

THE UNIVERSITY OF CALGARY

A Comparison of Decision Quality and Process Satisfaction in  
Group Decision Making Utilizing Stepladder Technique,  
Devil's Advocacy Technique and Conventional Group Decision  
Making

by

John Snowdon Abbott

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 General ..... 0578

Ancient ..... 0579  
 Medieval ..... 0581  
 Modern ..... 0582  
 Black ..... 0328  
 African ..... 0331  
 Asia, Australia and Oceania ..... 0332  
 Canadian ..... 0334  
 European ..... 0335  
 Latin American ..... 0336  
 Middle Eastern ..... 0333  
 United States ..... 0337  
 History of Science ..... 0585  
 Law ..... 0398  
 Political Science  
 General ..... 0615  
 International Law and  
 Relations ..... 0616  
 Public Administration ..... 0617  
 Recreation ..... 0814  
 Social Work ..... 0452  
 Sociology  
 General ..... 0626  
 Criminology and Penology ..... 0627  
 Demography ..... 0938  
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 Studies ..... 0628  
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 Plant Pathology ..... 0480  
 Plant Physiology ..... 0817  
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 General ..... 0306  
 Anatomy ..... 0287  
 Biostatistics ..... 0308  
 Botany ..... 0309  
 Cell ..... 0379  
 Ecology ..... 0329  
 Entomology ..... 0353  
 Genetics ..... 0369  
 Limnology ..... 0793  
 Microbiology ..... 0410  
 Molecular ..... 0307  
 Neuroscience ..... 0317  
 Oceanography ..... 0416  
 Physiology ..... 0433  
 Radiation ..... 0821  
 Veterinary Science ..... 0778  
 Zoology ..... 0472  
 Biophysics  
 General ..... 0786  
 Medical ..... 0760

Geodesy ..... 0370  
 Geology ..... 0372  
 Geophysics ..... 0373  
 Hydrology ..... 0388  
 Mineralogy ..... 0411  
 Paleobotany ..... 0345  
 Paleocology ..... 0426  
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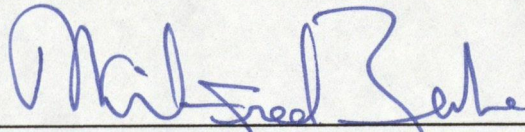
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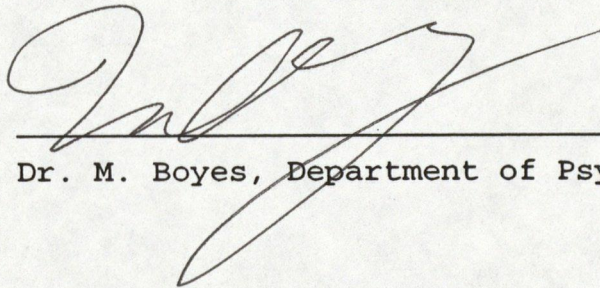
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## ABSTRACT

This study of 81 groups (324 post-secondary students), compares quality of group decision making and satisfaction with decision making processes utilizing the Stepladder, Devil's Advocacy, and Conventional group decision making techniques. Results failed to demonstrate relationships in either quality or satisfaction among the techniques. This study achieved similar results to the Rogelberg study (1992) in measurement of quality of decision making using the Stepladder technique but showed a much better result for groups using Conventional decision making. This possibly is as a result of participant familiarity with the Conventional procedure. With the exception of conflict which showed a significant difference between the Devil's Advocacy technique and the Conventional technique ( $p < .05$ ), the other process variables, participation and questioning showed no significant results. The personality variables of shyness and dominance were also measured. Shyness had a significant effect on questioning ( $p < .001$ ) and dominance had a significant effect on questioning ( $p < .05$ ) and conflict ( $p < .01$ ).

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## TABLE OF CONTENTS

|  |        |
|--|--------|
| Approval page.....                                       | ii     |
| Abstract.....  | iii    |
| Acknowledgements.....                                    | iv     |
| Table of Contents.....                                   | v      |
| List of Tables.....                                      | vii    |
| List of Figures.....                                     | viii   |
| <br>CHAPTER ONE: INTRODUCTION.....                       | <br>1  |
| <br>CHAPTER TWO: THE LITERATURE.....                     | <br>3  |
| A. The Quality of Group Decision Making.....             | 3      |
| B. The Process of Group Decision Making.....             | 4      |
| C. Improving Group Decision Making.....                  | 8      |
| i. Delphi Technique.....                                 | 9      |
| ii. Nominal Group Technique.....                         | 9      |
| iii. Conflict Introduction.....                          | 10     |
| a. Dialectical Inquiry Technique.....                    | 11     |
| b. Devil's Advocacy Technique.....                       | 12     |
| c. Stepladder Technique.....                             | 13     |
| vi. Group Decision Support Systems .....                 | 14     |
| <br>CHAPTER THREE: RESEARCH PROBLEMS AND HYPOTHESES..... | <br>15 |
| A. Differences in Quality.....                           | 15     |
| i. Stepladder vs Conventional.....                       | 15     |
| ii. Stepladder vs Devil's Advocacy.....                  | 18     |
| B. Differences in Satisfaction.....                      | 20     |
| i. Stepladder vs Conventional.....                       | 20     |
| ii. Stepladder vs Devil's Advocacy.....                  | 23     |
| <br>CHAPTER FOUR: METHOD.....                            | <br>26 |
| A. Participants and Experimental Design.....             | 26     |
| B. Procedure.....  | 26     |
| C. Stepladder Procedure.....                             | 28     |
| D. Conventional Procedure.....                           | 29     |
| E. Devil's Advocacy Procedure.....                       | 30     |
| F. Measures.....   | 33     |
| i. Outcome Measures.....                                 | 33     |
| ii. Process Measures.....                                | 33     |
| iii. Personality Measures.....                           | 34     |
| <br>CHAPTER FIVE: RESULTS.....                           | <br>35 |
| A. Descriptive Statistics.....                           | 35     |
| B. Group Level Results.....                              | 35     |
| C. Process Measure Results.....                          | 35     |
| D. Personality Measure Results.....                      | 37     |
| <br>CHAPTER SIX: DISCUSSION.....                         | <br>39 |
| A. Limitations.....                                      | 39     |
| B. Findings.....   | 39     |
| C. Improvements.....                                     | 41     |
| D. Future Directions.....                                | 42     |



|                                |    |
|--------------------------------|----|
| CHAPTER SEVEN: TABLES.....     | 43 |
| CHAPTER EIGHT: REFERENCES..... | 51 |
| CHAPTER NINE: APPENDICES.....  | 62 |

LIST OF TABLES

TABLE 1.0 Descriptive Statistics for.....43  
Group Level Measures

TABLE 1.1 Descriptive Statistics for.....43  
Individual Level Measures

TABLE 1.2 Group Means by Condition.....44

TABLE 2.0 Results of One-Way ANOVA for Group Quality...44

TABLE 2.1 Results of One-Way ANOVA for Indiv. Error....44

TABLE 2.2 Results of One-Way ANOVA for Domination.....45

TABLE 2.3 Results of One-Way ANOVA for Shyness.....45

TABLE 2.4 Results of One-Way ANOVA for Questioning ....45

TABLE 2.5 Results of One-Way ANOVA for Conflict.....45

TABLE 2.6 Results of One-Way ANOVA for Satisfaction....46

TABLE 2.7 Results of One-Way ANOVA for Participation...45

TABLE 3.0 Group Means by Shyness and Condition.....47

TABLE 3.1 Two-Way ANOVA on Participation.....47

TABLE 3.2 Two-Way ANOVA on Questioning.....48

TABLE 3.3 Two-Way ANOVA on Satisfaction.....48

TABLE 3.4 Two-Way ANOVA on Conflict.....48

TABLE 4.0 Group Means by Dominance and Condition.....49

TABLE 4.1 Two-Way ANOVA on Participation.....49

TABLE 4.2 Two-Way ANOVA on Questioning.....49

TABLE 4.3 Two-Way ANOVA on Satisfaction.....50

TABLE 4.4 Two-Way ANOVA on Conflict.....50

LIST OF FIGURES

|            |                                     |    |
|------------|-------------------------------------|----|
| Figure 1.0 | The Stepladder Technique.....       | 29 |
| Figure 1.1 | The Conventional Technique.....     | 30 |
| Figure 1.2 | The Devil's Advocacy Technique..... | 32 |

## CHAPTER ONE: INTRODUCTION

The subject of Group Decision Making is an important one in business because, for a number of reasons, many decisions are made in groups (Robbins, 1992).

In some cases the diversity of information required to make informed decisions is so great that a single individual usually does not possess the information. In other cases groups are used in decision making as an aid in the implementation process. In addition, we make decisions in groups because it increases the legitimacy of the decision - it is more in keeping with our North American democratic ideals (Robbins, 1992) and continues the tradition of department or special interest group representation. Overshadowing all of these reasons is the assumption that groups make better decisions because "many heads are better than one".

At the same time there are a number of issues, problems, or concerns in group decision making. Janis (1972) hypothesized that one of the greatest barriers to effective group decision making is Groupthink. Groupthink occurs when individuals become so concerned about maintaining group harmony or their personal acceptance in the group that they fail to critically evaluate the decisions of the group or explore other viable alternatives. Through a case analysis of historical fiascoes, Janis showed the impact of Groupthink on decision making groups. Yet a number of studies have been unable to empirically replicate these results (Turner, Probasco, Pratkanis, and Leve, 1992). These authors suggest a need for refinement in this theory, establishing better links between antecedents and consequences.

Probably one of the biggest drawbacks to group decision making has been the problem of accountability and risk taking in group decision making (Robbins, 1992; Neal et al.

1986). Social loafing (Latane, Williams, & Harkins, 1979) occurs when a person's group problem-solving efforts are less than individual efforts expended when working alone. The term reflects a reduced effort on a task, with the individual relying on others in the group to make a greater contribution than normal (Rogelberg et al. 1992). This is a well known phenomenon, particularly among students involved in group assignments. Making decisions in groups has been found to be time consuming (Robbins, 1992). It should come as no great surprise that the process of group interaction takes more time than making decisions on an individual basis.

There have been many approaches proposed to improve group decision making. A partial list includes the Nominal Group Technique, the Delphi Method, Devil's Advocacy, Dialectical Inquiry, Group Decision Support Systems and the Stepladder Technique.

This thesis will review the literature on group decision making from several theoretical and performance related perspectives. Further, a comparative investigation will be presented to ascertain the effectiveness of several methods of group decision making.

