group assignments were completed were placed in an alternate grouping. Once all assignments had been made, observers were notified via email of the condition they were going to observe along with the building, room number, and time to report on the day of the study. Alternates were all sent to the same room and were not informed they were alternates until the day of the study because this researcher felt they might not show up had they known there was a chance they may not be used.

### Experimenter Helper Roles

This researcher relied on several assistants the day of the study to help facilitate the participants and observers efficiently. The roles of these assistants were as follows. First, there was an alternate participant facilitator who helped coordinate the random assignment of alternate participants needed by each of the three treatment facilitators. Second, there was an alternate observer facilitator who coordinated replacements of absent observers by treatment condition. Third, an assistant to the experimenter went to

each room (12 total) to ensure there were three observers in each location. Fourth, there were three hall monitors that helped direct lost students to their assigned rooms. These assistants helped make the process flow quickly and efficiently and ensured that the available time allotted for the study was maximized.

#### Random Alternate Participant and Observer Assignments the Day of the Study

On the day of the study, the treatment facilitators checked in all of the participants as they arrived at the treatment facilitation rooms. Once the treatment facilitators knew who was missing (by group/subgroup), they wrote down the group number and subgroup (e.g., group 1, subgroup 2) of the missing person and placed it in a cup. The facilitator in the alternate participant's room followed a slightly different procedure by placing the names in a bag of alternates who had arrived. Prior to the training phase of the study, the treatment facilitators who needed additional participants contacted the alternate participant facilitator and informed him of the number of participant replacements they needed in order to fill vacancies in their condition. For each request, the alternate participant facilitator placed the name of the treatment facilitator in a separate bag. For example, if the DI treatment facilitator needed four alternates, the treatment facilitator's name was written on four separate slips of paper and placed in a bag. All requests from the treatment facilitators were placed in one bag together. Once all three treatment facilitators had communicated with the alternative participant facilitator letting him know how many participants they needed, the alternate participant facilitator pulled an alternate's name from one bag while at the same time pulling a treatment facilitator's name from another bag. In doing so, the alternate facilitator could then match an

alternate person with a given treatment condition. The alternates were then sent to the treatment facilitators' rooms who needed them.

When the alternates arrived in the treatment facilitator's room, they drew a slip of paper from a cup indicating which group/subgroup (where applicable) they were to be assigned. This process allowed all alternate participants an equal chance of being selected for a treatment condition, group, and subgroup (where applicable). Twelve replacement participants were needed, 4 for DI, 5 for DA and 3 for UCS. The detail placed on the assignment procedures was deemed essential to keep the assignment process completely random.

On the day of the study, all observers reported to their pre-assigned rooms. Before the study began, one of the researcher's assistants checked each room to make sure there were three observers present per room and assigned condition. Any observer absences were reported to the alternate observer facilitator. All alternate observers reported to the same room. As they arrived, the alternate observer facilitator recorded their name and pre-assigned condition on a piece of paper and placed it into a cup according to their pre-assigned treatment condition (e.g., UCS, DI, or DA). In order to fill the absences reported by the research assistant, the alternate observer facilitator pulled a name from the appropriate alternate observer cup and then sent that observer to the proper room and condition where they were needed. This process allowed each alternate observer an equal chance of being selected as an observer within their pre-assigned condition. Only one alternate observer was needed.

### Room Arrangements

This study required the use of 12 treatment rooms. Once the initial training had been provided to all of the participants, they were dismissed by groups of six to these private treatment rooms to complete the assigned tasks. To help the students identify their assigned room, a colorful sign with the room number, condition, and group number was taped on the outside door to each room. In the DI and DA rooms, signs were placed at opposite sides of the room, one indicating subgroup one and the other subgroup two. This made it clear to the participants where they were to work during the independent subgroup phases of the study. In the control condition (UCS), there were no signs indicating subgroups because there were no subgroups formed in this condition. The chairs were also marked for the observer seating. Blue folders for the observers, which contained the information for the study (e.g., checklists and conflict scales), were placed in each observer chair. Refreshments were provided in each room for the enjoyment of both participants and observers.

### Treatment Facilitation

The researcher for this study allowed three hours for the experimental phase of this study. Three facilitation rooms and facilitators were established for each condition in order to provide participants with the training they needed to complete the group decision task and post-task decision commitment questionnaire. There were twenty-four participants per condition who reported to one of three assigned room locations upon arriving the day of the study in order to receive training on their assigned group decision technique. The specific steps associated with each condition are provided next.

Dialectical Inquiry and Devil's Advocacy. Both DI and DA were facilitated in separate rooms. There were twenty-four participants per treatment condition. The rooms were arranged so that the assigned groups were in rows (e.g., row 1 = to group 1, row 2 = to group 2 etc.). A sign was placed in the front of each row indicating the group number. Each desk had a folder, which contained the information related to the study. On the outside of each folder was the name of the participant, group/subgroup assignment, and room number. The first step in these two conditions was to provide all subjects with informed consent forms to read and sign. This form was collected before any instruction was provided. In the second step, subjects were asked to print their names on slips of paper. These slips of paper were collected and placed in a bag to be used for three grand drawings held at the end of the study. The third step involved making subjects aware of their group and subgroup assignments. The fourth step required instructing participants to open their folders which contained: (a) an overview of the assigned technique, (b) the decision task, (c) tips for reaching consensus, (d) the instructions on how to apply the technique to their group problem, (e) written rationale sheets, and (f) subgroup answer sheets. Fifth, participants were informed verbally and in writing about the nature of the decision task, Adventure in the Amazon (Ukens, 1998) scenario.

In the sixth step, DI and DA conditions were provided with a general overview of the technique. Seventh, the participants were provided with the specific step-by-step instructions, similar to those developed and used by Schweiger et al., (1986; 1989) on how the technique they were assigned was to be applied to the group problem. Eighth, instructions on how to implement the DI and DA approaches were provided verbally and in writing with a general list of helpful tips on consensus seeking (see appendix L) which

was part of the Adventure in the Amazon (Ukens, 1998) exercise. Ninth, the participants were informed that once the group had completed the required steps and had reached consensus on a final decision, they needed to complete the answers on the final group answer sheet enclosed in a red folder.

Tenth, all of the DI and DA participants were instructed to independently complete a six-item questionnaire at the end of the decision task exercise. Eleventh, the participants were instructed that they would be solving the problem as a group in an assigned private room. Before being dismissed, the participants were instructed not to discuss the problem until they arrived in their assigned rooms. The twelfth and final step involved participants being informed to report back to their original facilitation room at the end of the study to turn in all materials. Participants were instructed to keep all materials in the folders they were provided with at the start of the study. All folders and materials were coded with the group number and condition in the event that materials were separated.

Unstructured Consensus Seeking (Control Group). The room for the facilitation phase of this condition was arranged so that the assigned groups were in rows (e.g., row 1 = to group 1, row 2 = to group 2 etc.). A sign was placed in the front of each row indicating the group number. Each desk had a folder, which contained the information related to the study. On the outside of each folder was the name of the participant, group assignment, and room number. The first step in these two conditions was to provide all subjects with informed consent forms to read and sign. This form was collected before any instruction was provided. In the second step, subjects were asked to print their names

on slips of paper to be collected and placed in a bag to be used for three grand drawings held at the end of the study.

The third step involved making subjects aware of their group assignment. The fourth step involved instructing participants to open their folders which contained: (a) an overview of the decision task, (b) instructions on how the group was to solve the problem, and (c) a final group answer sheet. Fifth, participants were informed verbally and in writing about the nature of the decision task, Adventure in the Amazon (Ukens, 1998) scenario. Sixth, the participants were instructed to independently complete a six-item questionnaire at the completion of the decision task exercise. Seventh, the participants were instructed that they would be solving the problem as a group in a private room. Before being dismissed, they were instructed not to discuss the problem until they arrived in their assigned rooms. Finally, the eighth step involved informing participants to report back to the facilitation room at the end of this study to turn in all materials. Participants were instructed to keep materials in the folders they were provided with at the start of the study. All folders and materials were coded with the group number and condition in the event that materials were separated.

### Summary

This chapter was presented to provide the reader a detailed account of the specific procedures that accompanied this experiment. The assignments of both the observers and participants were random, thus classifying this investigation as an experiment. The training for the observers as well as participants involved combinations of written and oral instructions. The results produced from the training and instructions are provided in the next chapter.

## CHAPTER V

### Findings

#### *Introduction*

This chapter reports the findings from this experiment. Provided in this chapter are the (a) descriptive data for the volunteer participants and observers, (b) instrument reliability assessment conducted on the observer checklist, and (c) results of the analysis of variance procedures conducted between the three groups on the four dependent variables measured (a) decision quality, (b) cognitive conflict, (c) affective conflict, and (d) decision commitment. The unit of comparison for this analysis is based on groups, not individuals, thus a small overall  $n=12$  is reported for this investigation. The conclusions made from these reported findings will be addressed in the following chapter.

#### Descriptive Data for Volunteer Participants

The sample used for this study consisted of 72 undergraduate students. The mean age was 19 with a standard deviation of 1.39. An age range of 7 years existed in this sample spanning from 17-24. The sample was comprised of 37 males (51.4%) and 35 females (48.6%). The academic level (e.g., freshman, sophomore, etc.) consisted of 17 freshman (23.6%), 18 sophomores (25%), 23 juniors (31.9%), and 14 seniors (19.4%). The study was open to all academic majors with a diverse range of 20 different fields of study being represented. See table 2 on page 81 for the breakdown of frequencies and percentages by major.

Table 2

*Frequencies and Percentages of Reported Undergraduate Majors*

Major	Frequency	Percentages
Agriculture	01	1.4%
Biology	05	6.9%
Business	25	34.7%
Chemistry	03	4.2%
Communications	01	1.4%
Early Childhood development	01	1.4%
Economics	02	2.8%
Engineering	19	26.4%
Environmental Science	01	1.4%
Hospitality and Tourism management	01	1.4%
Human Development	02	2.8%
Landscape Architecture	01	1.4%
Math	01	1.4%
Music	01	1.4%
Natural Resources management	01	1.4%
Political Science	02	2.8%
Psychology	02	2.8%
Sociology	01	1.4%
Turf Management	01	1.4%
University Studies	01	1.4%

Note. Totals are based on 72 total participants from 20 different reported majors.

### Descriptive Data for Observer Volunteers

A total of 36 trained observers participated in this study. The mean age was 24.61 years old with a standard deviation of 6.88. An age range of 32 years existed in this sample spanning from 18-50. The observer group was comprised of 11 males (30.6%) and 25 females (69.4%) and consisted of undergraduate and graduate students as well as non-students with baccalaureate degrees. The breakdown based on these three classifications is: 21 (58.3%) undergraduate students, 9 (25%) graduate students and 6 (16.7%) non-students with a bachelor's degree. The volunteer observers represented a diverse range of majors (17 in all). Table 3 on page 83 reports the frequencies and percentages by major.

Table 3

*Frequencies and Percentages of Reported Observer Majors*

Major	Frequency	Percentages
Agriculture	01	2.8%
Art	02	5.6%
Biology	01	2.8%
Business	07	19.4%
Career and Technical education	01	2.8%
Clothing Textiles	02	5.6%
Computer Science	01	2.8%
Consumer Studies	02	5.6%
Economics	03	8.3%
Engineering	03	8.3%
English	01	2.8%
Health Promotions	02	5.6%
International Relations	01	2.8%
Merchandise Marketing	01	2.8%
Psychology	05	13.9%
Resource Management	01	2.8%
Spanish	02	5.6%

Note. Total frequencies and percentages based on 36 observers.

## Reliability

The reliability of the two observer instruments was analyzed using a Kuder-Richardson KR-20 formula for dichotomously scored items (Pedhazur & Schmelkin, 1991). Due to lack of variability in the DI scores, a KR-20 alpha was unattainable. The KR-20 alpha reliability coefficient for the DA groups was .89. Interrater reliability was assessed using a percentage of agreement approach, which is a common practice used for analyzing the reliability of observational data between raters (Gall et al., 1996; Pedhazur & Schmelkin, 1991). The percentage of agreement for each group of 3 observers was derived by calculating the percentage of agreement between pairs of observers (e.g., observers 1 and 2, 1 and 3, and 2 and 3) (retrieved April 13, 2002 from the world wide web, [http://www.gower.k12.il.us/ASSESS/1b\\_fwd.htm](http://www.gower.k12.il.us/ASSESS/1b_fwd.htm)). The mean percentage of agreement is based on the percentages for each pair of observers in each group.