Businesses currently have a bewildering choice of techniques to employ in attempting to improve the decisions of groups. This thesis will attempt to determine which of Conventional group decision making, Devil's Advocacy technique or the Stepladder technique is superior in terms of decision quality and satisfaction with the decision making process. Reasons for differences among these techniques will be examined.

Since businesses make many decisions in groups, assisting managers in determining the best improvement methods to employ seems warranted.

## CHAPTER TWO: THE LITERATURE

### A. The Quality of Group Decisions

The fundamental assumption of most management and leadership theories originally was that group decision making would result in higher quality decisions than the decision of the most knowledgeable member of the group. The theory accepted that, in fact, a synergistic effect would be created (Likert, 1967; Maier, 1970; Vroom & Yetton, 1973). Based on these findings and anecdotal evidence popularized by Peters and Waterman (1983), the assumption of group superiority reached the status of accepted and conventional wisdom within the business community.

For the most part empirical evidence based on field and laboratory experiments contradicted this conventional wisdom. Hill (1982) looked at 140 related articles and found that group decision making was often inferior to the best individual in the group. Other authors either support Hill's position (Burleson, Levine & Somter, 1984; Libby, Trotman & Zimmer, 1987; Yetton & Bottger, 1982) or find no significant difference between the quality of decisions made by the best member and the group. Low quality in group decision making has been attributed to ineffective interaction processes (Michaelson, Black & Watson, 1989) and was labelled "process loss" by Steiner (1972).

In spite of the empirical evidence available, the logic and intuitive appeal of group superiority remained appealing and subject to more research. Lack of empirical support for groups making better decisions may have been due in part to the artificial nature of the groups, or the tasks or settings in which the research was conducted (Michaelson et al. 1989). Most studies have used ad hoc groups formed only for the duration of the research. Most tasks are contrived and unfamiliar to the subjects, and outcomes or reward systems seem to be lacking. In fact one needs to ask if the groups are really groups in the sense of business associates

working together on an ongoing basis, or simply strangers thrown together for the purpose of research.

Recent research (Watson, Sharp & Michaelsen, 1991; Michaelsen, Black & Watson, 1989; Sniezek & Henry, 1989) has re-energized the debate about the superiority of group decision making. Watson et al. (1991) found that when groups were familiar with the group decision making process (through 30 hours of involvement) and when salient rewards were clearly tied to performance, groups clearly and overwhelmingly outperformed the best member of the group. Michaelsen et al. (1989) used teams "engaged in solving contextually relevant and consequential problems", and found groups outperformed their most proficient group member 97% of the time. Sniezek & Henry (1989) found 30% of group judgements were more accurate than the most accurate member, and relate this to a high degree of disagreement in group discussion.

This recent literature appears to contradict earlier research findings by challenging the view that the quality of group decision making is limited by the results of the best member. In fact group decision making may produce better decisions than their best member when individuals are familiar with the group decision making process, when problems are relevant and when there is a salient reward system.

#### B. The Process of Group Decision Making

What exactly is group decision making and how do groups go about making decisions? There are a number of theories about how groups actually make decisions. At present there are three main schools of thought (Poole and Roth, 1988).

The first approach may best be described as the Unitary Phase School. This idea was first proposed by Bales and Strodtbeck (1951) and subsequently supported by a host of researchers (Landsberger, 1955; Heinecke and Bales, 1956 and

Morris, 1970). This school believes that there are a number of phases that groups progress through in the decision making process. The exact number of phases differs depending on the researcher, but all of these theories believe that group decision making takes place in a logical rational series of phases. The problem with this school of thought is that, from a purely experiential perspective, group decision making (as attested to by anyone who has ever worked on a committee) is not always logical or rational.

The second school of thought on group decision making is often referred to as the Non-Phasic Theories. This school argues that group decision making is more complex than the Unitary Phase model allows. These researchers would argue that phases really don't exist at all and that group decision making is best analyzed with continuous models (Poole, 1981; Main, 1966).

The final school described is Contingency Theory. Theorists of this school believe there may be more than one sequence of decision development. Group decision making is made up of both phases and disorganized periods (Poole, 1983; Poole and Doelger, 1986 and Hirokawa and Johnston, 1989). Of particular interest in this area is the work of Gersick (1988) who postulated that group process is "punctuated equilibrium", a series of alternating periods of inertia and quantum change. She proposes two phases divided in half by the length of time permitted for the activity.

Hirokawa and Johnston (1989) have proposed a detailed model of decision making. According to these researchers, group decision making is evolutionary (a process of social interaction and communication); non-linear (forward moving spirals), subject to interplay amongst interrelated variables, and subject to both internal and external constraints. There are two major factors that influence the decision making process in groups: internal factors (within the individuals that make up the group) and system factors



(that take place at the group level).

Internal factors that influence decision making consist of cognitive variables, psychological variables and communication variables.

Cognitive variables pertain to the thinking and processing that takes place within the mind of individuals, and can be organized into four general categories: structures, processes, heuristics and schemas (Hirokawa and Johnston, 1989). Structures consist of the relatively enduring networks of attitudes, beliefs, values and behavioral intentions with which new situations must be integrated. They are the knowledge base or rationale for particular decision preferences. Processes include the mental activities involved in the processing of information and include perception, evaluation categorization and storage. Heuristics are the conventions or short cuts that govern the processing of relevant information. Schemas represent the basic set of cognitive resources employed by the individual in dealing with the decision task and are the sum total of the individual's perception of the nature, demands and constraints of the decision situation.

Psychological variables are the personal motives, goals and traits of each individual. Motives reflect personal needs or desires, or the more or less consistent wants that individuals attempt to achieve through interaction with others. Some of these needs may be social acceptance, affiliation and self concept reinforcement. Goals represent situation-specific outcomes. These may grow directly out of the personal motives of the individuals.

Communication variables pertain to the communication skills of group members, the ability of individual members to "encode and decode" messages. Encoding refers to the ability to convey personal sentiments, and ideas through both verbal and non-verbal symbols and messages. Decoding refers to the individual's ability to perceive and process

incoming messages. These skills reflect the members' ability to create shared meanings (Hirokawa & Johnston, 1989).

System factors represent an additional important influence and consist of normative, social and communication variables.

Normative variables are the existing explicit or implicit rules that govern group decision making. They represent general guidelines that are socially accepted within the group context. Typical normative variables would include making decisions on the basis of majority rule, plurality or unanimity.

Social variables are variables such as authority, power and role definitions expected by the group. Social variables influence the outcomes by guiding the manner in which individuals interact with each other or bias the choice to be made by the decision makers.

Communication variables include the structure of the communication channels, the nature and frequency of messages and the nature, frequency and effectiveness of persuasive strategies.

All of these factors combine to influence the decisions that groups make. The Hirokawa and Johnston model (1989) represents group decision making as a complex social activity subject to multiple individual and system level influences. The early stages of group decision making are in reality individual processes in which each member of the group defines and relates to the assigned task in terms of their own cognitive schema. As group members start to interact and communicate with others in the group they must be concerned with group values and how their values compare to those of the group. They then establish decisional preferences based on their individual processes and the added information from the group interaction. Finally the members justify positions and persuade others to adopt these

positions. Group decisions emerge as a result of members taking into account individual best interests, communication and persuasive skills of each person, decision making rules adopted by the group, and social pressures imposed to avoid disrupting group cohesiveness (Hirokawa and Johnston, 1989).

Outlined in the next section, are some of the reasons that prevent groups from making high quality decisions and how they can be related to this theory of group decision making. The theory looks at a number of steps in the group decision making process, the tentative decisions that individuals make with limited information, the inclination and skill of individuals in sharing that decision with the group, the impact that the group has on the individual, and finally, the cognitive process that individuals go through in analyzing the new information presented by the group. The individual must also integrate the strength of personal preferences into the decision. For instance, in the first step, the individual heuristics and schemas guide each member in framing the problem and considering some possible solutions. Later in the life of the group the problems of groupthink, risktaking, conflict, questioning and participation emerge.

### C. Improving Group Decision Making

There are a number of methods that researchers have used in an attempt to improve group decision making. These include the Delphi Technique, Nominal Group Technique, and a variety of techniques designed to introduce conflict into the decision making process such as Devil's Advocacy, Dialectical Inquiry and the Stepladder Technique. Group Decision Support Systems (GDSS) presents a relatively recent addition to the scene.

### i. DELPHI TECHNIQUE

The Delphi technique is a forecasting method originally developed by the Rand Corporation in the 1960's. It attempts to utilize group decision making without bringing the group together (Reid, Pease and Taylor, 1990). The Delphi technique uses the inputs of experts, usually by mail, summarizes the results and feeds back these results to the experts for their consideration. This process usually goes through several iterations until a consensus evolves. The advantage of this technique is that the experts are unaffected by the usual social psychological factors of the group. The Delphi technique avoids the unwillingness of experts to abandon publicly expressed opinions, and the bandwagon effect of majority opinion (Helmer & Rescher, 1959). Subordinates can also express their opinions without fear of retribution. There is specific, purposeful interaction among experts on the same problem and the material advantages include avoiding the costs of having to gather the experts together (Helmer, 1966). Finally this technique is relatively easy to implement and requires no special training.

There are some problems with Delphi. Weaver(1971) points out that forecasting without any explanatory quality may be trivial. Consensus alone is not sufficient to be plausible. Finally, the degree of interaction and the opportunity to create synergy is probably minimal. Nevertheless Delphi technique may prove useful in the areas of information sharing, goal setting, team building and conflict resolution (Reid et al. 1990)

### ii. THE NOMINAL GROUP TECHNIQUE

The Nominal Group technique was originally proposed by Van de Ven and Delbecq (1971). This technique proposes that experts independently analyze a problem and propose solutions. Then each solution is explained but not debated.

Finally each solution is independently rank ordered by each expert (Frankel, 1987). A best solution is then determined by combining these rankings. Bartunek & Murningham (1984) consider it to be one of the best structured techniques. However, its performance has not consistently shown its superiority to other methods (Frankel, 1987). There are a number of problems with this technique, but perhaps the most important is the fact that this method assumes the problem is known and well structured. This method also does not permit any synergy or building on others ideas.

### iii. CONFLICT INTRODUCTION

In the past, organization conflict theorists have taken the position that conflict is detrimental to the functioning of organizations and should be avoided or resolved (Brown, 1983; Pondy, 1967). More recently, researchers have adopted the opposite opinion that conflict may be beneficial in the decision making process (Janis, 1972; Wall et al., 1987; Cosier & Dalton, 1990; Cosier & Schwenk, 1990; Pondy, 1992; Jehn, 1993).

Does conflict enhance the group decision making process? The answer may depend on the type and the amount of conflict, and the situation. Based on recent research (Kabanoff, 1991; Jehn, 1993), a number of types of conflict have been identified. Jehn (1993) identified three types of conflict: emotional, content and administrative. Emotional conflict is interpersonal incompatibility or "personality conflict". Content conflict occurs when parties disagree over facts or the tasks being performed, and administrative conflict is controversy about the procedures of task accomplishment. Jehn (1993) determined that content conflict produced negative results for routine tasks, but positive results for non-routine tasks. Emotional and administrative conflict were negative regardless of the task. Jehn (1993) showed that in content conflict a

curvilinear relationship explained more variance but the difference was not significant. Other researchers have found a curvilinear relationship (Wall et al., 1987) with task conflict and quality. A large body of knowledge points to the fact that conflict can improve group decision making (Johnson & Tjosvold, 1983; Janis & Main, 1977; Mason & Mitroff, 1981; Schwenk, 1988; Cosier & Schwenk, 1990).

It is important to note that even when groups have better quality and greater quantity of information, they may still reach incorrect decisions (Janis, 1972; Stein & Tanter, 1980; Rossi, 1983; Gibson, 1984). This failure of groups to use available information to maximize decision making quality has been attributed to the interaction process that precedes decision making (Steiner, 1972; Janis, 1972; Hackman & Morris, 1977; Gouran, 1982, McGrath, 1985). It seems clear that to improve the group decision making process, we must improve the interactive process leading up to the group decision and not just the quality and quantity of information available to the group. Hirokawa (1987) has suggested that the interactive process needs to include presence of vigilance, second guessing and accurate information processing. This seems to lead in the direction of questioning assumptions, expressing opinions and constructively disagreeing with group members when needed. This process will be referred to as "constructive conflict". There are a number of methods that researchers have used to introduce constructive conflict namely Dialectical Inquiry, Devil's Advocacy, and the Stepladder Technique.

#### a. DIALECTICAL INQUIRY

Dialectical Inquiry introduces conflict through assumption checking and the construction of an alternative plan or decision in order to improve group decision making. Dialectical inquiry essentially has the following four steps (Mason, 1969):

1. An initial plan is identified by the main group.
2. All assumptions underlying the plan are identified by the alternative group.
3. A counter-plan is developed by the alternative group, one that is feasible, viable and credible but using assumptions opposite to those supporting the original plan.
4. A structured debate is conducted with arguments for the plan and counter plan being heard.

b. DEVIL'S ADVOCACY

This technique creates constructive conflict by identifying all underlying assumptions in a given plan and demonstrating how these assumptions could be false (Mason, 1969). Essentially the same process as outlined in Dialectical Inquiry is followed except that the step of presenting a viable counter-plan is not used.

A host of research has been conducted over the past two decades comparing the effectiveness of Devil's Advocacy and Dialectical Inquiry (Chanin & Shapiro, 1985; Cosier, 1978; Cosier & Aplin, 1980; Cosier & Rechner, 1985; Cosier, Ruble & Aplin, 1978; Lourenco & Glidewell, 1975; Mitroff, Barabba & Kilmann, 1977; Schweiger & Sandberg, 1989; Schweiger, Sandberg & Ragen, 1986; Schwenk, 1982, 1984; Schwenk & Cosier, 1980; Mason & Mitroff, 1981; and Emshoff & Finnel, 1978). A number of these researchers have shown Dialectical Inquiry to be superior to Devil's Advocacy (Mitroff et al., 1977; Mason & Mitroff, 1981; Emshoff & Finnel, 1978; Lourenco & Glidewell, 1975). However equally well respected researchers claim that Devil's Advocacy is superior to Dialectical Inquiry (Schwenk, 1984). Still others (Schweiger & Finger, 1984) claim no difference exists. The results of a recent meta-analysis of 16 studies (Schwenk, 1990) seem to support the position that there may be little difference between Devil's Advocacy and Dialectical Inquiry when it comes to improving the decisions of groups. Schwenk

(1990) suggests that it may be that the improvement in group decision making comes from assumption checking and the form of that activity may not be important.

Why such divergent results? There are a number of confounding variables in these studies. A partial list of problems includes; the level of analysis - individual or group, degree of structure imposed, and the nature of the participants examined - students or employees.

### c. THE STEPLADDER TECHNIQUE

This technique proposed by Rogelberg, Barnes-Farrel & Lowe, (1992) adds an interesting twist to the introduction of constructive conflict in group decision making. The Stepladder technique is intended to enhance group decision making by structuring the entry of group members into a core group. In a four member group, initially two group members, (the "core" of the group) work together on the problem. Next, a third member joins the core group and presents preliminary solutions for the same problem. Following an opportunity for discussion of these new ideas, another member joins the group and makes another presentation. All members then conduct a final discussion and arrive at a decision.

In their experiments using groups of students in a relatively structured problem solving situation, the Winter Survival Exercise, Rogelberg et al. (1992) found that the groups using the Stepladder Technique produced superior results to those groups using the Conventional group decision making technique. Groups using the Stepladder technique surpassed the quality of the best individual 56% of the time, compared to groups using the Conventional technique who surpassed their best member only 13% of the time. The advantages of Stepladder seem clear. In addition to introducing moderate amounts of content conflict, the technique also reduces "social loafing", encourages shy



members of the group to present their ideas, forces dominant members to consider other alternatives and reduces group pressure to conform (Rogelberg et al. 1992).

#### iv. GROUP DECISION SUPPORT SYSTEMS

Recent research in the computer area has suggested that Group Decision Support Systems (GDSS) may aid in some aspects of group decision making. GDSS is a generic term referring to individuals using computers in inputting suggestions in a group decision making situation. A recent meta-analysis by McLeod (1992) suggests that the use of GDSS has a number of positive effects. GDSS increases equality of participation and decreases domination by a few individuals. In terms of task focus, GDSS was shown to increase the depth of analysis, the task oriented communication and efforts to clarify the task (McLeod, 1992). The third major finding is inconclusive. Time taken to reach decision in laboratory tests showed groups taking longer than individuals, but in field studies showed groups taking less time than individuals to reach decisions. Reviews of literature by McLeod (1992) conclude that GDSS increases decision quality, time needed to reach decision, equality of participation and degree of task focus. GDSS was also found to decrease consensus and satisfaction. Keisler and Sproule (1992) noted the issue of "flaming" (the making of rude or offensive comments with little accountability) was a concern.

The remainder of this paper concentrates on three of these methods: the Conventional technique, Dialectical Inquiry, and the Stepladder technique.

## CHAPTER THREE: RESEARCH PROBLEM AND HYPOTHESES

I have organized my presentation as follows, first I present hypotheses related to decision quality and the difference between Stepladder and Conventional techniques. I then present hypotheses as to the reasons for this difference. Second, I present hypotheses related to the difference between Stepladder and Devil's Advocacy techniques and the reasons for this difference. Then, following the same structure, I present hypotheses related to satisfaction.

**A. Differences in Quality****i. Stepladder vs Conventional**

The first objective of this study will be to replicate the Rogelberg et al. (1992) findings: that groups using the Stepladder technique produce better quality decisions than groups using Conventional technique. On the basis of their findings, it is hypothesized that:

**H1a: The quality of decisions made in Stepladder groups will be higher than that made in Conventional groups.**

Support for this hypothesis will be found by comparing the mean decision quality of the groups using Stepladder technique against the quality of decisions made by the groups using the Conventional technique.

The second objective will be to identify those factors that contribute to the Stepladder technique producing better quality decisions than the Conventional Technique.

Rogelberg et al. (1992) propose several reasons for reduced effectiveness of group decision making which the Stepladder technique supposedly addresses. These are as follows: (1) some members may be shy and therefore not inclined to offer opinions, (2) some members tend to dominate "air-time" of the discussion and discourage others from contributing their

ideas, (3) the group may be subject to conformity and groupthink, and (4) social loafing may contribute to process loss.

Other researchers have offered additional explanations for reduced group effectiveness and quality of decisions made in groups. Hirokawa (1987) cites "lack of vigilance" and the reluctance of groups to revisit previously agreed upon answers as a contributor to group ineffectiveness. Lack of vigilance is a lack of questioning of a stated position. Janis (1972) indicated that directive leadership may predispose groups to one particular course of action in order to please the boss, and cites absence of a preferred solution as one way of improving group decision making.

While not addressed in their 1992 article, Rogelberg et al. (1992) speculate that pre-existing power differences among group members may reduce the effectiveness of groups. Members may feel less inclined to contribute novel or contradictory ideas if their boss or more senior members are present.

In the current study, four of these reasons will be examined in an effort to demonstrate that the Stepladder technique increases quality of group decisions because of its effect on: (1) participation, (2) shy members, (3) dominant members, (4) questioning.

Excluded from this study are the effects of leadership style (since groups will not have formal leaders), power differentials (since participants will not have any perceived power differences) and groupthink since groups will not have the required antecedent, high cohesiveness. Specifically, I propose the following hypotheses:

**H1a1: The participation of individuals in groups utilizing the Stepladder technique will be higher than in groups using Conventional technique.**

Support for this hypothesis will be found by the following

pattern of results:

In the Stepladder groups one would expect to find a significantly higher degree of participation than in the Conventional groups.

**H1a2: The effect of the Stepladder technique on participation will be greater for shy members than the effect of the Conventional technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of shy members then we would expect to see a significant interaction between decision making technique and shyness. That is, one would suppose that participation would increase more for more shy versus less shy members under the Stepladder technique than under the Conventional technique.

**H1a3: The effect of the Stepladder technique on participation will be greater for dominant members than the effect of the Conventional technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of dominant members then a significant interaction between decision making technique and dominance should be observed. That is, we would expect that participation would decrease more for more dominant versus less dominant members under the Stepladder technique than under the Conventional technique.

**H1a4: There will be more questioning of assumptions in groups utilizing the Stepladder technique than in groups using the Conventional technique.**

Support for this hypothesis will be found by the following

pattern of results:

If the Stepladder technique increases the questioning of assumptions, groups utilizing the Stepladder technique should have a significantly higher incidence of questioning than in groups using the Conventional technique.

ii. Stepladder vs Devil's Advocacy

The third objective in this study will extend the Rogelberg et al. (1992) study by comparing the effectiveness of the Stepladder technique in improving group decision making to the Devil's Advocacy technique. Therefore the following hypotheses will be considered.