In the DI condition, there was a 96.67% agreement in group 1, 100% agreement in group 2, 100% agreement in both groups 3 and 4. Thus, each group reported high levels of agreement between among observations made by three observers. The DA condition yielded slightly lower percentages of agreement between the observers' ratings. There was 100% agreement between observers in group 1, 89.46% of agreement in group 2, 82.45% agreement in group 3 and 92.96 % agreement in group 4. The minimum percentage of agreement necessary to establish interrater reliability is 80% (retrieved April 13, 2002 from [http://www.gower.k12.il.us/ASSESS/1b\\_fwd.htm](http://www.gower.k12.il.us/ASSESS/1b_fwd.htm)). Based on the percentages of agreement, the reliability of the observations in both the DI and DA conditions were within the acceptable range. The control condition (UCS) did not follow

any specific technique therefore no decision process checklist was created and used by the observers.

#### Reported Observations for DI and DA

Observations made by the 12 trained observers in the DI condition were all equal with the exception of one observer in group one who responded that subgroup two did not actively discuss how to develop a counter plan to subgroup one's initial plan. The results of the observations in the DI condition showed near unanimous agreement that the groups observed did correctly follow the steps associated with the DI condition. In regard to the DA observations, 2 out of 3 of the trained observers in groups 2 through 4 reported the participants did not correctly follow the steps associated with the DA condition. In addition, observers in groups 2 through 4 reported unanimously that participants in subgroup two offered a counter proposal to subgroup one's plan as opposed to an objective critique.

#### Impact of Conditions on the Decision-Making Process

This investigation looked at the impact that DI, DA, and UCS had on the group decision-making process, specifically how the following four dependent variables were affected (a) decision quality, (b) cognitive conflict, (c) affective conflict, and (d) decision commitment. The effects these techniques had on these variables in this investigation were not statistically significant. The results for each measured variable are reported separately using a one way analysis of variance at a .05 alpha level.

### Decision Quality

H<sub>1</sub>: There will be a difference in decision quality between the DI, DA, and UCS groups.

To examine the effect the three treatment conditions DI, DA, and UCS had on decision quality, group ( $n=12$ ) scores from the Adventure in the Amazon (Ukens, 1998) exercise were analyzed using a one-way analysis of variance set at a .05 alpha level. The results of this analysis revealed that there was no statistical difference (see table 4 on page 86) between the treatment groups and decision quality,  $F(2,9) = 1.172$  ( $p < .353$ ). See table 5 on page 86 for mean scores and standard deviations. Thus, for hypothesis (H<sub>1</sub>) the researcher failed to reject the null (There is no difference in decision quality between the DI, DA, and UCS groups).

Table 4

*Analysis of Variance for Decision Quality*

Source	SS	df	MS	F
Between Treatment Condition	45.50	2	22.75	1.172
Within Treatment Condition	174.75	9	19.417	
Total	220.25	11		

Table 5

*Means and Standard Deviations for Adventure in the Amazon Group Scores by Condition*

Condition	Mean	Standard Deviation
Dialectical Inquiry	50.75	4.57
Devil's Advocacy	50.50	1.91
UCS (control)	46.50	5.80

Note. The lower the score the higher the quality of the group decision.

### Cognitive Conflict

H<sub>2</sub>: There will be a difference in the observed cognitive conflict levels between the DI, DA, and UCS groups.

Three trained observers per group (per treatment condition) used a three-question rating scale to measure cognitive conflict. There were three observers assigned per group (per treatment condition) of six participants. The score for each observer on this measure was averaged with the scores of the other two observers in their group to derive a mean group score on this measure. This procedure was done for each group. Thus, group scores (4 per treatment condition) were compared versus individual scores. The analysis of variance on this variable showed no statistical difference between the treatment groups and observed cognitive conflict,  $F(2,9) = .282$  ( $p < .761$ ) (see table 6 on page 88). Table 7 on page 88 provides the means and standard deviations for the group cognitive conflict scores for each condition. Thus, for hypothesis (H<sub>2</sub>) the researcher failed to reject the null (There is no difference in the observed cognitive conflict levels between the DI, DA, and UCS groups).

Table 6

*Analysis of Variance for Cognitive Conflict*

Source	SS	df	MS	F
Between Treatment Condition	.388	2	.194	.282
Within Treatment Condition	6.189	9	.688	
Total	6.576	11		

Table 7

*Means and Standard Deviations for Cognitive Conflict Observation Scores*

Condition	Mean	Standard Deviation
Dialectical Inquiry	3.33	.68
Devil's Advocacy	3.25	.92
UCS (control)	2.92	.88

Note. Rating based on a 1 (none) – 5 (great deal) scale for cognitive conflict. The higher the score the more expressions of observed cognitive conflict.

### Affective Conflict

H<sub>3</sub>: There will be a difference in the observed affective conflict levels between the DI, DA, and UCS groups.

Using the same approach as for cognitive conflict, 3 trained observers per group (per treatment condition) used a four-item rating scale designed to measure affective conflict. As before, there were three observers assigned per group (per treatment condition) of six participants. The score for each observer on this measure was averaged with the scores from the other two observers in their group to derive a mean group score on this measure. This procedure was used for each group of three in the DI, DA, and UCS conditions. The analysis of variance procedure yielded no statistical difference between the treatment groups and observed affective conflict,  $F(2,9) = .046$  ( $p < .955$ ) (see table 8 on page 90). The observers reported low levels of affective conflict. Table 9 on page 90 provides means and standard deviations for the group affective conflict scores by condition. Thus, for hypothesis (H<sub>3</sub>) the researcher failed to reject the null (There is no difference in the observed affective conflict levels between the DI, DA, and UCS groups).

Table 8

*Analysis of Variance for Affective Conflict*

Source	SS	df	MS	F
Between Treatment Condition	.09695	2	.04848	.046
Within Treatment Condition	9.411	9	1.046	
Total	9.508	11		

Table 9

*Means and Standard Deviations for Affective Conflict Observation Scores*

Condition	Mean	Standard Deviation
Dialectical Inquiry	1.7725	1.11
Devil's Advocacy	1.8125	1.01
UCS (control)	1.605	.94

Note. Rating based on a 1 (none) – 5 (great deal) scale for affective conflict. The higher the score the more expressions of observed affective conflict.

## Decision Commitment

H<sub>4</sub>: There will be a difference in decision commitment between the DI, DA, and UCS groups.

Decision commitment was measured using a 6-item seven point Likert scale. All 72 participants completed this questionnaire at the completion of the decision task exercise. Once again, individual scores were converted into group scores. The mean score for each group (6 per group) was used as the basis of comparison. The analysis of variance procedure once again revealed no statistical difference between treatment condition and decision commitment,  $F(2,9) = .983$  ( $p < .411$ ) (see table 10 on page 92). Means and standard deviations for this variable are reported in table 11 on page 92. Thus, for (H<sub>4</sub>) the researcher failed to reject the null (There will be a difference in decision commitment between the DI, DA, and UCS groups).

Table 10

*Analysis of Variance for Decision Commitment*

Source	SS	Df	MS	F
Between Treatment Condition	.406	2	.203	.983
Within Treatment Condition	1.858	9	.206	
Total	2.253	11		

Table 11

*Means and Standard Deviations for Decision Commitment Scores*

Condition	Mean	Standard Deviation
Dialectical Inquiry	5.53	.34
Devil's Advocacy	5.27	.53
UCS (control)	5.09	.46

Note. Likert scale based on a 1 (strongly disagree) – 7 (strongly agree) for decision commitment. Higher scores indicate stronger commitment to the group decision.

### Summary

There were no statistically significant differences between any of the treatment conditions on the four dependent variables measured. Because there were no differences found between the DI, DA, and UCS conditions no post-hoc analyses were conducted and reported in this investigation. Chapter six discusses the meaning of these results as well as provides explanations for these findings and for future research.

## CHAPTER VI

### Discussion, Recommendations, and Conclusions

#### *Introduction*

The purpose of an experiment is to examine the effect an imposed treatment(s) has on a dependent variable(s). This investigation found no statistical significance between the structured and unstructured approaches used on any of the four dependent variables measured (a) decision quality, (b) affective conflict, (c) cognitive conflict, and (d) decision commitment. This chapter provides explanations for these findings along with implications for future research. The following discussion offers explanations concerning the results of this study and why no statistical differences were found. In doing so, each dependent variable is addressed separately. Directions for future research are also provided later this chapter.

#### Discussion of Results

##### Decision Quality

H<sub>1</sub>: There will be a difference in decision quality between the DI, DA, and UCS groups.

Enhanced decision quality is the primary purpose of the group decision-making process. In this study, there were no statistically significant differences detected between two highly structured decision-making approaches and an unstructured approach with regard to their effects on decision quality. In fact, the UCS group had the highest quality decisions (although not statistically different) compared to the two structured approaches. This is contrary to the findings of previous investigations conducted by Schweiger and his associates (e.g., Schweiger et al., 1986; Schweiger et al., 1989). In their studies, the structured DI and DA approaches resulted in better group decision quality, as rated by

expert judges, compared to a consensus (C) method. However, the results of the present study, with regard to decision quality, are consistent with those reported in a study by Priem et al., (1995) which compared DI and (C) conditions and found no statistical difference between these two approaches with regard to their effects on decision quality. In fact, the unstructured (C) condition in Priem et al., (1995) had higher quality decisions than the structured DA condition. In addition, Schwenk and Cosier (1993) reported no difference in decision quality between DA, Agreement (e.g., Consensus), and Control (no technique) conditions. The following discussion related to the findings offers several explanations for the relationship between decision-making techniques and decision quality.

First, it is well established that groups tend to better utilize the talents and capabilities of their members, thus leading to more informed and better quality decisions than those produced when individuals solve complex problems alone (Kieitner & Kinicki, 1998; Robbins, 1997). However, it is not completely clear from previous research (Priem et al., 1995; Schweiger et al., 1986; Schweiger et al., 1989; Schwenk & Cosier, 1993) if structured group decision-making techniques lead to better quality decisions when compared to unstructured group decision-making approaches. It is possible that group decision quality, with respect to newly formed groups, is not affected greatly by an applied structured process (e.g., DI or DA) but more from the mere fact that a group was formed to make a decision. The lack of consistency with regard to previous research findings coupled with the lack of statistically significant differences detected in this study between the structured and unstructured approaches, leads this researcher to conclude that there may not be a strong relationship between the use of

specific group decision-making techniques, structured or unstructured, and decision quality at least for newly formed decision-making groups.

Schwenk and Cosier (1993) found no difference in decision quality between structured and unstructured approaches and concluded that their lack of finding differences may have been due to the judges they used to rate decision quality, the decision quality instrument, or the sample. Many of these same explanations, with the exception of expert judges, could also apply to this current investigation. Factors such as those mentioned could indeed impact the results of a study, this study being no exception. Some of these factors are offered as possible explanations for the lack of statistical differences found in this study. However, that being said, real consideration needs to be given to the possible reality that the use of structured group decision-making strategies may offer little benefit in improving group decision quality outcomes, at least in the case of newly formed groups and when the problem the group is solving has a predetermined solution.

A second conclusion made from the findings related to group decision strategies and decision quality is that decision quality is a difficult variable to measure in a controlled experiment. Previous studies (e.g., Priem et al., 1995; Schweiger et al., 1989) usually relied on the use of business case studies, rated by judges, to measure decision quality while the current study used an objectively scored decision task. The approach used in this study as well as the case study approach used in previous investigations may both be missing critical aspects of the group decision-making process such as (a) personal consequences for the decision makers as a result of a decision and (b) how decision outcomes often develop over time versus all at once. The participants in this study may

have followed the processes involved in structured technique (e.g., DI); however, they may not have captured the essence of these approaches because no real-life consequences were at stake. Mechanically, a procedure such as DI may be successfully implemented to a group through training, but the depth at which its members apply it may only be at a surface level due to low personal consequences. This would agree with claims made by the early supporters of the DI technique, Mitroff and Mason (1981) who believed the essence of the DI technique is difficult to measure in controlled experiments. In addition, the results of many real-life decisions may not be immediately known. Often, it takes time before the results of a decision can be assessed to determine if the decision(s) made was either good or bad.

The use of hypothetical decision tasks, whether objectively scored (e.g., Adventure in the Amazon) or subjectively scored by judges, may not be the best approach for assessing the effects structured approaches have on decision quality. To assess the efficacy of techniques such as DI and DA, the group problems used to analyze decision quality may need to be real-life situations with unclear outcomes and have direct personal consequences for its members versus hypothetical scenarios. Thus, while the structured approaches may not work well for problems with predetermined answers and low personal consequences for its group members, they may be beneficial for real-life strategic decisions where the outcomes are not readily apparent and personal investments from the group's members are involved. The results of this study provide support for the notion that structured techniques do not work well for problems with predetermined outcomes.