**H1b: The quality of decisions made by groups utilizing the Stepladder technique will be higher than the quality of decisions made by groups using the Devil's Advocacy technique.**

Support for this hypothesis will be tested by comparing the mean scores of groups utilizing the Stepladder technique and groups using Devil's Advocacy.

The fourth objective will be to identify those factors that contribute to the Stepladder technique producing higher quality results than Devil's Advocacy.

While Devil's Advocacy may reduce the problems of Groupthink by introducing conflict into the decision making process, this technique could exacerbate other factors contributing to the reduced effectiveness of group decision making such as the willingness of some participants to voice their opinions. Members who are shy may not be encouraged to participate when confronted by planned conflict. Dominant members may be encouraged to monopolize airtime even more in a conflict situation. Those who tend towards social loafing may not be encouraged to exert more effort in a situation of planned conflict. In contrast, the Stepladder technique does address these issues. Stepladder technique

requires not only a presentation of perhaps new ideas but also a debate on the merits of the decision. Devil's Advocacy encourages debate and demands someone or a portion of the group try to poke holes in the proposed solution. I would therefore suggest the following hypotheses:

**H1b1: The participation of individuals in groups utilizing the Stepladder technique will be higher than in groups using the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

In the Stepladder groups one would expect to find a significantly higher degree of participation than in the Devil's Advocacy groups.

**H1b2: The effect of the Stepladder technique on participation will be greater for shy members than the effect of the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of shy members, then one would expect to see a significant interaction between decision making technique and shyness. That is, one would expect that participation would increase more for more shy versus less shy members under the Stepladder technique than under the Devil's Advocacy technique.

**H1b3: The effect of the Stepladder technique on participation will be greater for dominant members than the effect of the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of dominant members then we would expect to

see a significant interaction between decision making technique and dominance. That is, one would expect that participation would decrease more for more dominant versus less dominant members under the Stepladder technique than under the Devil's Advocacy technique.

**H1b4: There will be more questioning of assumptions in groups utilizing the Stepladder technique than in groups using the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique increases the questioning of assumptions one would expect to find groups utilizing the Stepladder technique to have a significantly higher incidence of questioning than in groups using the Devil's Advocacy technique.

## B. Differences in Satisfaction

### i. Stepladder vs Conventional

The fifth objective of this study will be to assess the effect that the type of group decision making process has on an individual's satisfaction with the process. The hypotheses will therefore be:

**H2a: The satisfaction with the decision making process in the Stepladder groups will be higher than that in the Conventional groups.**

Support for this hypothesis will be found by comparing the mean scores of the Satisfaction Scale of the groups using the Stepladder technique against the mean scores of the groups using the Conventional technique.

The sixth objective will be to identify those factors that contribute to the process in the Stepladder technique producing higher satisfaction than the process in the Conventional technique.

Satisfaction has been positively related to participation (Starke and Sexty, 1992). The Stepladder technique encourages participation and provides a mechanism for all individuals to be heard in the decision making process, especially those who typically are too shy to contribute, and does so with a minimum of conflict. The Stepladder technique will also reduce dominance of individual members by equalizing airtime and reduce the tendency of social loafing, all of which could add substantially to frustration, the reverse of satisfaction.

**H2a1: The average participation of individuals in groups utilizing the Stepladder technique will be higher than in groups using Conventional technique.**

Support for this hypothesis will be found by the following pattern of results:

In the Stepladder groups one would expect to find a significantly higher degree of participation than in the Conventional groups.

**H2a2: The effect of the Stepladder technique on participation will be greater for shy members than the effect of the Conventional technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of shy members then one would expect to see a significant interaction between decision making technique and shyness. That is, one would expect that participation would increase more for more shy versus less shy members under the Stepladder technique than under the Conventional technique.

**H2a3: The effect of the Stepladder technique on participation will be greater for dominant members than the**



**effect of the Conventional technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of dominant members then one would expect to see a significant interaction between decision making technique and dominance. That is, we would expect that participation would decrease more for more dominant versus less dominant members under the Stepladder technique than under the Conventional technique.

**H2a4: There will be less conflict experienced by groups utilizing the Stepladder technique than by groups using Conventional technique.**

Member satisfaction has been negatively related to conflict. Wall et al. (1987) and Nadler, Hackman & Lawler, (1979) have indicated the decision making process may alienate participants. Groups may perform their tasks but burn themselves out in the process, and be unwilling to work together in the future. Schweiger et al. (1986) suggests that decision making by consensus rather than by introducing conflict will produce high satisfaction for the participants.

Some types of conflict (task centred) at certain levels may be constructive, but other types (interpersonal) may be dysfunctional (Witteman, 1991). In his research Tjosvold (1991) found that content conflict increased stimulation and curiosity which lead to positive attitudes. Deutsch (1971) and Coser (1970) found that non-interpersonal conflict could intensify interpersonal relationships. Witteman (1991) found that satisfaction with decision activity and communications changed in a curvilinear fashion over time. Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique produces less conflict than

Conventional technique one would expect that the number of arguments and disagreements reported in the Stepladder groups would be less than in the Conventional technique.

ii. Stepladder vs Devil's Advocate

The seventh objective is to establish that the satisfaction with the Stepladder process is higher than with the Devil's Advocacy process of group decision making. A number of studies (Jehn, 1993; Witteman, 1991) have concluded that task-centred conflict is positively and curvilinearly related to satisfaction. That is, moderate amounts of conflict enhance satisfaction. The Stepladder technique allows for some conflict but less than the level of conflict in the Devil's Advocacy technique. The hypotheses will therefore be:

**H2b: Satisfaction with the decision making process in Stepladder groups will be higher than that in Devil's Advocacy groups.**

Support for this hypothesis will be found by comparing the average satisfaction of the groups using the Stepladder technique with the average satisfaction of the groups using the Devil's Advocacy technique.

The eighth objective will be to identify those factors that contribute to the Stepladder technique producing higher satisfaction than the Devil's Advocacy technique.

Satisfaction has been negatively related with conflict (Wall, et al. 1987) and Devil's Advocacy has significant elements of conflict inherent in the process. In addition, shy members will be substantially inhibited in any sort of planned conflict. Frustration with the process will continue because dominant members will still dominate and those who loaf will continue to loaf.

**H2b1: The participation of individuals in groups utilizing the Stepladder technique will on average be higher than in groups using Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

In the Stepladder groups one would expect to find a significantly higher degree of participation than in the Devil's Advocacy groups.

**H2b2: The effect of the Stepladder technique on average participation will be greater for shy members than the effect of the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of shy members then one would expect to see a significant interaction between decision making technique and shyness. That is, we would expect that participation would increase more for more shy versus less shy members under the Stepladder technique than under the Devil's Advocacy technique.

**H2b3: The effect of the Stepladder technique on average participation will be greater for dominant members than the effect of the Devil's Advocacy technique.**

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique has a greater effect on the participation of dominant members, then one would expect to see a significant interaction between decision making technique and dominance. That is, we would expect that participation would decrease more for more dominant versus less dominant members under the Stepladder technique than under the Devil's Advocacy technique.

H2b4: There will be less conflict experienced by groups utilizing the Stepladder technique than by groups using Devil's Advocacy technique.

Support for this hypothesis will be found by the following pattern of results:

If the Stepladder technique produces less conflict than the Devil's Advocacy technique one would expect that the average number of reported level of arguments and disagreements in Stepladder groups would be less than in the Devil's Advocacy groups.

## CHAPTER FOUR: METHOD

## A. Participants and Experimental Design

A total of 15 undergraduate classes at the University of Calgary and the Southern Alberta Institute of Technology were randomly assigned to one of three decision making conditions. In the Stepladder condition five classes constituted 25 groups (100 students). The five classes using the Devil's Advocacy technique were made up of 26 groups (104 students) and the five classes using the Conventional techniques were made up of 30 groups (120 students). A total of 324 individuals participated (152 males, 171 females and 1 respondent who failed to identify gender). Because students were randomly assigned to conditions on a class by class rather than group by group basis, it is possible that the groups within each condition differ systematically. To test this a one-way ANOVA on individual scores on the ranking task was undertaken. The results of this test showed no significant difference between conditions at the individual or group level. The means for the Conventional, Stepladder and Devil's Advocacy conditions were 44.7, 46.8 and 45.7 respectively.

Previous research (summarized in a meta-analysis by Schwenk, 1990), established that Devil's Advocacy is less influence by group composition (students vs managers) and task complexity than other techniques (Dialectical Inquiry). I have selected post secondary students as the subject group in this experiment, consistent with Rogelberg et. al (1992).

## B. Procedure

Before beginning all participants were read the Consent form (Appendix A), ask to sign it and then randomly assigned into groups of four. Participants were first asked to complete a questionnaire assessing personal characteristics and personality variables (Appendix B). They were then

asked to complete a ranking task, first individually, then as a member of a group following one of the preassigned group processes. During the ranking task each group's interaction was observed for compliance with instructions. Following the task each participant was asked to complete a second questionnaire assessing his perceptions of the process. Within each class students were randomly assigned into groups of four. The independent variable (group decision making technique) was established and then manipulated through written and verbal instructions to the participants.

A summary of procedural instructions (Appendix C-1, C-2, C-3) a copy of the Winter Survival Exercise (Johnson and Johnson, 1987) attached as Appendix D, and two copies of the Decision Form (Appendix E) were then given to each participant. Detailed procedural instructions were also read out to the participants (Appendices F-1, F-2 and F-3). The participants then completed the exercise on an individual basis.

The task utilized was the same as Rogelberg et al. (1992) used; Johnson and Johnson's Winter Survival Exercise. Rogelberg considered this exercise to be novel and moderately complex. Participants imagined they were the survivors of an airplane crash in a remote northern area during the winter time. They were asked to rank order 12 items remaining from the crash in terms of their importance to survival.

After completing the exercise on an individual and independent basis the participants transcribed their answers onto two copies of the Decision form, one copy to be given to the experimenter and one copy to be kept for the participants reference. Instructions then directed participants to complete the exercise as a group using one of the conditions and to come up with the one best solution that the experts had developed. To enhance motivation the

participants were informed that they would be told how their group answers compared with the experts' and their peers' solutions. After completion of the exercise the participant completed a Post Exercise Questionnaire (Appendix G) designed to reflect a self reported measure of: satisfaction, participation, questioning and conflict.