Third, the findings of this study, based on the results of the DA observer checklists, indicate that the DA technique is a more complex and difficult procedure to train participants to use compared to the DI method. This is contrary to the claim made by Cosier (1982) that DA should be an easier technique to implement than DI. In the DA condition, two out of the three observers in groups 2, 3, and 4 reported that the groups they observed did not follow the steps in this procedure correctly. In addition, observers in 3 out of 4 groups indicated that students in subgroup two (who were to only offer a critique) offered a counterproposal to subgroup one's plan for solving the problem, which was not the correct application of the DA technique. The DA condition, based on the observations made by the trained observers, appeared to be closer to the DI approach (e.g., plan / counter plan). This may indicate that the DI approach is a more natural process than the DA approach for groups to learn and apply. It also indicates that additional clarification of the operational meaning of critique needs to be provided to DA participants. Therefore, for individuals just introduced to the DA technique, more time needs to be spent on training and practice before applying the strategy to a real group problem.

Fourth, group size was offered as an improvement in this study over previous studies. Increasing the group size from 4 to 6 may have only benefited the UCS group. Because the DI and DA groups did not have time to practice with the strategies, these conditions may not have capitalized fully on the increased diversity offered by additional group members. However, the UCS group members, being in a more familiar and natural decision making strategy, may have benefited the most from the increase in group size, thus potentially explaining the better quality decisions yielded from this condition.

Fifth, the potential benefits and positive impact on decision quality often ascribed to the DI and DA approaches may be revealed more dramatically in groups that are further developed in the group lifecycle continuum. The results of this study indicated that newly formed groups did not benefit from any one particular type of decision strategy. More cohesive and developed groups, which are more prone to problems such as groupthink (Napier & Gershenfeld, 1993; Robbins, 1997), may benefit greater from the application of structured decision techniques such as DI and DA. Schweiger et al., (1989) used a longitudinal component in a comparative experiment of DI, DA, and C and reported significant differences between the structured approaches compared to the unstructured approach. The groups used in their study were allowed to remain intact, and thus develop more fully while they worked on two different group decision-making business case exercises. The best realization of the benefits of structured group decision-making approaches may lie with more developed groups than newly formed groups like those used in this study.

### Cognitive Conflict

H<sub>2</sub>: There will be a difference in the observed cognitive conflict levels between the DI, DA, and UCS groups.

Both DI and DA are considered cognitive conflict enhancing techniques, yet in this investigation no statistical difference was found between the three decision techniques on this variable. However, while no statistical differences were found, the mean score differences (e.g., DI  $\bar{M}$  = 3.33, DA  $\bar{M}$  = 3.25, and UCS  $\bar{M}$  = 2.92) indicated that DI and DA groups did have higher levels of cognitive conflict compared to the UCS groups. This would agree with previous research (e.g., Schweiger et al., 1986; Schweiger

et al., 1989; Schwenk & Cosier, 1993) that claims DI and DA are cognitive conflict enhancing techniques. It may be that the DI and DA strategies have less to do with decision quality and more to do with other benefits of group decision making such as increased levels of cognitive conflict. Cognitive conflict is manifested as a respectful, yet open challenge to the ideas and opinions of other people.

Increased cognitive conflict may be the most beneficial for developed ongoing groups than newly formed, one-shot groups. Often, mature, intact, and cohesive groups suffer decreases in performance (e.g., decision quality) from groupthink, thus would be helped from challenges to the status quo. In addition, increases in cognitive conflict might be more beneficial to groups facing real-life high-stakes decisions where the outcomes have direct personal consequences for the group members involved in the decision. Hypothetical problems such as the Adventure in the Amazon (Ukens, 1998), which have no direct personal consequences for the group members, thus may not be as dependent on the need to reveal hidden assumptions surrounding an issue as would a high stakes real-life decision. The greater the personal involvement in the decision, the greater the potential benefit cognitive conflict might offer the decision-making process. Therefore, cognitive conflict levels, while not statistically different in this investigation, do appear, based on the mean score differences, to be impacted more from structured approaches than an unstructured approach.

The DI and DA conditions claim to increase participation by providing group members with defined roles in the decision-making process. This enhanced participation is designed to lead to greater expressions of cognitive conflict. It appears that the structured techniques did help to increase participation levels among the participants in

these conditions. On both the DI and DA checklists, there were 4 observer questions related to group member participation. In both conditions, there was 100% agreement among all observers that all group members participated in the decision-making process. These observations provide some evidence that participation was high, at least in the DI and DA conditions. Thus, the increase in participation observed in the DI and DA conditions provides support for why higher levels of cognitive conflict were present both the DI and DA groups.

### Affective Conflict

H<sub>3</sub>: There will be a difference in the observed affective conflict levels between the DI, DA, and UCS groups.

Low levels of affective conflict were reported for all three conditions (refer to mean scores presented in table 9 on page 90). The most plausible explanation for these low levels is based on a group lifecycle perspective. All of the groups used in this study were ad hoc groups formed for a three hour, one-day period of time. These groups had no history of working together and were therefore in the earliest stage of development in the group lifecycle, which is marked by a propensity to avoid hostile confrontation (Napier & Gershenfeld, 1993). In the beginning stage of development, group norms have not been established and people tend to be cordial, friendly, and seek to avoid conflict. Thus, regardless of the type of group decision approach (e.g., DI, DA, or UCS), participants were more likely to withhold negative feelings and emotions directed toward other group members. Had these groups been afforded the opportunity to work together over a longer period of time and on multiple group decision assignments, and then the manifestation of affective conflict would likely have been more prevalent.

However, it is interesting to note that the mean group scores reported in this study for the structured conditions did have slightly higher levels of reported affective conflict than the unstructured condition. This would make intuitive sense, from a group lifecycle perspective, because these structured approaches both had elements that required engineered forms of confrontations (e.g., debate and critique). The application of these structured conflict techniques was likely uncomfortable and awkward for members of a newly formed group. The unstructured condition did not involve any type of formal structure which had confrontational elements like those in the DI and DA techniques, thus it allowed group members a greater opportunity to avoid any proposed threats to group harmony. It has been reported (Amason, 1996) that higher levels of affective conflict negatively impacts decision quality. Because DI and DA had higher levels of affective conflict might explain why decision quality scores were lower in these conditions compared to the UCS condition. The results of these findings also indicate that groups of people who are not familiar with these techniques and the conflict inducing elements associated with them (e.g., debate and critique) may negatively react to them (e.g., defensiveness) thus increasing the levels of affective conflict.

### Decision Commitment

H<sub>4</sub>: There will be a difference in decision commitment between the DI, DA, and UCS groups.

Researchers claim that increases in cognitive conflict should lead to increases in decision commitment because more information and ideas are shared and challenged among group members which results in a more thorough examination of an issue before a final solution is reached (Amason, 1996). This study found that all three of the treatment conditions had relatively equal amounts of observed cognitive conflict and consequently near equal levels of decision commitment. However, the structured DI and DA approaches did have both higher levels of observed cognitive conflict as well as higher levels of reported commitment to the decision. Research on this topic has been conflicting with regard to the reported findings of previous research (Amason, 1996; Priem et al., 1995; Schweiger et al.; 1986, Schweiger et al., 1989). The results of this study found the commitment levels for the final group decision to be higher (but not statistically significant) for DI and DA compared to UCS. This finding appears to provide support for the claim made by Amason (1996) that cognitive conflict should enhance decision commitment. Thus, the results of this study indicate that increased decision commitment along with cognitive conflict levels is higher for structured decision-making techniques than unstructured approaches.

## Limitations

There a number of limitations associated with this study. These limitations along with how they might have impacted this study are discussed in the following order. First, the biggest limitation of this study was lack of power. The lack power likely contributed to the inability to detect statistically significant differences between the three treatment conditions and the dependent variables measured. Had a larger sample been feasible statistical differences between the groups might have been detected.

Second, ad hoc groups were used over intact and developed groups. Ad hoc groups do not possess all of the characteristics associated with ongoing intact groups such as higher levels of trust and cohesiveness. The results of this study indicate that for newly formed groups the benefits of using structured techniques may be limited. Structured techniques such as DI and DA may have more benefit for mature work groups by helping break the cycle of groupthink, thus improving decision outcomes. From a group lifecycle perspective, newly formed groups are more prone to conflict avoidance (Napier & Gershenfeld, 1993), thus they may not react favorably to conflict inducing techniques. As indicated in this study, higher levels of affective conflict were associated with lower decision quality outcomes.

Third, the decision task used in this study may not have encompassed the elements associated with real-life decisions such as personal consequences, risk, promotions, etc., which may be more suitable for structured decision-making techniques. The outcomes of strategic group decisions are often not known for long periods of time. Thus, hypothetical decision tasks with predetermined outcomes, regardless of how

ambiguous the right answer might be, may not capture the essence of the DI and DA approaches.

Fourth, the timeframe of this study was conducted in one day over a three-hour period of time. Due to the short duration of time, group norms did not have time to develop and mature. The DI and DA approaches may have had a different effect on the outcomes of the study had the groups spent more time together.

Fifth, the use of volunteers may have affected the findings of this study in several ways. Rosenthal & Rosnow (1975) developed a hierarchy of traits associated with volunteers which include: (a) increased sociability, (b) arousal seeking, and (c) less authoritarian. Some of these characteristics may have impacted this study. It is conceivable that more sociable and less authoritarian participants might discuss issues more openly and fully, thus observers would record higher levels of cognitive conflict. It is possible that characteristics associated with the sample influenced cognitive conflict as much as the techniques did. Consequently, the affective conflict levels may have been low due to the low authoritarian nature of the sample. The high levels of decision commitment reported by all conditions might be a reflection of the more motivated (e.g., arousal seeking) and sociable nature of the sample versus influences from the conditions themselves. These differences represent potential threats to external validity due to the personalogical differences associated with the volunteer sample (Gall et al., 1996).

### Delimitations

There are two delimitations of this study that might have impacted the results. First, participants did not have an opportunity to practice with the strategies. Schweiger et al., (1989) reported that with practice and experience participants improved with the decision strategies. It appeared that the short-term training might not have been adequate for the DA condition based on reported observations from the trained observers. The problems many of the DA groups had with regard to not conducting a proper critique may have been addressed and eliminated with more training and practice. The DA approach may not have been fully represented in this study, thus the results may have been different with regard to the outcomes had more training been conducted.

Second, the observers used in this study received only one training session prior to the actual experiment. It is conceivable that although the observations made by this group were consistent as indicated by the percentage of agreement, they were not accurate reports of the decision making process used by the groups. Practice with identifying the different techniques as well as manifestations of cognitive and affective conflict might have resulted in different outcomes. For example, there was more variability in the DA condition observations, which might have meant the DA observers were unclear on what they were suppose to be observing, which implies a training problem. Thus, it was a delimiting factor for this study that DI and DA observers did not receive more than one training session prior to the experiment. However, due to timing and scheduling conflicts, it was not feasible to conduct more than one training session per observer.

### Recommendations for Future Research

Following are several areas suggested for consideration for future research. First, in future comparative studies of DI and DA, a greater emphasis needs to be placed on investigating the relationships between these techniques in groups that have opportunities to develop over time. Research may find that more mature groups in the group lifecycle continuum benefit greater from these techniques versus newly formed groups. Developed and cohesive groups may be more prone to phenomena such as groupthink, which has negative consequences for the quality of group decisions (Robbins, 1997). It would be helpful to compare structured cognitive conflict enhancing techniques in more developed work groups because these types of groups may benefit the most from the effects of structured decision making. Little research, with the exception of Schweiger et al., (1989), has attempted to examine the effects these techniques have on more developed and ongoing work groups.

While it is challenging to conduct longitudinal research of this nature, it does offer an excellent opportunity to explore the potential benefits structured approaches might have on cohesive groups. Ongoing work groups/teams could be established through experimental research by using intact classes of students at either the undergraduate or graduate levels who would be allowed to work together in groups for an entire semester class. An even better approach would be to establish work groups for the entirety of an academic program that uses cohort groups that begin and finish a planned program of study at the same time. These groups would remain intact throughout an entire program, thus developing characteristics of more mature groups. This would allow a researcher(s) to track the performance of intact groups through the group lifecycle in

order to determine how techniques such as DI and DA would impact more developed groups.

In this type of research, attempts should be made to measure for factors such as group cohesiveness, member power, and the presence of groupthink prior to the introduction, training, and implementation of structured cognitive conflict enhancing techniques. For example, outside observers could be trained to detect the warning signs (e.g., rationalization, pressure on doubters to conform, silence, etc.) of groupthink (Robbins, 1997). If it were established that groupthink was present in the group(s), then structured techniques such as DI and DA could be applied to see if the negative effects of groupthink are actually attenuated after the introduction and application of these strategies. In addition, assessments could be made with regard to the performance (e.g., decision quality, output, etc.) of the group(s) before and after the introduction of the structured techniques.