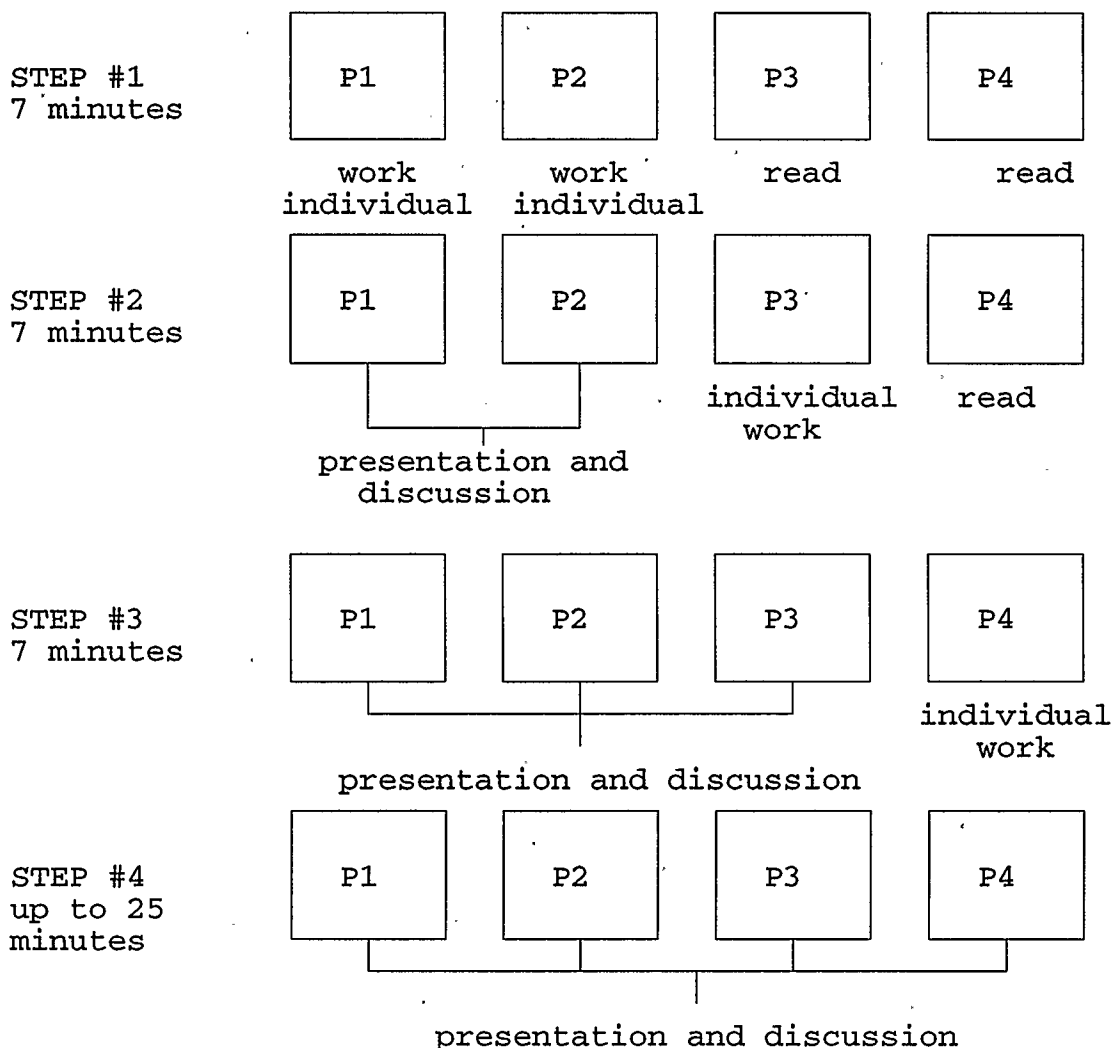
### C. Stepladder Group Procedure

In each group the participants were assigned the numbers 1 through 4. These numbers served as the order of entry for the participants. First participant 1 and 2 were given the experimental packet to complete individually while the other two group members read the newspaper in silence. After a period of 7 minutes (timing validated by Rogelberg et al. 1992), participant 3 was given the experimental packet to complete individually and participant 4 continued to read the paper. Meanwhile participant 1 and 2 were taken to a separate area to work on the problem together. After 7 minutes participant 4 was given the packet to work on independently and participant 3 joined participants 1 and 2. The three person group was reminded that participant 3 needed to present his individual solution first and that in another 7 minutes participant 4 would join them. Participant 4 then joined the three person group and presented his solutions. The group was then given a maximum of 25 minutes to create the one best solution. This procedure is replicated graphically in Figure 1.0.

Figure 1.0

## STEPLADDER TECHNIQUE

## STEP AND TIMING



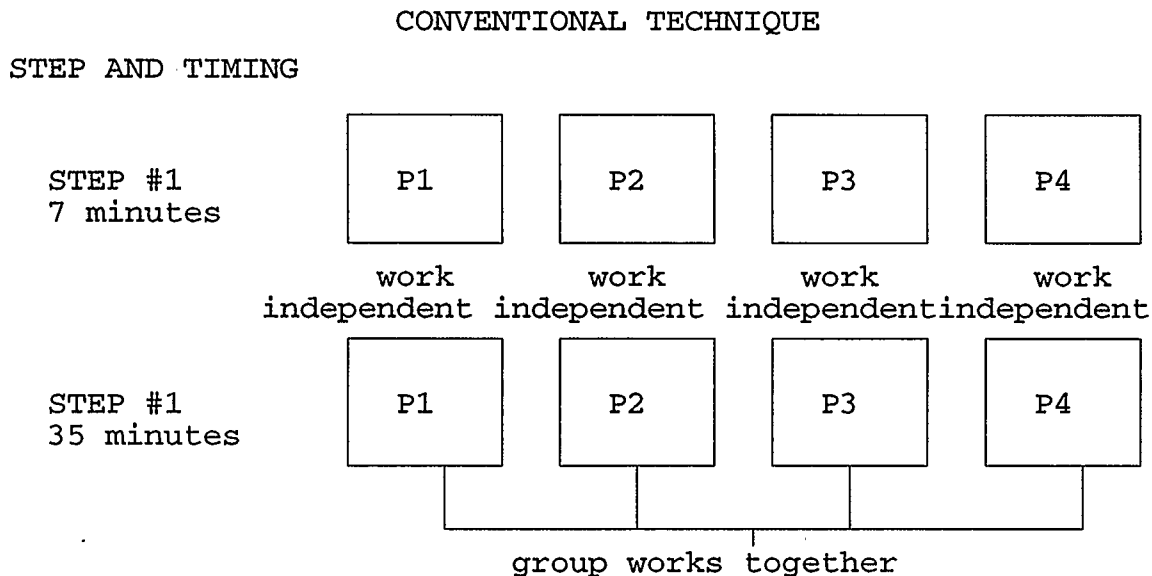
P# = Group participant with their respective participant number.

#### D. Conventional Group Procedure

After taking 7 minutes to individually complete the exercise participants were instructed that they were to work together to create the one best solution anyway they wanted. They were informed they had up to 35 minutes to generate alternatives resulting in a final decision. This procedure is replicated graphically in Figure 1.2.



Figure 1.1



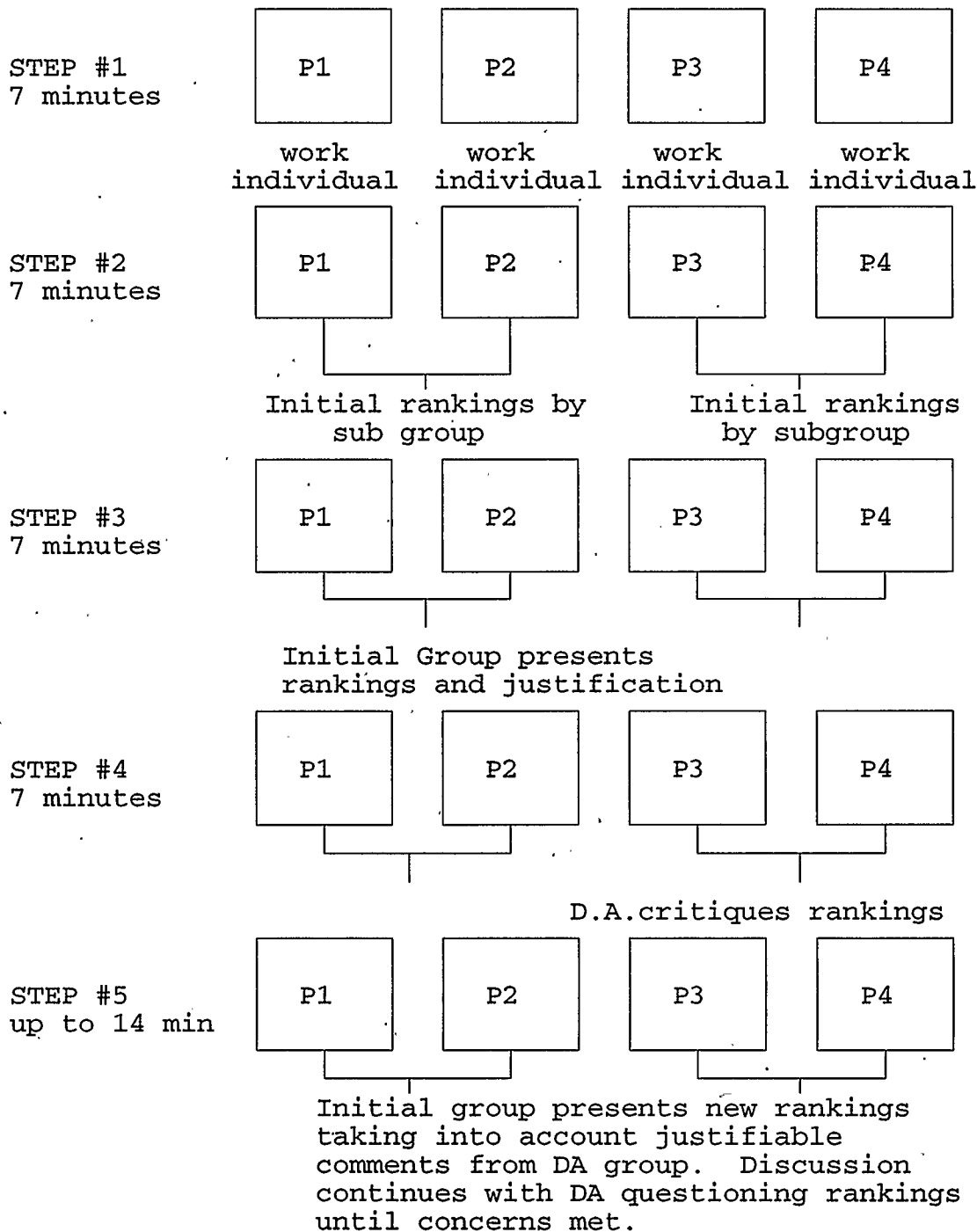
P# = Group participant with their respective participant number

#### E. Devil's Advocacy Procedure

First the participants completed the exercise individually. They had 7 minutes for this. They copied their answers on both copies of the Decision form. In each group the participants were assigned the numbers 1 through 4. The group of four was then broken into two subgroups with numbers 1 and 2 serving as the initial group and numbers 3 and 4 as the Devil's Advocacy group. The initial group then developed a ranking of the 12 items and built an argument for them, supported by all key assumptions, facts and data that underlie them. The subgroup recorded both the rankings and all key assumptions on the back of the Decision form for future reference. At the same time, the Devil's Advocate subgroup prepared for their critique by discussing the case and any critical assumptions, data etc. which they could identify (time 7 minutes). The first subgroup presented its recommendations and assumptions to the Devil's Advocate subgroup (time 7 minutes). The Devil's Advocate subgroup then subjected the initial groups rankings to a

critique pointing out the flaws in the rankings (time 7 minutes). The two groups then continued their debate with the initial group presenting ideas and the Devil's Advocate group pointing out any flaws in reasoning. Eventually the initial group satisfies the concerns of the Devil's Advocacy group and reaches agreement. This procedure is replicated graphically in Figure 1.2.

Figure 1.2 DEVIL'S ADVOCACY  
STEP AND TIMING



P# = Group participant with their respective participant number

## F. Measures

### i. Outcome measures

Quality of group decisions was assessed by measuring the sum of the absolute differences between the ranks assigned by the group for each item and the correct ranking determined by three wilderness experts (from Rogelberg et al. 1992). A low score (little absolute difference between expert's ranks and participants rank) indicated a highly effective decision.

Individual error was assessed in much the same manner as quality of group decisions except that this measure was taken on individual scores rather than group scores. Inspection of the distribution of this variable revealed it was significantly skewed, therefore the variable was transformed using a reverse square root transformation.

Satisfaction with the group decision making process was assessed by the administration of a Satisfaction scale at the end of the exercise. A high rating represents a high level of satisfaction. Satisfaction was measured by taking the mean of five semantic differential items (Appendix G, Questions 20A through 20E). Interitem reliability was .83. Inspection of the distribution of this variable revealed it was significantly skewed, therefore the variable was transformed using a reverse square root transformation.

### ii. Process measures

Each of the following process measures was assessed by constructing a scale based on the mean of a number of items. Each item was assessed using a five point response format from, "not at all" to "to a very great extent".

Participation was measured by taking the mean of eight items. Participants responded to such questions as: "To what extent does the final solution reflect your input?" (Appendix G, Questions 1-8). Interitem reliability was .77. Inspection of the distribution of this variable revealed it

was significantly skewed, therefore the variable was transformed using a reverse square root transformation.

Conflict was measured by taking the mean of five items. Conflict was measured by responses to such questions as, "I expressed negative feelings about someone's behaviour" (Appendix G, Questions 9-15). Interitem reliability was .75. Inspection of the distribution of this variable revealed it was significantly skewed, therefore the variable was transformed using a logarithm.

Questioning was measured by taking the mean responses to four items such as: "I felt free to ask others for clarification of their ideas" (Appendix G, Questions 16-19). Interitem reliability was .63. Because of the low reliability of this scale it will be interpreted with caution.

### iii. Personality measures

Shyness was measured using a subscale (Appendix B) of the Interpersonal Adjective Scales (Wiggins et al. 1988). The mean of eight items assessing shyness was used. Interitem reliability was .87.

Dominance was also measured on a subscale (Appendix B) of the Interpersonal Adjective Scales (Wiggins et al. 1988). The mean of eight items assessing dominance was used. Interitem reliability was .84.

## CHAPTER FIVE: RESULTS

## A. Descriptive Statistics

At the group level Table 1.0 indicates that across all 81 groups the mean quality of decision making changed significantly from 45.73 on an individual basis to 38.23 when groups were used ( $t_{80} = -8.47$ ,  $p < .001$ ).

As expected, dominance and shyness were significantly correlated ( $-.60$ ). Participation and satisfaction were significantly positively correlated ( $.29$ ) as were participation and questioning, (table 1.1 shows a correlation of  $-.51$ ; because scores on participation were reversed to correct skewness the sign is also reversed). Also as conflict increased satisfaction decreased (table 1.1 shows a correlation of  $.34$ , satisfaction was reversed and therefore the sign of the correlation should be reversed).

## B. Group Levels Results

Hypotheses 1a and 1b proposed that decision quality would be higher in the Stepladder technique than in either Conventional or Devil's Advocacy techniques. The appropriate test for this is a paired comparison following a one-way ANOVA. As shown in Table 2.0 the means for this variable were not significantly different. As shown in Table 1.2 the means for Stepladder, Devil's Advocacy and Conventional were 40.16, 38.39 and 36.5 the exact opposite of the results I had hypothesized. Based on this, a paired comparison was not undertaken.

## C. Process Measure Results

Hypotheses 1a1, 1b1, 2a1, and 2b1 proposed that participation of individuals would be higher in the Stepladder technique than in either the Conventional or Devil's Advocacy techniques. The appropriate test for this is a paired comparison following a one-way ANOVA. As shown

in Table 2.7 the means for this variable were not significantly different. As shown in Table 1.2 the means for the Stepladder, Devil's Advocacy and Conventional techniques were 1.43, 1.43 and 1.45. Based on this a paired comparison was not undertaken.

Hypotheses 1a4 and 1b4 proposed that questioning of assumptions would be more extensive in the Stepladder technique than in either Conventional or Devil's Advocacy techniques. The appropriate test for this is a paired comparison following a one-way ANOVA. As shown in Table 2.4 the means for this variable were not significantly different. As shown in Table 1.2 the means for the Stepladder, Devil's Advocacy and Conventional techniques were 3.56, 3.74 and 3.55. Based on this a paired comparison was not undertaken.

Hypotheses 2a and 2b proposed that satisfaction with the decision making process would be more extensive in the Stepladder technique than in either Conventional or Devil's Advocacy techniques. The appropriate test for this is a paired comparison following a one-way ANOVA. As shown in Table 2.6 the means for this variable were not significantly different. As shown in Table 1.2 the means for the Stepladder, Devil's Advocacy and Conventional techniques were 1.41, 1.39 and 1.37. Based on this a paired comparison was not undertaken.

Hypotheses 2a4 and 2b4 proposed that the Stepladder technique would result in less conflict than in the Devil's Advocacy or Conventional techniques. The one-way ANOVA (Table 2.5) was significant ( $p < .05$ ). As shown in Table 1.2 the means for the Stepladder, Devil's Advocacy and Conventional techniques were .73, .79 and .68. The paired comparison showed that only the difference between the Conventional and Devil's Advocacy techniques was significant.

#### D. Personality Measures

Hypotheses 1a2, 1b2, 2a2 and 2b2 proposed that shy individuals would participate more in the Stepladder technique than in either the Conventional or Devil's Advocacy techniques. In other words the effect of the Decision Making technique on participation would be greater for more shy than less shy individuals. This was tested using a Two-Way ANOVA. Decision Making technique was the first factor, having three levels. The second factor, scores on shyness was used to split the participants into two groups: those above the median on shyness and those below.

The hypotheses would be supported by a significant interaction effect between shyness and technique. The results of the ANOVA showed no significant effect of condition on participation. However the effect of shyness was highly significant ( $p < .001$ ) Table 3.1. As shown in Table 3.0 the average reversed participation score for less shy individuals was 1.39 compared to 1.48 for more shy individuals. However, the interaction of shyness and Decision Making technique was not significant.

Hypotheses 1a3, 1b3, 2a3 and 2b3 proposed that participation of the dominant individuals would decrease the greatest in the Stepladder technique. The effect of the Decision Making technique on participation would be greater for more dominant individuals than less dominant individuals. This was tested using a Two-Way ANOVA. Decision Making technique was the first factor (three levels). The second factor, scores on dominance was used to split the participants into two groups: those above the median and those below.

The hypotheses would be supported by a significant interaction effect between dominance and Decision Making technique. The results of the ANOVA showed no significance. As shown in Table 4.0, the average reversed participation



score for more dominant participants was 1.41 compared to 1.45 for less dominant participants. As indicated in Table 4.1 the effect of dominance approached conventional significance levels.

Although not formally listed as hypotheses in this study, the impact of shyness and dominance on Questioning, Satisfaction and Conflict was subjected to the same Two-Way ANOVA test as the previous hypotheses.

Shyness was found to have a highly significant effect on Questioning (Table 3.2,  $p < .001$ ). Conflict was significantly affected by Decision Making technique  $p < .05$  with significantly higher levels of conflict (Table 3.4) in the Devil's Advocacy technique.

Dominance was found to significantly influence Questioning (Table 4.2,  $p < .05$ ) and Conflict (Table 4.4  $p < .01$ ). Conflict was also significantly affected by Decision Making technique (Table 4.4,  $p < .05$ ), with the Devil's Advocacy technique producing significantly higher levels of Conflict.

## CHAPTER SIX: DISCUSSION

## A. Limitations

This thesis has not attempted to compare all known techniques for improving group decisions. This is simply due to time and resource constraints. This study also utilized post secondary student groups in the experimental design, therefore limiting its external validity. One of the major problems with small group research has been the confusion over the definition of groups. This study utilized groups of post secondary students who were randomly assigned to groups for the sole purpose of this research. The groups were therefore by definition not highly cohesive, not ongoing, nor subject to formal leadership as groups in a company might be expected to be. Therefore these findings should not be extrapolated to highly cohesive business groups. Given the large number of significance tests in this thesis, the probability of a result being falsely declared statistically significant is large. The risk of an experiment-wise error has not been controlled for; therefore, those results that are significant should be interpreted with caution.