Second, future group decision-making research on structured decision-making strategies should direct more attention to group composition factors such as (a) motivation levels, (b) sociability, (c) willingness to participate, and (d) leadership styles. These types of factors may impact the group decision-making process more than any specific structured group decision-making technique. While this was not the primary focus of this study, the possible influences from the characteristics of the volunteer sample provides some tentative evidence of the importance needed in taking group characteristics into consideration in future group decision-making studies.

Third, more effective methods for assessing intra-group conflict should be explored. The use of observers to assess intra-group conflict appears to be a good

approach for measuring this variable, in the view of this researcher; however, more sensitive instrumentation may also be needed to detect the different types of conflict levels. Perhaps a combination of both observer and participant measures implemented at the same time might provide more insight into the presence of cognitive and affective conflict. It may be that outside observers perceive the manifestations of affective and cognitive conflict differently than the actual group members themselves.

Fourth, measures to assess group member's willingness and desire to participate in group activities should also be developed and used in comparative studies of group decision-making approaches. It is claimed that the structured approaches of DI and DA increase cognitive conflict as a result of greater involvement of the group members. However, it appears that attempts to measure this variable have not been directly examined and may be worthy of further exploration in future research.

Fifth, and most importantly, new approaches need to be explored which examine the effects structured group decision-making techniques have on decision quality in real-life scenarios versus hypothetical ones. Approaches that involve allowing groups to make real-life group decisions with no predetermined outcomes may be the most appropriate to gauge the effectiveness of strategies like DI and DA. The problems should be real, personal to the group (e.g., of their own choosing), and should have direct, yet measurable (e.g., amount of money raised) consequences (good or bad) for the decision makers involved.

## Summary

The benefits of using structured group decision-making strategies to enhance decision outcomes may be limited for newly formed groups with regard to effects on decision quality. However, the techniques may still benefit the decision-making process in other ways such as increased cognitive conflict levels and greater commitment to the decision. The usefulness of structured techniques such as DI and DA may be better revealed in more mature and developed groups compared to newly formed groups. The nature of the problems to be solved by structured techniques should be real-life complex group decisions, which involve personal stakes, and the outcomes take time to develop.

Using hypothetical scenarios and case studies may not be the most appropriate method for assessing the quality of group decisions made using a structured approach such as DI or DA. The results of this small study found no statistical differences in decision outcomes between structured decision-making approaches and an unstructured approach. The author of this study does not conclude the DI and DA techniques are useless, but does raise concerns about their universal effectiveness. These techniques may be limited to certain types of groups and problems and not appropriate for all group decision-making situations.

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Appendix A

Table Card

## **VOLUNTEERS NEEDED FOR A STUDY**

*Undergraduate students are being sought for a study  
comparing different group decision making strategies.*

### **REQUIREMENTS FOR STUDY**

- Open to undergraduate students from any academic discipline.
- Study limited to 125 volunteers.
- 3 hours of your time required.
- Be willing to work in small groups.

### **DATE • TIME • LOCATION**

Saturday February 23, 2002 • 1:00 p.m. - 4:00 p.m.  
Wallace Hall

You will be notified via email approximately one week prior  
to the study of the room in Wallace Hall to report to.

### **BENEFITS FOR VOLUNTEERING**

- Exposure and practice with a group decision making strategy.
- All participants will receive incentives:
  - VT Sweatshirt*
  - VT Cap*
  - A chance in a Grand Prize drawing*

### **TO SIGN-UP**

Simply visit the following website and sign up online:  
<http://catalog.fullpond.com/decisions>  
Please sign up by February 11, 2002.

### **QUESTIONS?**

Contact: David Robertson  
Daytime phone: 389-0014 ext. 136 / Evening phone: 380-4551  
Email: [darober4@vt.edu](mailto:darober4@vt.edu)

Supported by the Department of Teaching and Learning

Appendix B  
Advertisement Poster

## **VOLUNTEERS NEEDED FOR A STUDY**

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### **QUESTIONS?**

Contact: David Robertson  
Daytime phone: 389-0014 ext. 136 / Evening phone: 380-4551  
Email: darober4@vt.edu

## Appendix C

### Online Website for Study

Life is all about decisions

**I Need A  
Few Good  
Hokies**



Two Heads Are Better Than One.



Group Decision Making.

## Life is all about making decisions.

### Introduction to the Study

Everyone wants to make good decisions, right? Did you know that the trend in organizational decision-making is moving toward the use groups to make and execute high stakes decisions? While this may be the trend, few people have had experience and training in group decision strategies. Now is your chance to participate in a fun, interesting and interactive study that compares 3 different group oriented decision-making strategies and the effects these techniques have on the decision-making process. This is a great opportunity to learn more about strategies for group decision-making.

What is required of me?

All volunteers will be required to:

- (1) Volunteer 3 hours of your time on **Saturday February 23rd from 1:00 PM - 4:30 PM.**
- (2) Work in pre-assigned groups to solve a fun and interactive group decision task.
- (3) Complete a few short questionnaires at the end of the task related to your group decision-making experience.

What are the benefits to participating?

- (1) You will be exposed to different strategies for solving group problems.
- (2) You will gain experience and practice with one group decision-making strategy.
- (3) You will have a chance to meet and interact with fellow VT students.
- (4) You will receive the following cool items for participating: (a) VT sweatshirt, (b) VT Cap, and (c) a chance at a drawing for one of three grand prizes:

- o Overnight stay at Mountain Lake Resort
- o Magnavox Compact Stereo System
- o Heavy Duty Back Country Back Pack

When, where, what and how?

Life is all about decisions

- (1) When will this study occur? **Saturday February 23rd from 1:00 PM - 4:30 PM.**
- (2) Where will it occur? **Wallace Hall on the campus of VT.** You will be notified approximately one to two weeks prior to the study of the actual room to report to in Wallace Hall.
- (3) How do I sign up? To sign up, simply click on this link and complete the information requested
- (4) What else do I need to do? Please click on this link to read and print off the consent form required for participation. This form will need to be signed and brought with you the day of the study.

**If I have questions who can I contact and how?**

If you have questions, please feel free to contact me via phone or email.  
Phone: (d) 540-389-0014, ext. 136 / (e) 540-380-4551  
Email: (w) drobertson@robertsonmarketing.com or (h) DWRKBR@aol.com

Thank you in advance for your willingness to participate in this fun and exciting group study! I will look forward to meeting you.

Sincerely,

David W. Robertson

## Appendix D

Adventure in the Amazon, Ukens (1998) Correct Answer Ranking

**Adventure in the Amazon Correct Answer Order**

<b><u>Item</u></b>	<b><u>Correct Order Rank</u></b>
Aluminum Pan	10
Can of insecticide	9
Canteen with water	6
Compass	2
First aid kit	4
Large knife	1
Mosquito netting	3
Pack of cigarettes	12
Parachutes	5
Revolver	11
Sack of coconuts	13
Safari hat	8
Small shovel	7
Tallow candles	15
Vinyl jackets	14

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## Appendix E

### Decision Commitment Scale

### Six-Item Questionnaire

- Complete this questionnaire after your group has completed the decision task exercise.

Scale: 1      2      3      4      5      6      7

**1 = Strongly Disagree**

**7 = Strongly Agree**

Circle the number that **BEST** reflects your response to the following statements.

1. I am proud to tell others that I was involved in making this decision.

1      2      3      4      5      6      7

2. I was willing to put in a great deal of effort to see this decision be successful.

1      2      3      4      5      6      7

3. I was willing to talk this decision up with fellow students as being a good decision for the group.

1      2      3      4      5      6      7

4. I really cared about seeing this decision be successful.

1      2      3      4      5      6      7

5. A change in present circumstances would have caused me to reduce support for this decision.

1      2      3      4      5      6      7

6. I feel there was not much to be gained by sticking with this decision.

1      2      3      4      5      6      7

Dooley, R.S., & Fryxell, G.E. (1999).

## Appendix F

### Decision Technique Overview for Participant Subjects

#### in DI and DA Conditions

## Overview of the Dialectical Inquiry Technique:

### The Technique:

Dialectical Inquiry (DI) technique is a group decision-making strategy designed to provide a step-by-step process to help groups achieve consensus on a decision. This technique works the following way (Schweiger, Sandberg, & Ragan, 1986):

- (1) The group as a whole (e.g., 6 people) is presented with a problem to solve.
- (2) The group subdivides into 2 equal subgroups (e.g., 3 people in subgroup 1 and 3 people in subgroup 2)
- (3) Subgroup 1 (independent of subgroup 2) develops a **plan** to solve the problem. Once subgroup 1 has developed their plan to solve the problem, they present their plan to subgroup 2 (note: subgroup 2 should **not** have its own plan to solve the problem at this point in time).
- (4) After subgroup 1 has presented their plan, subgroup 2 (independent of subgroup 1) develops a **counter-plan** (e.g., competing plan). Once subgroup 2 has developed their counter-plan, they present it to subgroup 1.
- (5) Once both subgroups have presented their plans, they **debate** the merits of both plans in an effort to reach consensus on a final plan.

**Flow: Plan (subgroup 1) - Counter-plan (subgroup 2) -Debate (both subgroups) - Final Plan (Consensus)**

## Overview of the Devil's Advocacy Technique:

### The Technique:

The Devil's Advocacy (DA) technique is a group decision-making strategy designed to provide a group with a step-by-step process to achieve consensus on a decision. DA works the following way (Schweiger, Sandberg, & Ragan, 1986):

- (1) The group as a whole (e.g., 6 people) is presented with a problem to solve.
- (2) The group next subdivides into 2 equal subgroups (e.g., 3 people in subgroup 1 and 3 people in subgroup 2).
- (3) Subgroup 1 (independent of subgroup 2) develops a **plan** to solve the problem.
- (4) Once subgroup 1 has completed solving the problem, they present their plan to subgroup 2. Subgroup 2 listens to subgroup 1's plan (note: subgroup 2 is **not to develop their own plan to solve the problem**).
- (5) After subgroup 1 presents its plan, subgroup 2 offers a formal critique of subgroup 1's plan.
- (6) Once subgroup 2 offers its critique, subgroup 1 (independent of subgroup 2) gets together again and discusses and records any changes they feel should be made to their original plan as a result of the critique from subgroup 2.
- (7) Subgroup 1 then gets back together with subgroup 2 to present their plan with any changes they elected to make to their original plan. At this point, the entire group (e.g., 6 people) may be able to achieve consensus on a final plan or subgroup 2 may offer another critique, thus requiring subgroup 1 to get back together again as a subgroup to discuss and record any further changes to their plan. Subgroup 1 would then present any additional changes to subgroup 2. This part of the process may continue thru several critiques and revisions until final consensus can be achieved.

**Flow: Plan (subgroup 1) - \*Critique (subgroup 2) - \*Revised Plan/Resubmit (subgroup1) - Consensus**

**\* Note, there may be more than one critique/revision needed before consensus can be reached.**

## Appendix G

Specific Instructions for participants by condition: DI, DA, & UCS

### **Participant instructions to follow for the DI investigation:**

- (1) The nature of the problem you will be solving in your group today is a hypothetical scenario called “Adventure in the Amazon” where your group has crash-landed in an airplane in the Amazon jungle. There were 15 items aboard the aircraft that your group has access to and can use. To solve the problem each item must be rank ordered from **1** being the **most** important to your survival and **15** being the **least** important (Ukens, 1998).
- (2) You will be read the decision task (Adventure in the Amazon) by the treatment facilitator after all training on the DI approach has been completed. You will also be read a list of helpful hints for reaching consensus.
- (3) Your group of 6 will proceed to your assigned classroom and you are asked not to discuss the problem until you arrive at your designated room and break into your subgroups of 3.
- (4) There will be 3 observers in the room with you and they **cannot provide any assistance or answer any questions** for your group.
- (5) Once in the assigned classroom you will sub-divide into your smaller subgroup of 3. Note, it will be marked where subgroup 1 will sit and where subgroup 2 will sit.
- (6) Subgroup 1 (independent of subgroup 2) will develop a plan first to solve the problem. While subgroup 1 is working on the problem, subgroup 2 will be allowed to discuss the problem among themselves, but they are **NOT** to solve the problem (e.g., DO NOT rank order the answers on your answer sheet) at this time.
- (7) Subgroup 1 is to record its answers on the subgroup 1 answer sheet located in your folder. Record your answers only in the left hand column of your answer sheet. Do not record any information in the right hand columns of your subgroup 1 answer sheet.
- (8) Subgroup 1 is to provide a brief written rationale for each response as to why each item was chosen in the order it was selected. The written rationales are to be **recorded on the written rationale sheet in your folder**. These rationales will help your subgroup when you present your plan to subgroup 2 in the next step.
- (9) Subgroup 1 then gets together with subgroup 2 and presents its plan. Subgroup 1 needs to loan one copy of its plan and written rationales to subgroup 2.

### **DI participant instructions continued:**

- (10) Subgroup 2 is instructed to listen to subgroup 1 as they present their plan. Subgroup 2 may ask questions for clarification, but they are **NOT** to provide a critique of subgroup 1's plan.
- (11) Once Subgroup 1 is finished presenting its plan to subgroup 2, the groups divide again into their subgroups. Subgroup 2 (independent of subgroup 1) will develop a **counter-plan** to subgroup 1's plan.
- (12) Subgroup 2 is to record their answers for their counter-plan on the subgroup 2 answer sheet located in your folder. Record your answers only in the left hand column of your answer sheet. Do not record any information in the right hand columns of your subgroup 2 answer sheet
- (13) Subgroup 2 is to provide a brief written rationale for each response as to why each item was chosen in the order it was selected. The written rationales are to be **recorded on the written rationale sheet in your folder**. These rationales will help your subgroup when you present your plan to subgroup 1 in the next step.
- (14) Subgroup 2 then gets together with subgroup 1 and presents its **counter-plan**. At this point, subgroup 2 needs to return the copy of subgroup 1's plan.
- (15) Subgroup 1 is instructed to listen to subgroup 2 as they present their plan. Subgroup 1 may ask questions for clarification, but they are **NOT** to provide a critique of subgroup 2's plan.
- (16) Once both subgroups have presented their plans, they are to **Debate** the merits of each plan. The goal being for the **entire group (all 6 members)** to reach **consensus** on a final plan.
- (17) Once a final plan is reached, it is to be recorded on the final answer sheet located in the **RED** folder. Only one final answer sheet is provided. **Record your group's final answers in the left hand column. Do not record your answers in the far right hand columns. There will be only one red folder per group.**
- (18) Once the decision exercise is completed, each member is to **individually complete the 6-item questionnaire located in your folder**. This is to be done **after** the Adventure in the Amazon exercise is finished.

(19) Once everything is completed, **your entire group of 6 needs to return together** to the group facilitator located outside room **100** to turn in **All Folders & Paperwork** from this study. At this time, you will collect your incentives for participating in this study.

**Thank you for your time & participation in this study!**

### **Participant instructions to follow for the DA investigation:**

- (1) The nature of the problem you will be solving in your group today is a hypothetical scenario called “Adventure in the Amazon” where your group has crash-landed in an airplane in the Amazon jungle. There were 15 items aboard the aircraft that your group has access to and can use. To solve the problem each item must be rank ordered from **1** being the **most** important to your survival and **15** being the **least** important (Ukens, 1998).
- (2) You will be read the decision task (Adventure in the Amazon) by the treatment facilitator after all training on the DA approach has been completed. You will also be read a list of helpful hints for consensus seeking.
- (3) Your group of 6 will proceed to your assigned classroom and you are asked not to discuss the problem until you get to your designated room and break into your subgroups.
- (4) There will be 3 observers in the room with you. They **cannot provide any assistance or answer any questions** for your group.
- (5) Once in the assigned classroom you will sub-divide into your smaller group of 3. Note, it will be marked where subgroup 1 will sit and where subgroup 2 will sit.
- (6) Subgroup 1 (independent of subgroup 2) will develop a **plan** to solve the problem. While subgroup 1 is working on the problem, subgroup 2 members will be allowed to discuss the problem among themselves, however, they are **NOT** to solve the problem (e.g., **DO NOT** develop a rank order of the answers). Subgroup 2 will be provided with an answer sheet so they can see the 15 items subgroup 1 is to rank order. Subgroup 2 is **NOT** to fill in any of their own answers on the answer sheet.
- (7) Subgroup 1 is to record its answers on the subgroup 1 answer sheet. Record your answers only in the left hand column of your answer sheet. Do not record any information in the right hand columns of your subgroup 1 answer sheet.
- (8) Subgroup 1 is to provide a brief written rationale for each response as to why each item was selected in the order it was recorded. This written rationale is to be recorded on the written rationale sheet located in your folder. This rationale will help assist your subgroup when you present your plan to subgroup 2 in the next step.
- (9) Subgroup 1 then gets together with subgroup 2 and presents its plan to subgroup 2. Subgroup 1 is to share a copy of its plan and written rationales with subgroup 2 during the presentation of their plan.

### **DA participant instructions continued:**

(10) Subgroup 2 is instructed to listen to subgroup 1's plan. Subgroup 2 may ask questions for clarification, but they are **NOT** to provide a counter-plan (e.g., competing plan).

(11) After subgroup 1 presents its plan, subgroup 2 offers an objective **critique** (e.g., points out flaws and weaknesses) of subgroup 1's plan. At the conclusion of the critique, subgroup 2 should give back the copy of subgroup 1's plan.

(12).After the critique from subgroup 2, subgroup 1 (independent of subgroup 2) gets back together into its subgroup to discuss and record any changes they feel need to be made to their original plan as a result of the feedback provided to them by subgroup 2. Any changes they elect to make need to be recorded on your subgroup 1 answer sheet.

(13) Subgroup 1 meets back with subgroup 2 to present any changes they elected to make to their original plan as a result of the critique. Subgroup 1 will again provide a copy of their plan (showing any changes they elected to make) to subgroup 2. At this point in the in the process, the entire group of 6 may be able to reach consensus on a final plan or subgroup 2 may chose to offer an additional critique of subgroup 1's plan. **The critique/revision process may continue thru several cycles before final consensus by the entire group can be achieved.**

(14) Once your entire group of 6 reaches a final decision, record your final answer on the final answer sheet located in the **RED** folder. **Record your group's final answers in the left hand column only. Do not record anything in the spaces on the far right of this answer sheet. There will be only one red folder per group.**

(15) Once the decision exercise is completed, each member is to **individually** complete the **6-item questionnaire located in your folder**. This is to be done **after** the Adventure in the Amazon exercise is finished.

(16) Once everything is complete, **your entire group of 6 needs to return together** to the group facilitator located outside room **126** to turn in **All Folders & Paperwork** from this study.

(17) At this the time you will collect your incentives for participating in this study.

**Thank you for your time & participation in this study!**

## Instructions for UCS

- (1) You will be solving an assigned problem in a group of 6 people.
- (2) Your group is to solve this problem-using consensus.
- (3) You will be read the decision task (“Adventure in the Amazon”) by your group facilitator. There is a copy in your folder for your reference.
- (4) The nature of the problem you will be solving in your group today is a hypothetical scenario called “Adventure in the Amazon” where your group has crash-landed in an airplane in the Amazon jungle. There were 15 items aboard the aircraft that your group has access to and can use. To solve the problem each item must be rank ordered from **1** being the **most** important to your survival and **15** being the **least** important (Ukens, 1998).
- (5) You will be assigned a room number where your group will work to solve the problem. The group facilitator will provide your room assignment.
- (6) When your group walks to the assigned room, you are not to discuss the problem with anyone else until you get to your assigned room.
- (7) When your group arrives at the assigned room, there will be 3 observers in the room. These observers **cannot provide any form of assistance or answer any questions for your group.**
- (8) Once your group has developed its final answer to the problem, **record your group’s final answers on the final decision answer sheet located in the red folder.** \*There will be only **one RED** folder per group.
- (9) Once your group has completed the decision task, **each individual in the group is to complete the 6-item questionnaire in the back of the folder.**
- (10) Once both the group decision task and the individual 6-item questionnaire are complete, **please return as a group** to your group facilitator in room **236**.
- (11) All paperwork is to be turned back in to your facilitator.
- (12) Once all paperwork is turned in, you will receive incentives for your time.

**Thank you for your time & participation in this study!**

## Appendix H

### Observer Checklist for DI and DA Conditions

## Dialectical Inquiry Process Checklist

**Observer name:** \_\_\_\_\_

**Group #:**

Please check the appropriate box either yes or no based on your observation.

### **(A) Subgroup One (Plan)**

(1) Subgroup one participants, independently of subgroup two, actively discussed the hypothetical scenario:

YES       NO

(2) Subgroup one participants developed a strategy to solve the problem:

YES       NO

(3) Careful consideration was given to the task and the solution developed:

YES       NO

(4) A written rationale was provided for each response:

YES       NO

(5) All subgroup one participants contributed to solving the problem:

YES       NO

(6) Subgroup one participants presented their solution to subgroup two:

YES       NO

### **(B) Subgroup Two (Counter Plan)**

(1) Subgroup two participants listened carefully to subgroup one's plan

YES       NO

(2) Subgroup two participants did **not** offer a critique of subgroup one's plan

\*  YES       NO

- Checking **Yes** means they did not offer a critique. If they did offer a critique, check **No**.

(3) After hearing Subgroup one's plan, there was active discussion between all subgroup two participants on how to develop a counterproposal

YES       NO

(4) Subgroup two, independently of subgroup one, developed a rational counterproposal

YES       NO

(5) All subgroup two members participated in the development of the counterproposal

YES       NO

(6) A written rationale for each response was provided

YES  NO

(7) Subgroup two presented their counterproposal to subgroup one

YES       NO

(8) Subgroup one participants listened carefully to subgroup two's plan

YES       NO

### **(C) Debate**

(1) After subgroup two presented its counterproposal to subgroup one, both sides (groups) debated the merits of each plan:

YES       NO

(2) All participants participated in the debate

YES       NO

(3) The debate was constructive and new ideas emerged from the discussion

YES       NO

**(D) Group as a whole**

(1) After the debate, the group was able to reach final consensus

YES       NO

**Overall Analysis**

(1) Both groups understood and properly followed the steps involved in the DI process

YES       NO

(2) All group members contributed in the decision making process

YES       NO

**\*\*\* Return completed form to your group facilitator \*\*\***  
**Room 100 Wallace Hall**

## Devil's Advocacy Process Checklist

**Observer name:** \_\_\_\_\_

**Group: #**

Please check the appropriate box either yes or no based on your observation

### **(A) Subgroup One (Plan)**

(1) Subgroup one participants, independently of subgroup two, actively discussed the hypothetical scenario:

YES       NO

(2) Subgroup one participants developed a strategy to solve the problem:

YES       NO

(3) Careful consideration was given to the task and solution developed:

YES       NO

(4) A written rationale was provided for each response:

YES       NO

(5) All subgroup one participants contributed to solving the problem:

YES       NO

(6) Subgroup one participants presented their solution to subgroup two:

YES       NO

### **(B) Subgroup Two: (Critique)**

(1) Subgroup two participants listened carefully to subgroup one's plan:

YES       NO

(2) Subgroup two participants provided an objective critique of subgroup one's plan:

YES       NO

(3) Subgroup two did **not** offer a counterproposal:

\*  YES  NO

- Checking **Yes** means they did not offer a counterproposal. If they did offer a counter proposal check No.

(4) Subgroup two's critique did **not** involve personal/emotional attacks:

YES  NO

(5) All subgroup two participants participated in the critique:

YES  NO

**(C) Subgroup One: (Post-Critique Revision)**

(1) The critique led to additional discussion over the original plan among subgroup one participants (independent of subgroup two):

YES  NO

(2) Subgroup one, independently of subgroup two, made revisions to its original plan as a result of the critique:

YES  NO

(3) All subgroup one participants contributed to any revisions made to the plan:

YES  NO

(4) Subgroup one presented its revised plan to subgroup two:

YES  NO

**(D) Group as a whole: (Consensus)**

(1) The group was able to reach consensus on a final plan:

YES  NO

(2) The entire group was able to reach consensus after only one critique:

YES  NO

**Overall Analysis:**

(1) Both subgroups understood and properly follow the steps involved in the DA process:

YES       NO

(2) All group members contributed in the decision making process:

YES       NO

**\*\*\* Return completed form to your group facilitator \*\*\***  
**Room 126**

## Appendix I

### Affective and Cognitive Conflict Scales

## Cognitive and Affective Conflict Scales

Scale: 1      2      3      4      5      **KEY: 1= None / 5= Great Deal**  
Please circle the number that **best** corresponds to the statement based on your observations.

### Cognitive Conflict:

1. How many disagreements over different ideas about this decision were made?

1      2      3      4      5

2. How many differences about the content of this decision did the group have to work through?

1      2      3      4      5

3. How many differences of opinion were there within the group over this decision?

1      2      3      4      5

### Affective Conflict:

1. How much anger was there among the group over this decision?

1      2      3      4      5

2. How much personal friction was there in the group during the decision?

1      2      3      4      5

3. How much were personality clashes between group members evident during this decision?

1      2      3      4      5

4. How much tension was there in the group during this decision?

1      2      3      4      5

Amason, A.C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management Teams. *Academy of Management Journal*, 39, (1), 123-148.