## B. Findings

Rogelberg's study (1992) found the Stepladder technique to provide superior quality decisions than the Conventional method. To my surprise, however, my results indicated the opposite. As found above, no significant difference in quality among techniques was revealed. Rogelberg's raw scores on quality for the Conventional and the Stepladder techniques were 48.27 and 43.20 respectively; while mine were 36.5 and 40.2. Rogelberg (1992) found that 56% of his groups using the Stepladder technique exceeded the scores of the best member in the group compared with 13% using the Conventional technique. I found 52% of my groups using the Stepladder technique exceeded the score of the best member

compared with 40% using the Conventional technique. Groups using Devil's Advocacy exceeded the best member 46% of the time. We seem to have achieved similar scores using the Stepladder technique but astonishingly different results using the Conventional method. Given the similarity of results in groups using the Stepladder technique and the difference in groups using the Conventional method of group decision making, we must ask the question, why?

There may be a number of possible explanations. Perhaps the two groups of students were somehow different. Perhaps my population had a greater familiarity with one of the techniques or perhaps the instructions or the interpretation of the instructions was somehow different.

Considering these possibilities it is most likely that the significant difference occurred in the knowledge base of the sampling of students. Rogelberg used undergraduate psychology students from a large eastern university in the United States while I used undergraduate commerce students from a university and business students from a college in western Canada. My students all had extensive knowledge of and familiarity with the Conventional technique of group decision making. This technique is used extensively by students in working on group assignments and the students are called upon frequently to work on group assignments. It may be that Rogelberg's students were not as familiar with this technique. This reasoning would explain why the two studies obtained similar scores with the Stepladder technique (neither group had any knowledge of this technique) while getting significant differences with the Conventional technique. The study conducted by Watson et al. (1991) found that familiarity with the decision making process significantly impacted the results of the quality of group decision making.

I had expected to find satisfaction to be higher in the Stepladder technique than in the Conventional or Devil's

Advocacy technique because satisfaction has been positively related to participation (Starke and Sexty, 1992) but no significant difference in satisfaction amongst the three conditions was found. Speculating, we may conclude that other factors such as familiarity with the condition used had more of an effect than did participation.

I suspect that one of the major problems with measuring the process variables was the use of self reporting scales. While the scales in most cases consisted of questions that had a high interitem reliability, questions were in some cases answered very hurried as students were under some time constraints to arrive at their next class on time. The availability of students only during class time may have impacted the thought and effort that went into this final step in the study. It may be that the variables questioning, participation and conflict would have been better measured by using a more objective method like videotaping and having independent observers count specific behaviours.

### C. Improvements

In retrospect, I believe the quality of my study could be significantly improved in the following ways:

i. The time needed to properly instruct participants in the particular technique to be used was underestimated. In future I would allow significantly more time to give verbal instructions and to answer questions.

ii. The time needed to properly complete the Post Exercise Questionnaire was underestimated. This was critical to a fair evaluation of the process variables. I do not believe these were properly evaluated by the participants.

iii. In view of the above concerns I would not attempt to conduct this type of study in a one hour class again. I felt rushed as I'm sure did the participants.

iv. I believe that equal familiarity with the specific decision making techniques would create better experimental conditions that would result in a fairer evaluation of the techniques. Groups in my study were very familiar with the Conventional method of group decision making and not at all familiar with the Stepladder technique or the Devil's Advocacy technique. This may have biased the results.

#### D. Future Directions

The most useful study to business would be a longitudinal study that would compare techniques of group decision making in ongoing established groups. Such a study would reduce at least one of the major problems I encountered, (that of my population being more familiar with one technique than another). It would also be more externally valid and be able to address some issues that my study was not able to. The issues of groupthink, power differentiation and leadership need to be addressed by the use of ongoing groups in research.

Despite my findings I believe the Stepladder technique to be a significant and valuable tool in the process of group decision making. I would like to see other researchers use a longitudinal study in an attempt to compare the Stepladder technique against not only the Conventional technique but against all of the other group decision making techniques presented in this paper and therefore be able to answer the question "Which method of group decision making is best and under what conditions"? Clearly previous research has identified; familiarity with the process, contextually relevant and consequential problems, and salient reward systems as conditions that have significant relevance.

## CHAPTER SEVEN: TABLES

TABLE 1.0 DESCRIPTIVE STATISTICS FOR GROUP LEVEL MEASURES

|               | Mean  | SD   | Intercorrelation |
|---------------|-------|------|------------------|
| GROUP ERROR   | 38.23 | 9.57 |                  |
| AVE IND ERROR | 45.73 | 5.32 | .53              |

TABLE 1.1 DESCRIPTIVE STATISTICS FOR INDIV. LEVEL MEASURES

|                  | Mean | SD   | Intercorrelation |       |      |      |      |      |
|------------------|------|------|------------------|-------|------|------|------|------|
|                  |      |      | 1                | 2     | 3    | 4    | 5    | 6    |
| 1. PARTICIPATION | 1.43 | .17  |                  |       |      |      |      |      |
| 2. QUESTIONING   | 3.61 | .69  | -.51a            |       |      |      |      |      |
| 3. SATISFACTION  | 1.39 | .26  | .29a             | -.23a |      |      |      |      |
| 4. CONFLICT      | .73  | .30  | -.01             | .13c  | .34a |      |      |      |
| 5. IND. ERROR    | 4.72 | 1.00 | -.03             | .02   | .03  | .04  |      |      |
| 6. SHYNESS       | 3.50 | 1.11 | .22a             | .20a  | .04  | -.09 | -.02 |      |
| 7. DOMINANCE     | 5.36 | .89  | -.17c            | .19b  | -.04 | .16b | .08  | -.6a |

a p<.001

b P<.01

c P<.05

NOTE: the signs for Participation, Satisfaction and Individual Error have been reversed because in transformation a reversed square root was used.

TABLE 1.2 GROUP MEANS BY CONDITION

Conventional Stepladder Devil's Advocacy

## GROUP LEVEL MEASURES

|                 | Mean  | SD    | Mean  | SD   | Mean  | SD    |
|-----------------|-------|-------|-------|------|-------|-------|
| Group Error     | 36.5  | 10.14 | 40.16 | 8.04 | 38.39 | 10.21 |
| Ave. Ind. Error | 44.72 | 6.45  | 46.76 | 3.75 | 45.73 | 5.14  |

## INDIVIDUAL LEVEL MEASURES

|                  |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|
| Participation    | 1.45 | .17  | 1.43 | .17  | 1.43 | .18  |
| Questioning      | 3.55 | .68  | 3.56 | .72  | 3.74 | .66  |
| Satisfaction     | 1.37 | .26  | 1.41 | .25  | 1.39 | .27  |
| Conflict         | .68  | .29  | .73  | .27  | .79  | .33  |
| Shyness          | 3.53 | 1.14 | 3.52 | 1.07 | 3.50 | 1.11 |
| Dominance        | 5.29 | .94  | 5.40 | .82  | 5.39 | .90  |
| Individual Error | 4.81 | 1.08 | 4.61 | 1.00 | 4.72 | .89  |

NOTE: Participation, Satisfaction and Individual Error were transformed using a reverse square root transformation.

TABLE 2.0 RESULTS OF ONE WAY ANOVA FOR GROUP QUALITY

| SOURCE                       | D.F. | MEAN SQUARES | F.    | P.  |
|------------------------------|------|--------------|-------|-----|
| Decision Making<br>technique | 2    | 91.76        | 1.002 | .37 |
| Error                        | 78   | 91.58        |       |     |

TABLE 2.1 RESULTS OF ONE WAY ANOVA FOR AVERAGE INDIVI. ERROR

| SOURCE                       | D.F. | MEAN SQUARES | F.   | P.  |
|------------------------------|------|--------------|------|-----|
| Decision Making<br>technique | 2    | 28.93        | 1.03 | .36 |
| Error                        | 78   | 28.23        |      |     |

TABLE 2.2 RESULTS OF ONE WAY ANOVA FOR DOMINANCE

| SOURCE                       | D.F. | MEAN SQUARES | F.  | P.  |
|------------------------------|------|--------------|-----|-----|
| Decision Making<br>technique | 2    | .45          | .57 | .57 |
| Error                        | 321  | .80          |     |     |

TABLE 2.3 RESULTS OF ONE WAY ANOVA FOR SHYNESS

| SOURCE                       | D.F. | MEAN SQUARES | F.  | P.  |
|------------------------------|------|--------------|-----|-----|
| Decision Making<br>technique | 2    | .133         | .11 | .90 |
| Error                        | 321  | 1.25         |     |     |

TABLE 2.4 RESULTS OF ONE WAY ANOVA FOR QUESTIONING

| SOURCE                       | D.F. | MEAN SQUARES | F.  | P.  |
|------------------------------|------|--------------|-----|-----|
| Decision Making<br>technique | 2    | 1.22         | 2.6 | .08 |
| Error                        | 321  | .48          |     |     |

TABLE 2.5 RESULTS OF ONE WAY ANOVA FOR CONFLICT

| SOURCE                       | D.F. | MEAN SQUARES | F.   | P.  |
|------------------------------|------|--------------|------|-----|
| Decision Making<br>technique | 2    | .30          | 3.42 | .03 |
| Error                        | 321  | .09          |      |     |



TABLE 2.6 RESULTS OF ONE WAY ANOVA FOR SATISFACTION

| SOURCE                       | D.F. | MEAN SQUARES | F.  | P.  |
|------------------------------|------|--------------|-----|-----|
| Decision Making<br>technique | 2    | .05          | .79 | .46 |
| Error                        | 321  | .07          |     |     |

TABLE 2.7 RESULTS OF ONE WAY ANOVA FOR PARTICIPATION

| SOURCE                       | D.F. | MEAN SQUARES | F.  | P.  |
|------------------------------|------|--------------|-----|-----|
| Decision Making<br>technique | 2    | .01          | .44 | .65 |
| Error                        | 321  | .03          |     |     |

TABLE 3.0 Group Means by Shyness and Condition

|               | C    | SL   | DA   | ALL  |
|---------------|------|------|------|------|
| Low Shyness   |      |      |      |      |
| Participation | 1.41 | 1.38 | 1.39 | 1.39 |
| Questioning   | 3.67 | 3.75 | 3.83 | 3.75 |
| Satisfaction  | 1.38 | 1.41 | 1.36 | 1.38 |
| Conflict      | .70  | .78  | .81  | .76  |
| High Shyness  |      |      |      |      |
| Participation | 1.48 | 1.47 | 1.48 | 1.48 |
| Questioning   | 3.43 | 3.35 | 3.61 | 3.46 |
| Satisfaction  | 1.35 | 1.41 | 1.44 | 1.40 |
| Conflict      | .66  | .68  | .76  | .70  |