Jehn, K. (1992). *The impact of intragroup conflict on effectiveness: A multimethod examination of the benefits and detriments of conflict*. Unpublished doctoral dissertation, Evanston: Northwestern University.

Jehn, K. (1994). Enhancing effectiveness: An investigation of advantages and disadvantages of value-based intragroup conflict. *International Journal of Conflict Management*, 5, 223-238.

## Appendix J

### Online Descriptive Data Signup Form

## Descriptive Information Form

Please complete the following form and click the submit button at the bottom when complete.

Last Name  First Name

Mailing Address:

City , State  Zip Code

Gender:  Male  Female Age:

Major:  / Minor

Class: (please check one) Undergraduate:  Freshman  Sophomore  Junior  Senior |  
Graduate:  Master's  Doctoral

Please mark the following group decision exercises you have been exposed to:

Lost on the Moon  Lost at Sea  Adventure in the Amazon  Artic Expedition   
Earthquake Survival

Have you ever been exposed to group decision-making strategies?  Yes  No

If yes, please select all group decision-making strategies you have used:

Devil's Advocacy,  Nominal Group Technique,  Dialectical Inquiry,  Consensus thru  
Qualification,  other.

Phone number (area code + number):

Email Address:

How did you learn about this study?

Please list any student organization you are affiliated with:

## Appendix K

### Written Handouts for Observer Training

## **Observer Training Document**

### **Objective of the study**

The objective of this study is to compare three group decision-making strategies and the impact these techniques have on: (1) decision quality, (2) group conflict and (3) decision commitment.

### **Overview of the study**

This study will involve 72 undergraduate students from various academic disciplines. These students will be randomly assigned to three different treatment conditions: (1) Devil's Advocacy, (2) Dialectical Inquiry and (3) Unstructured Consensus Seeking. Within the treatment conditions participants will be assigned to groups of six. Thus, there will be 4 groups of 6 per treatment condition. All groups will be assigned the same problem to solve. The problem they will be solving is "Adventures in the Amazon" by Ukens, (1998) which is a hypothetical scenario where a group of travelers have crashed landed in a small plane in the middle of the Amazon rainforest. Participants must rank order by level of importance 15 items, which will aid in their survival. There will be 3 trained observers per group of 6 who will record observations concerning how well the assigned decision process was followed by each group. In addition, observations will be recorded concerning group conflict, both affective and cognitive. All observations will be recorded on a checklist created specifically for this investigation.

### **The Role of the Observer**

The role of the observer is to record on a checklist how well the students followed the steps in their assigned treatment condition as well as to record their perceptions of any cognitive and/or affective conflict observed.

#### **Dialectical Inquiry Observers:**

The role of the Dialectical Inquiry observer is as follows:

- (1) To observe and record on a checklist how well the group followed the steps in the DI approach.
- (2) To observe and record on a checklist their observations relating to group conflict levels, both affective and cognitive.

#### **Devil's Advocacy Observers:**

The role of the Devil's Advocacy observer is as follows:

- (1) To observe and record on a checklist how well the group followed the steps in the DA approach.
- (2) To observe and record on a checklist their observations relating to

group conflict levels, both affective and cognitive.

### **Overview of decision strategies**

#### **Dialectical Inquiry (DI):**

Dialectical Inquiry is a group decision-making strategy designed to provide group members with a structured path for reaching consensus. The technique works as follows (Schweiger, Sandberg, & Ragan, 1986): First, the entire group (e.g., all 6 members) is assigned a problem to solve. Second, the group is subdivided into two equal subgroups of 3 people each (e.g., subgroup one and subgroup two). Third, subgroup one, independently of subgroup two, develops a **plan** to solve the problem. Once they have devised their plan, they present it to subgroup two. Fourth, subgroup two after hearing subgroup one's plan, develops, independently of subgroup one, a rational **counter-plan**. Subgroup two then presents its counter-plan to subgroup one. Fifth, once the two sides have presented their plans, the two sides then **debate** the merits of each plan. The goal being to develop a modified **final plan** which takes the best of both plans and any new ideas that surfaced during the discussion and merge them all together into a final plan. This type of an approach provides defined roles for each subgroup to play as well as it provides a step-by-step process which the group can follow to reach consensus.

**DI Process Flow: Plan (subgroup one) - Counter plan (subgroup two) - Debate (both subgroup one and two) - Consensus**

### **Devil's Advocacy (DA):**

Devil's Advocacy is a group decision-making strategy designed to provide group members with a structured path for reaching consensus. The technique works as follows (Schweiger, Sandberg, & Ragan, 1986): First, the entire group (e.g., all 6 members) is presented with a problem to solve. Second, the group is subdivided into two equal subgroups (e.g., subgroup one and subgroup two). Third, subgroup one, independently of subgroup two, develops a plan to solve the problem. Fourth, once subgroup one develops its plan they then present their plan to subgroup two. Fifth, subgroup two offers an objective critique of subgroup one's plan. Subgroup two is to only point out flaws, as they see them, in subgroup one's plan. They are **not** to provide a counterproposal (e.g., their own listing of the answers). Sixth, subgroup one then meets, independently of subgroup two, to discuss revisions to their plan as a result of subgroup two's critique. Seventh, subgroup one again meets with subgroup two to go over any changes they have made as a result of the critique. At this point, the group may be able to reach consensus on the final plan or subgroup two may offer another critique to which subgroup one would have to meet again to discuss possible revisions. This process can continue through several critiques and revisions until a final plan is achieved to which everyone can support. Note, typically there will only be one critique and one revision.

**DA Process Flow: Plan (subgroup one) - \*Critique (subgroup group two/ \* there may be more than one critique) - \*Revised Plan/Resubmit (subgroup one / \* there may be multiple revisions and presentations by subgroup one to subgroup two) - Consensus**

### **Conflict Observations**

There are 2 types of group conflict under investigation in this study: (1) Cognitive and (2) Affective (Amason, Hochwarter, & Harrison, 1995). An overview of each type is provided for your reference:

#### **Cognitive Conflict:**

Cognitive Conflict is a positive form of conflict and is considered a healthy component of the group decision-making process. In other words, it is a type of conflict that is to be encouraged versus avoided. This type of conflict is constructive in nature and relies on objective and factual information. It does not involve personal or emotional attacks. For instance, you may observe cognitive conflict phrases such as "that is a good idea, but have you may also want to consider...and here is why". Below are additional examples that represent cognitive conflict:

- Asking clarifying questions

- Offering rational comparisons
- Challenging a position (in a respectful & objective manner)
- Pointing out potential problems

### **Affective Conflict:**

Affective conflict is the negative form of group conflict and can have negative consequences on the group decision-making process. It is represented by personal and emotional attacks. For example, name calling, or comments such as “that is a stupid idea, it would never work” represent the negative form of group conflict. Below are additional examples that represent this form of conflict:

- Argumentative
- Defensiveness
- Yelling
- Sarcasm
- Confrontational / Personal attacks
- Offensive comments

### **Observers the day of the study**

On the day of the study, there will be 3 observers per group of 6. Observers are **not** to provide clarification of any kind for the participants. They are **not** to provide assistance in **any manner**, rather their sole purpose is to observe and record observations on the provided checklists. Once the group completes its task as well as a short decision commitment questionnaire, observers are to report back to the **treatment condition facilitator to return all observation checklists**. Note, there will be a facilitator for each condition (e.g., DI, DA, and UCS).

### **Checklist Order of Completion**

- (1) Complete the decision strategy observation checklist as the group engages in each step, thus this checklist will be completed **first**.
- (2) Complete the conflict questionnaire once the group you are observing completes the entire exercise, thus it will be completed **last**.

### **Additional Information Related to this Study**

- (1) This study will take place on Saturday, February 23<sup>rd</sup> from 1:00 PM – 4:30 PM.
- (2) The study will take place at Wallace Hall.
- (3) Observers are to report to Wallace Hall 30 minutes early at 12:30 PM.
- (4) Observers will be notified via EMAIL approximately 1 week prior to the study of the room number to report to in Wallace Hall.
- (5) At the conclusion of the study, all observers will receive a free VT sweatshirt and cap.

- (6) Once their group has completed the task and all questionnaires, observers are to return to their assigned facilitator to return their observations.
- (7) Once everything is turned in, observers will be given their incentives and will be free to leave.

### **Contact Information**

David Robertson  
5109 Buckskin Lane  
Salem, VA 24153

Phone (all calls local from Blacksburg):  
(w) 540-389-0014, ext. 136 (h) 540-380-4551

Emails:

(w) [drobotson@robertsonmarketing.com](mailto:drobotson@robertsonmarketing.com)

(h) [DWRKBR@aol.com](mailto:DWRKBR@aol.com)

(VT) [darober4@vt.edu](mailto:darober4@vt.edu)

## Appendix L

Consensus Tips from Adventure in the Amazon, Ukens (1998)

### *GUIDELINES FOR REACHING CONSENSUS*

Your group will supply a number of resources that each member lacked when you worked independently on the task. Enter into the group task with a commitment to use these resources and to arrive at the best possible solution. Shoulder your share of the responsibility for the group's success, and discuss the task and process openly and candidly. Use flexible patterns of communication so that all members of your group will be able to participate equally and will feel free to speak up when they have a need to do so. Minority opinions should be encouraged, not only will this increase participation, but it could supply information or logic that previously was missing.

The following guidelines will help during the decision-making process:

1. *Think through your own ideas as well as you can before meeting with the group (but realize that others may know information that you do not).*
2. *Express your own opinions and explain yourself fully, so that the rest of the group has the benefit of all members' thinking.*
3. *Listen to the opinions and feelings of all other group members and be ready to modify your own position on the basis of logic and understanding.*
4. *Avoid arguing for your own position in order to "win" as an individual, what is "right" is the best collective judgment of the group as a whole.*
5. *View disagreements or conflict as helping to clarify the issue rather than as hindering the process. Do not "give in" if you have serious reservations about an issue; instead, work toward resolution.*
6. *Recognize that tension-reducing behavior, such as laughing or kidding, can be useful, as long as meaningful conflict is not smoothed over prematurely.*
7. *Refrain from conflict-reducing techniques such as voting, averaging, trading, compromising, or giving in to keep the peace.*
8. *Monitor interactions among people as the group attempts to complete its work, and initiate discussions of what is really going on.*
9. *Do not assume that an answer is correct just because there is agreement initially. Discuss the reasons for the answer and explore all possibilities.*

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Appendix M

Observer Instructions the day of the study

(instructions placed in blue folder)

## DI Observer Instructions

Condition: Dialectical Inquiry (DI)

- Attached is an overview of the process for your reference.

Please follow the instructions in the order listed below:

- (1) Fill out the Dialectical Inquiry process checklist as the group/subgroups you are observing progress thru each stage in the process. Do **not** wait until the end to complete this checklist. Please complete the checklist before completing the conflict scale.
- (2) **Complete the conflict scales** once the group has completed the decision exercise (e.g., Adventure in the Amazon) and you have finished completing the checklist. The conflict scale will be the **last** item you will complete.
  - Reminder, **cognitive conflict** is constructive conflict (e.g., asking questions, challenging a position, etc) whereas **affective conflict** is destructive conflict (e.g., personal attacks, emotion based, etc).
- (3) Return as a group (you and the other two observers) to **Room 100** to turn in all of your completed forms to the DI group facilitator (David Robertson) who will be seated outside the room.
- (4) Once all completed paperwork is turned in you will be provided with your incentive gifts for your time and help with this study.

***THANK YOU FOR YOUR HELP WITH THIS STUDY!***

### **Overview of the Dialectical Inquiry (DI) Technique for the Observers:**

Dialectical Inquiry is a group decision-making strategy designed to provide group members with a structured path for reaching consensus. The technique (Schweiger, Sandberg, & Ragan, 1986) works as follows:

- First, the entire group (e.g., all 6 members) is assigned a problem to solve.
- Second, the group is subdivided into two equal subgroups of 3 people each (e.g., subgroup one and subgroup two).
- Third, subgroup one (independent of subgroup two) develops a **plan** to solve the problem. Once they have devised their plan, they present it to subgroup two.
- Fourth, subgroup two after hearing subgroup one's plan develops (independent of subgroup one) a rational **counter-plan**. Subgroup two then presents its counter-plan to subgroup one.
- Fifth, once the two groups have presented their plans to each other, then both subgroup 1 and 2 **debate** the merits of each plan **together**.
- The goal being to develop a modified **final plan**, which takes the best of both plans and any new ideas that surfaced during the discussion and merges them into a final plan. This type of an approach provides defined roles for each subgroup as well as it provides a step-by-step process, which the group can follow to reach consensus.

**DI Process Flow: Plan (subgroup one) - Counter plan (subgroup two) - Debate (both subgroup one and two) - Consensus**

## DA Observer Instructions

### **Condition: Devil's Advocacy (DA)**

- Attached is an overview of the process for your reference.

Please follow the instructions in the order listed below:

- (1) Fill out the **Devil's Advocacy (DA) process checklist as the group/subgroups you are observing progress thru each stage** in the process. Do **not** wait until the end to complete this checklist. Please complete the checklist **before** completing the conflict scale.
- (2) **Complete the conflict scales** once the group has completed the decision exercise (e.g., Adventure in the Amazon) and you have finished completing the checklist. The conflict scale will be the **last** item you will complete.
  - Reminder, **cognitive conflict** is constructive conflict (e.g., asking questions, challenging a position, etc) whereas **affective conflict** is destructive conflict (e.g., personal attacks, emotion based, etc).
- (3) Return as a group (you and the other two observers) to **Room 126** to turn in all of your completed forms to the DA group facilitator (Kathryn Robertson) who will be seated outside the room.
- (4) Once all completed paperwork is turned in you will be provided with your incentive gifts for your time and help with this study.

***THANK YOU FOR YOUR HELP WITH THIS STUDY!***

## **Overview of the Devil's Advocacy (DA) Technique for the observers:**

Devil's Advocacy is a group decision-making strategy designed to provide group members with a structured path for reaching consensus. The technique (Schweiger, Sandberg, & Ragan, 1986) works as follows:

- First, the entire group (e.g., all 6 members) is presented with a problem to solve.
- Second, the group is subdivided into two equal subgroups (e.g., subgroup one and subgroup two).
- Third, subgroup one (independent of subgroup two) develops a plan to solve the problem.
- Fourth, once subgroup one develops its plan, then they present their plan to subgroup two.
- Fifth, subgroup two offers an objective critique of subgroup one's plan. Subgroup two is to only point out flaws, as they see them, in subgroup one's plan. They are **not** to provide a counterproposal (e.g., they are **not** to provide a listing of the answers).
- Sixth, subgroup one then meets (independent of subgroup two) to discuss and record any revisions they feel are needed to their original plan as a result of subgroup two's critique.
- Seventh, subgroup one again meets with subgroup two to go over any changes they have made as a result of the critique. At this point, the group may be able to reach consensus on the final plan or subgroup two may offer another critique, thus subgroup one would meet again to discuss possible revisions to their plan. This process can continue through several critiques and revisions until a final plan is achieved, which everyone can support.

**DA Process Flow: Plan (subgroup one) - \*Critique (subgroup two/ \* there may be more than one critique) - \*Revised Plan/Resubmit (subgroup one / \* there may be multiple revisions and presentations by subgroup one to subgroup two) - Consensus**

## UCS Observer Instructions

### **Condition: Unstructured Consensus Seeking (UCS)**

Please follow the instructions in the order listed below:

- (1) **Complete the conflict scales** once the group you are observing has completed the decision exercise (e.g., Adventure in the Amazon).
  - Reminder, there is **no specific decision technique** you need to observe in this group. Thus, you will **not** be completing any type of decision process checklist (e.g., like those for the DI and DA techniques). You will only need to complete the conflict scale once the group you are observing is finished with the task.
  - Reminder, **cognitive conflict** is constructive conflict (e.g., asking questions, challenging a position, etc) whereas **affective conflict** is destructive conflict (e.g., personal attacks, emotion based, etc).
- (2) Return as a group (you and the other two observers) to **Room 236** to turn in all of your completed forms to the UCS group facilitator (Scott Williams) who will be seated outside the room.
- (3) Once all completed paperwork is turned in you will be provided with your incentive gifts for your time and help with this study.

***THANK YOU FOR YOUR HELP WITH THIS STUDY!***

## Appendix N

Treatment Condition Facilitator Instructions the day of the study

## Unstructured Consensus Seeking Facilitator Directions

Room: 236

The study is to begin at 1:00 PM. Saturday, February 23<sup>rd</sup>. Allow until 1:10 PM for late arrivals, then get started.

\* Note, there will be pens in a cup for those who forget to bring one.

Please follow exactly the steps as outlined below:

1. Check people off by name as they enter your room. You will have a master list that provides their name and assigned group number (e.g., Group 1, 2, 3 or 4). Give them a consent form to READ and SIGN as they ENTER the room (if they have not already signed up).
2. Chairs will be arranged accordingly by group.
3. Once everyone is seated, look to see how many people are missing. Once you know how many people are missing, walk down to room 244 and tell Tom Robertson, Jr. how many people you need. He will then randomly select the people you need. Then escort them back to your room.
4. Write down on separate slips of paper the positions you need alternates for (e.g., group 1, group 2, group 3, group 4) and place them in a cup. When the alternates arrive, have them pull one slip of paper from the cup. This will provide them with the group they are to be in for this study.
5. On your master sheet of people record the names of all alternates used and what group they were assigned to (e.g., Group 1, 2, 3, or 4).
6. Cross out the name of the missing person on the folder and write in the alternates name on the folder.
7. Also, there will be 3 observers sitting outside your classroom. Make sure they are all present. They are not to be invited in your room until you have dismissed everyone to their proper rooms.
8. Introduce yourself and thank them for coming to the study. Once you have all the people you need, which is 24 (4 groups of 6 people) ask everyone if they have signed-up online for this study. If for some reason someone has not, you will need to provide him or her with a Data Information Sheet, which you will need to collect once they complete the form.

9. Ask everyone if they brought their signed consent form. Collect them. For those who forgot, provide them with a consent form and have them sign it. 10. 10. Everyone must sign this form and you must collect them ALL before you can begin. You only need to collect the back page where they sign it.

10. There will be a “pink” slip of paper on each desk, ask everyone to print their name on it and have them pass them forward. You will need to collect them and place in an empty cup, which will be provided. These nametags will be used for the grand drawing.

11. Once this is all done you will proceed to the facilitation stage of the study.

Thank everyone for coming and their time on this day!

FACILITATION STAGE (tell them they can follow along on their instructions sheet located in their folder):

1. Tell them that they will be solving a problem in their assigned group.
2. Make sure everyone is clear at this point on what group (e.g., Group 1, 2, 3, or 4) he or she is in.
3. Tell them that they will be solving a problem in their group of 6 by using consensus (but provide them with no guidelines or instructions on how to reach consensus).
4. Everyone will have a folder. Ask them at this point to open it up.
5. Read the “Adventure in the Amazon” problem ask them to read along.
6. Explain that in order to solve the problem they (as a group of 6) are to rank order the items from 1 being the most important to their survival and 15 being the least important.
7. Explain to them that they are to report to their assigned rooms to complete this task. Tell them they cannot discuss the problem with anyone else as they walk to their assigned room. At this point tell them their room assignments:
  - Group 1 = Room 236 (the room you are in)
  - Group 2 = Room 301 (next floor up)
  - Group 3 = Room 342A (next floor up)
  - Group 4 = Room 230
8. Tell them that there will be 3 observers in these rooms who are there to observe the process. Explain to them that the observers cannot provide any form of assistance or answer any questions.

9. Tell them that once they develop a final plan (e.g., ordering of the answers) to record it on the final answer sheet in the RED folder. There will only be one RED folder per group of six. Explain to them that they record their final answer only on the left hand side of the answer sheet. They are NOT to record anything in the spaces on the right hand side of the page. Give the red folder to one person in each group.

10. Tell them that once the decision task is completed, that they have to (each individual person) complete a short 6-item questionnaire which is located in their folder. Tell them how to record their answers (e.g., 1 = strongly disagree, 7= strongly agree)

11. Instruct them that once everything is done and everyone has completed the questionnaire then they are to return to room 236 to return all paperwork. Ask them to return as a Group of 6. You will be sitting outside the room and will collect all paperwork. Explain to them that everything has to be returned. At this point, you will be given a ticket to pickup your incentives.

12. Tell them that there are refreshments in their room. Dismiss students by group number and ask them not to discuss the problem until they reach their assigned location.

Once you have dismissed everyone, invite the 3 observers who have been waiting outside the room to come inside the room.

13. Walk to each room to make sure the groups got to their assigned rooms & that there are 9 people total in each room (3 observers, 6 subjects).

14. Return and wait outside room 236 until all your groups and observers have returned.

15. Once everything is turned in and you have checked off (using the checklist) all necessary paperwork, then provide each person with a ticket to be taken to the merchandise table where they can collect their sweatshirt and cap for their time and help.

## Devil's Advocacy – DA Facilitator Instructions

Room: 126

The study is to begin at 1:00 PM. Saturday, February 23<sup>rd</sup>. Allow until 1:10PM for late arrivals, then get started.

\* Note, there will be pens in a cup for those who forget to bring one.

Please follow exactly the steps as outlined below:

1. Check people off by name as they enter your room. You will have a master list that provides their name and assigned group number (e.g., Group 1, 2, 3 or 4). Give them a consent form to read and sign if they have not already done so.
2. Rows of desks will be arranged by group (e.g., Row 1 = Group 1, Row 2 = Group 2, Row 3= Group 3 and Row 4 = Group 4).
3. Once everyone is seated, look to see how many people are missing. Once you know how many people are missing, Radio to room 244 and tell Tom Robertson, Jr. how many people you need. He will then randomly select the people you need and send them to you.
4. Write down on separate slips of paper the positions you need alternates for (e.g., group 1, group 2, group 3, group 4) and place them in a cup. When the alternates arrive, have them pull one slip of paper from the cup. This will provide them with the group they are to be in for this study.
5. On your master sheet of people record the names of all alternates used and what group they were assigned to (e.g., Group 1, 2, 3, or 4).
6. Cross out the name of the missing person on the folder and write in the alternates name on the folder.
7. Also, there will be 3 observers sitting outside your classroom. Make sure they are all present. They are not to be invited in your room until you have dismissed everyone to their proper rooms.
8. Introduce yourself and thank them for coming. Once you have all the people you need, which is 24 (4 groups of 6 people) ask everyone if they had signed-up online for this study. If for some reason someone has not, you will need to provide him or her with a Data Information Sheet, which you will need to collect once they complete.
9. Ask everyone if they brought their signed consent form. Collect them. For those who forgot, provide them with a consent form and have them sign it. Everyone must sign this form and you must collect them all before you can begin. You only have to collect the back page of the consent form.

10. There will be a “pink” slip of paper on each desk, ask everyone to print their name on it and have them pass them forward. You will need to collect them and place in an empty cup, which will be provided. The nametags will be used for the grand drawing, which will take place later.

11. Once this is all done you will proceed to the facilitation stage of the study.  
DA Continued.

#### FACILITATION STAGE:

- 1 Tell them that they will be solving a problem in their assigned group.
2. Make sure everyone is clear on what GROUP and SUB-GROUP they are in. The first 3 people in each row will be SUB-GROUP 1 and the next 3 SUB-GROUP 2.
3. Tell them that they are to solve this problem using the DA method. Express to them that this method is designed to provide a step-by-step process for a group to reach consensus.
4. Everyone open up folders at this point.
5. Provide a short explanation of the nature of the problem (Adventure in the Amazon). It is a hypothetical scenario where a group of people have crashed in the Amazon. There are 15 items that your group has to select which aid in their survival. To solve the problem your group will rank order the items from 1 being the most important to your survival and 15 being the least important.
6. Go over the TRAINING on how the DA method works. Refer to attached “Technique” page and specific “Instruction” sheet. During this time you (Kathryn) will go over each item (e.g., subgroup 1 answer sheet, rationale sheet, etc) in the participants folders.
7. Ask if anyone has questions.
8. Read the “Adventure in the Amazon” problem and ask them to follow along.
9. Read to them the guidelines for reaching consensus, they are simply helpful guidelines/hints. Tell them they MUST use the DA process just discussed.
10. Tell them their room assignments:
  - Group 1 = Room 126 (the room you are in)
  - Group 2 = Room 364
  - Group 3 = Room 300
  - Group 4 = Room 332

11. Provide the first person in each row with the RED folder containing the final answer sheet.
12. Dismiss groups by row and ask them not to discuss the problem until they reach their assigned location. Tell them about refreshments and thank them for coming.
13. Once you have dismissed everyone, invite the 3 observers who have been waiting outside to come in the room.
14. Go to each room and make sure there are 9 people total per room (3 observers and 6 subjects).
15. Once you have done the room / group verification, you are to remain outside room 126 for your groups to return.
16. Once everything is turned in and you have checked off (using the checklist) receiving all necessary paperwork, then provide each person with a ticket to be taken to the merchandise table where they can collect their sweatshirt and cap for their time and help.

## **Dialectical Inquiry – DI Facilitator Instructions**

Room: 100

The study is to begin at 1:00 PM. Saturday, February 23<sup>rd</sup>. Allow until 1:10PM for late arrivals, then get started.

\* Note, there will be pens in a cup for those who forget to bring one.

Please follow exactly the steps as outlined below:

1. Check people off by name as they enter your room. You will have a master list that provides their name and assigned group number (e.g., Group 1, 2, 3 or 4). Give them a consent form to read and sign if they have not already done so.
2. Rows of desks will be arranged by group (e.g., Row 1 = Group 1, Row 2 = Group 2, Row 3= Group 3 and Row 4 = Group 4).
3. Once everyone is seated, look to see how many people are missing. Once you know how many people are missing, Radio to room 244 and tell Tom Robertson, Jr. how many people you need. He will then randomly select the people you need and send them to you.
4. Also, there will be 3 observers sitting outside your classroom. Make sure they are all present. They are not to be invited in your room until you have dismissed everyone to their proper rooms.
5. Write down on separate slips of paper the positions you need alternates for (e.g., group 1, group 2, group 3, group 4) and place them in a cup. When the alternates arrive, have them pull one slip of paper from the cup. This will provide them with the group they are to be in for this study.
6. On your master sheet of people, record the names of all alternates used and what group they were assigned to (e.g., Group 1, 2, 3, or 4).
7. Cross out the name of the missing person on the folder and write in the alternates name on the folder.
8. Once you have all the people you need, which is 24 (4 groups of 6 people) ask everyone if they had signed-up online for this study. If for some reason someone has not, you will need to provide him or her with a Data Information Sheet, which you will need to collect once they complete.

9. Ask everyone if they brought their signed consent form. Collect them. For those who forgot, provide them with a consent form and have them sign it. Everyone must sign this form and you must collect them all before you can begin.
10. There will be a “pink” slip of paper on each desk, ask everyone to print their name and pass them forward. You will need to collect them and place in an empty cup, which will be provided. The nametags will be used for the grand drawing, which will take place later.
11. Once this is all done you will proceed to the facilitation stage of the study.
12. Thank everyone for coming and their time on this day!

(DI group continued)

FACILITATION STAGE:

1. Tell them that they will be solving a problem in their assigned group.
2. Make sure everyone is clear on what GROUP and SUB-GROUP they are in. The first three people in each row will be SUB-GROUP 1 and the next 3 SUB-GROUP 2.
3. Tell them that they are to solve this problem using the DI method. Express to them that this method is designed to provide a step-by-step process for a group to reach consensus.
4. Everyone open folders at this point.
5. Provide a short overview of the Adventure in the Amazon Problem and how the rank ordering works.
6. Go over the training of the DI approach. Refer to “Technique & “Instructions” pages. During this time go over each item of paper in the folders. Use a group as an example.
7. Ask if there are any questions.
8. Read the Adventure in the Amazon scenario and ask them to follow along.
9. Read to them the helpful guidelines for consensus.
10. Explain to them that they are to report to their assigned rooms to complete this task. At this point tell them their room assignments:
  - Group 1 = Room 100 (the room you are in)
  - Group 2 = Room 244
  - Group 3 = Room 336
  - Group 4 = Room 234
11. Provide the RED folder to the first person in each group.
12. Dismiss everyone by group and ask them not to discuss this problem with anyone until they get to their rooms.
13. Go to each room to make sure everyone is present (9 total people).
14. Once everything is turned in and you have checked off (using the checklist) receiving all necessary paperwork, then provide each person with a ticket to be taken to the merchandise table where they can collect their sweatshirt and cap for their time and help.

## Appendix O

### Treatment Facilitator Returned Material Checklists

## Facilitator's Checklist

Type: Devil's Advocacy (DA) & Dialectical Inquiry (DI)

**Please check-off all returned forms:**

Signed Consent Form:

All participant signed consent forms returned:

- 24 returned

Observers' Observation Lists:

\* There will be two forms returned: (1) Check-off List and (2) Cognitive and Affective Conflict Scales

Group One: **3 check-off lists and 3 conflict scales returned**

Group Two: **3 check-off lists and 3 conflict scales returned**

Group Three: **3 check-off lists and 3 conflict scales returned**

Group Four: **3 check-off lists and 3 conflict scales returned**

Decision Task Group Problem Final Answer Form:

Group One:

Group Two:

Group Three:

Group Four:

DA & DI continued.

Individual Decision Commitment Form:

**Note, there will be a total of 24 of these forms returned.**

Group 1 – 6 forms returned, one for each person

Group 2 – 6 forms returned, one for each person

Group 3 – 6 forms returned, one for each person

Group 4 – 6 forms returned, one for each person

## Facilitator's Checklist

Type: UCS

### **Please check-off all returned forms:**

#### Signed Consent Form:

All participant signed consent forms returned:

- 24 returned

#### Observers' Observation Lists:

\* There will be one form returned: Cognitive and Affective Conflict Scales

Group One:                   **3 conflict scales returned**

Group Two:                   **3 conflict scales returned**

Group Three:               **3 conflict scales returned**

Group Four:               **3 conflict scales returned**

#### Decision Task Group Problem Final Answer Form:

Group One:

Group Two:

Group Three:

Group Four:

## Individual Decision Commitment Form:

**Note, there will be a total of 24 of these forms returned one for each person.**

Group 1 – 6 forms returned, one for each person

Group 2 – 6 forms returned, one for each person

Group 3 – 6 forms returned, one for each person

Group 4 – 6 forms returned, one for each person

Appendix P

Adventure in the Amazon, Ukens (1998)

Letter of Permission from John Wiley & Sons, Inc.

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WILEY

PERMISSIONS DEPARTMENT  
605 Third Avenue  
New York, NY 10158-0012  
TEL 212.850.6811  
FAX 212.850.6008

February 4, 2002

David Robertson  
5109 Buckskin Lane  
Salem, VA 24153  
VIA FACSIMILE: 540-389-7978

Dear Mr. Robertson:

RE: Your January 23, 2002 request for permission to republish selected portions of text from Ukens/ ADVENTURE IN THE AMAZON, [ISBN: 0787939803]. This material will appear in your forthcoming dissertation, to be published by Virginia Tech in 2002.

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Sincerely,

Emily Pesa  
Permissions Assistant  
John Wiley & Sons, Inc.

Tel: (212) 850-8765  
Fax: (212) 850-6008  
E-mail: [cpesa@wiley.com](mailto:cpesa@wiley.com)

## Appendix Q

### Decision Commitment Instrument Permission

## Permission for Commitment Scale

Subj: Re: Request for permission to use an instrument on decision commitment  
Date: 7/16/01 10:23:19 AM Eastern Daylight Time  
From: rdooley@okstate.edu (Robert S Dooley/mgmt/cba/Okstate)  
To: DWRKBR@aol.com

David,

Thank you for your interest in our study. You are more than welcome to use the instrument. It is provided on page 396, Table 1 of the paper published in Academy of Management Journal. The scale was a 7 point Likert type scale anchored from "strongly disagree" to "strongly agree".

Good luck with your research.

Robert Dooley  
Associate Professor  
Dept. of Management  
Oklahoma State University

DWRKBR@aol.com  
07/14/2001 03:03 PM

To: rdooley@okstate.edu  
cc: (bcc: Robert S Dooley/mgmt/cba/Okstate)  
Subject: Request for permission to use an instrument on decision commitment

Dear Dr. Dooley:

Hello. I would like to take this opportunity to introduce myself and the reason for this email. My name is David Robertson and I am a Ph.D. candidate in Training and Development at Virginia Tech. The reason I am writing to you is to request your permission to use an instrument on decision commitment that you and your colleague, Dr. Gerald E. Fryxell, modified from Mowday, Steers and Porter's (1979) organizational commitment questionnaire. I came

across you and your colleagues article entitled "Attaining Decision Quality and Commitment From Dissent: The Moderating Effects of Loyalty and Competence in Strategic Decision-Making Teams" published in the Academy of Management

Journal where I learned about your instrument.

I am seeking to conduct an experimental study for my dissertation which compares several cognitive conflict enhancing decision-making strategies (e.g., DI, DA) and their effects on (a) decision quality, (b) conflict levels, (c) member participation and (d) decision commitment.

Would it be possible to use your instrument in my study? If so, could you please direct me to where I might obtain a copy of the one you and Dr. Fryxell developed?

I appreciate your time and consideration regarding this request. I will look forward to your reply when you have the chance. If you have any questions for me, please do not hesitate to contact me at:

Phone:

(h) 540-380-4551 (after 6:30 PM EST M-Fri, anytime over the weekend)

(w) 800-678-0014, ext. 136 (7:30 AM - 6:00 PM EST M-Fri)

E-mail:

(home) DWRKBR@aol.com

(work) drobertson@robertsonmarketing.com

(school) darober4@vt.edu

Sincerely,  
David Robertson  
5109 Buckskin Lane  
Salem, VA 24153

Appendix R  
Conflict Scale Permission

## Permission for Conflict Scales

Subj: RE: Permission to use an instrument  
Date: 4/8/00 1:02:40 PM Eastern Daylight Time  
From: jehnk@wharton.upenn.edu (Jehn)  
To: DWRKBR@aol.com ('DWRKBR@aol.com')

absolutely, that is fine. the items are published in the article your mention as well as a revised version in jehn, 1995, ASQ. i am working on a longer version that includes the dimensions in jehn, 1997, ASQ if you would like to see that version, as well.

dr jehn

\*\*-----Original Message-----

\*\*From: DWRKBR@aol.com [mailto:DWRKBR@aol.com]

\*\*Sent: Saturday, April 08, 2000 12:22 PM

\*\*To: jehn@wharton.upenn.edu

\*\*Subject: Permission to use an instrument

\*\*

\*\*

\*\*Dear Dr. Jehn:

\*\*

\*\*Hello.

\*\*

\*\*I would like to take this opportunity to briefly introduce

\*\*myself and my

\*\*desire to use one of your instruments in a study.

\*\*

\*\*My name is David Robertson and I am a doctoral student in

\*\*training and

\*\*development at VA TECH currently working on my dissertation

\*\*prospectus. The

\*\*study I am proposing to my committee compares three groups

\*\*decision making

\*\*strategies: (1) Dialectical Inquiry, (2) Devil's Advocacy and

\*\* (3) Consensus

\*\*Seeking. In this proposed study, I will measure group

\*\*conflict levels, both

\*\*cognitive and affective, decision quality and decision acceptance.

\*\*

\*\*I am writing to you to ask for permission to use an

\*\*instrument you used in

\*\*your 1994 study published in The International Journal of

\*\*Conflict Management

\*\*"Enhancing Effectiveness: An Investigation of Advantages and

\*\*Disadvantages of  
\*\*Value-Based Intragroup Conflict". This instrument was also  
\*\*used by Allen  
\*\*Amason in a study entitled "Distinguishing the Effects of  
\*\*Functional and  
\*\*Dysfunctional Conflict on Strategic Decision Making:  
\*\*Resolving a paradox of  
\*\*Top Management Teams "(1996).  
\*\*  
\*\*This instrument, since it is designed to measure both  
\*\*affective and cognitive  
\*\*conflict levels, would be a great fit for my proposed study.  
\*\*  
\*\*Please let me know if it would be possible to use this  
\*\*instrument for my  
\*\*study. Certainly, all credit to you for this instrument would  
\*\*be sighted in  
\*\*my work. I will be happy to discuss this proposed study with  
\*\*you when it is  
\*\*convenient with your schedule.  
\*\*  
\*\*Thank you for your time and consideration. I will look  
\*\*forward to your  
\*\*response when you have the opportunity.  
\*\*  
\*\*Sincerely,  
\*\*David Robertson  
\*\*Home: 540-380-4551  
\*\*Office: 800-678-0014, ext. 136  
\*\*Work E-mail: drobertson@robertsonmarketing.com  
\*\*Home E-mail: [DWRKBR@aol.com](mailto:DWRKBR@aol.com)

## VITA

David W. Robertson was born on December 09, 1966. He lives with his wife, Kathryn Robertson in Virginia. He attended Roanoke College, where he received a Bachelor of Arts Degree in Criminal Justice in 1989. He graduated in 1996 with a Master of Arts Degree in Liberal Studies with a concentration in Social Science from Hollins College. In the fall of 1997, David began his doctoral work at Virginia Tech in Career and Technical Education. His area of specialization is in industrial training and development with a cognate emphasis in business management. While working on his Ph.D., David worked in his family business, Robertson Marketing Group, with his two older brothers. He has applied the training and development techniques learned in school to his own business, which employees 90 people.