C=Conventional

SL=Stepladder

DA=Devil's Advocacy

TABLE 3.1 Two-Way ANOVA on Participation

| Source                    | D.F. | Mean Square | F.    | P.   |
|---------------------------|------|-------------|-------|------|
| Decision Making Technique | 2    | .010        | .329  | .72  |
| Shyness                   | 1    | .561        | 19.37 | .000 |
| Interaction               | 2    | .006        | .19   | .82  |

TABLE 3.2 Two-Way ANOVA on Questioning

| Source                    | D.F | Mean Square | F.     | P.   |
|---------------------------|-----|-------------|--------|------|
| Decision Making Technique | 2   | .944        | 2.587  | .124 |
| Shyness                   | 1   | 6.446       | 14.336 | .000 |
| Interaction               | 2   | .239        | .531   | .588 |

TABLE 3.3 Two-Way ANOVA on Satisfaction

| Source                    | D.F. | Mean Square | F.   | P.   |
|---------------------------|------|-------------|------|------|
| Decision Making Technique | 2    | .054        | .812 | .445 |
| Shyness                   | 1    | .028        | .424 | .515 |
| Interaction               | 2    | .0891       | .341 | .263 |

TABLE 3.4 Two-Way ANOVA on Conflict

| Source                    | D.F | Mean Square | F.    | P.   |
|---------------------------|-----|-------------|-------|------|
| Decision Making Technique | 2   | .273        | 3.082 | .047 |
| Shyness                   | 1   | .291        | 3.288 | .071 |
| Interaction               | 2   | .022        | .251  | .779 |

TABLE 4.0 Group Means by Dominance and Condition

|                | C    | SL   | DA   | ALL  |
|----------------|------|------|------|------|
| Low Dominance  |      |      |      |      |
| Participation  | 1.49 | 1.43 | 1.43 | 1.45 |
| Questioning    | 3.45 | 3.47 | 3.67 | 3.52 |
| Satisfaction   | 1.37 | 1.40 | 1.37 | 1.38 |
| Conflict       | .65  | .67  | .75  | .68  |
| High Dominance |      |      |      |      |
| Participation  | 1.40 | 1.42 | 1.42 | 1.41 |
| Questioning    | 3.66 | 3.66 | 3.80 | 3.71 |
| Satisfaction   | 1.37 | 1.42 | 1.42 | 1.40 |
| Conflict       | .72  | .80  | .83  | .78  |

C=Conventional

SL=Stepladder

DA=Devil's Advocacy

TABLE 4.1 Two-Way ANOVA on Participation

| Source                    | D.F | Mean Square | F.    | P.   |
|---------------------------|-----|-------------|-------|------|
| Decision Making Technique | 2   | .012        | .393  | .675 |
| Dominance                 | 1   | .109        | 3.639 | .057 |
| Interaction               | 2   | .069        | 2.290 | .103 |

TABLE 4.2 Two-Way ANOVA on Questioning

| Source                    | D.F | Mean Square | F.    | P.   |
|---------------------------|-----|-------------|-------|------|
| Decision Making Technique | 2   | 1.071       | 2.312 | .101 |
| Dominance                 | 1   | 2.447       | 5.282 | .022 |
| Interaction               | 2   | .052        | .113  | .893 |

TABLE 4.3 Two-Way ANOVA on Satisfaction

| Source                    | D.F | Mean Square | F.    | P.   |
|---------------------------|-----|-------------|-------|------|
| Decision Making Technique | 2   | .045        | .774  | .462 |
| Dominance                 | 1   | .052        | .456  | .500 |
| Interaction               | 2   | .031        | .2431 | .785 |

TABLE 4.4 Two-Way ANOVA on Conflict

| Source                    | D.F | Mean Square | F.    | P.   |
|---------------------------|-----|-------------|-------|------|
| Decision Making Technique | 2   | .265        | 3.046 | .049 |
| Dominance                 | 1   | .729        | 8.373 | .004 |
| Interaction               | 2   | .030        | .343  | .710 |

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**CHAPTER NINE: APPENDICES**

## APPENDIX A CONSENT FORM

This study is being undertaken by John Abbott as part of the MBA program at The University of Calgary under the supervision of Wilfred Zerbe, PhD.

I hereby acknowledge that I have been notified by the researcher that the study in which I am about to participate is about group decision making.

I have also been advised that my participation is voluntary, that I am free to withdraw at any time, and I have been offered an alternative to participation in this study.

I understand that my individual responses, including those that may be recorded on video tape, will not be released but kept strictly confidential and used only for the purpose of this study. Publication of data will be in aggregate form only.

I have been given a copy of this form and have had an opportunity to have my questions answered.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Dated: \_\_\_\_\_

Thank you for your help with this study.

John Abbott  
Master's Student  
286-2857

Wilfred Zerbe  
Associate Professor  
The University of Calgary

APPENDIX B PERSONAL CHARACTERISTICS MEASURES

NAME: \_\_\_\_\_ MALE: \_\_\_\_\_ FEMALE: \_\_\_\_\_ AGE: \_\_\_\_\_

Below you will find a list of words that are used to describe people's personal characteristics. Please rate how accurately each word describes you as a person. Judge how accurately each word describes you on the scale. For example consider the word BOLD. How accurately does you, circle the number "6".

|                     | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
|---------------------|------------|------------|------------|------------|----------|----------|----------|-----------|
|                     | extremely  | very       | quite      | slightly   | slightly | quite    | very     | extremely |
|                     | inaccurate | inaccurate | inaccurate | inaccurate | accurate | accurate | accurate | accurate  |
| 1. ASSERTIVE        | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 2. TIMID            | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 3. DOMINANT         | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 4. UNAGGRESSIVE     | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 5. FORCEFUL         | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 6. UNBOLD           | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 7. SELF-ASSURED     | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 8. SHY              | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 9. DOMINEERING      | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 10. MEEK            | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 11. FIRM            | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 12. UNAUTHORITATIVE | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 13. SELF-CONFIDENT  | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 14. FORCELESS       | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 15. PERSISTENT      | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |
| 16. BASHFUL         | 1          | 2          | 3          | 4          | 5        | 6        | 7        | 8         |

## APPENDIX C-1 CONVENTIONAL GROUP DECISION MAKING

| STEP   | INSTRUCTIONS  | TIMING     |
|--------|---|------------|
| Step 1 | Individually rank the items from 1-12 and record ranking in Column #1 of the Decision Form.<br><br>* Note - You can only have; one #1, one #2, etc. | 7 minutes  |
| Step 2 | As a group rank the items from 1-12 and record rankings in column #5 of the Decision Form.  | 35 minutes |

Please ensure you put your Name, Group and Number (1-4) on all pages.

Hand-in Decision Form with Column #1 and #5 completed.

### APPENDIX C-2 STEPLADDER TECHNIQUE

| STEP   | INSTRUCTIONS   | TIMING     |
|--------|--|------------|
| Step 1 | P1 + P2 work individually on rankings<br>P3 + P4 read newspaper                              | 7 minutes  |
| Step 2 | P1 + P2 work together on rankings<br>P3 works individually on rankings<br>P4 reads newspaper | 7 minutes  |
| Step 3 | P3 presents rankings to P1 + P2 with debate to follow<br>P4 works individually on rankings   | 7 minutes  |
| Step 4 | P4 presents rankings to P1, P2 and P3  | 25 minutes |

Record individual rankings in Column #1 and final group ranking in Column #5 of the Decision Form.

Please ensure you put your name, group and number (1-4) on all pages.

Hand in 1 Decision Form per person with Columns #1 and #5 completed.

## APPENDIX C-3 DEVIL'S ADVOCACY TECHNIQUE

| STEP   | INSTRUCTIONS   | TIMING     |
|--------|--|------------|
| Step 1 | Individually rank the items from 1-12 (1 being most important, 12 least important), and record rankings in Column #1 of Decision Form. | 7 minutes  |
| Step 2 | Break into Initial (1+2) and Devil's Advocacy (3+4) Groups and discuss ranking with partner.   | 7 minutes  |
| Step 3 | Initial Group presents rankings with justification to Devil's Advocacy Group.  | 7 minutes  |
| Step 4 | Devil's Advocacy Group responds with critique  | 7 minutes  |
| Step 5 | Two groups discuss with view to best ranking. DA group continues to question assumptions of initial group.                             | 14 minutes |

Please ensure you put your name, group and number (1-4) on all pages. Hand in one Decision form per person with Columns #1 and #5 completed.

**APPENDIX D WINTER SURVIVAL EXERCISE: THE SITUATION**

You have just crash-landed in the woods of northern Minnesota and southern Manitoba. It is 11:32 a.m. in mid-January. The light plane in which you were travelling crashed on a lake. The pilot and copilot were killed. Shortly after the crash, the plane sank completely into the lake with the pilot's and the copilot's bodies inside. None of you are seriously injured and you are all dry. The crash came suddenly; before the pilot had time to radio for help or to inform anyone of your position. Since your pilot was trying to avoid a storm, you know the plane was considerably off course. The pilot announced shortly before the crash that you were twenty miles northwest of a small town that is the nearest known habitation. You are in a wilderness area made up of thick woods broken by many lakes and streams. The snow depth varies from above the ankles in windswept areas to knee-deep where it has drifted. The last weather report indicated that the temperatures would reach minus twenty-five degrees Fahrenheit in the daytime and minus forty at night. There are plenty of dead wood and twigs in the immediate area. You are dressed in winter clothing appropriate for city wear - suits, pantsuits, street shoes, and overcoats. While escaping from the plane, several members of your group salvaged twelve items. Your task is to rank these items according to their importance to your survival, starting with 1 for the most important item and ending with 12 for the least important one. You may assume that the number of passengers is the same as the number of persons in your group, and that the group has agreed to stick together.

Courtesy of D.Johnson and F.Johnson adapted by Roy Lewicki.

**APPENDIX E WINTER SURVIVAL DECISION FORM**

Rank the following items according to their importance to your survival, starting with 1 for the most important one and proceeding to 12 for the least important one.

| ITEM   | #1          | #2    | #3          | #4    | #5    |
|--|-------------|-------|-------------|-------|-------|
|  | INDIV       | INDIV | EXPERT      | TEAM  | TEAM  |
|  | RANK        | ERROR | RANK        | ERROR | RANK  |
| A. Ball of steel wool                                  | _____       | _____ | _____       | _____ | _____ |
| B. Newspapers (one per person)                         | _____       | _____ | _____       | _____ | _____ |
| C. Compass   | _____       | _____ | _____       | _____ | _____ |
| D. Hand axe  | _____       | _____ | _____       | _____ | _____ |
| E. Cigarette lighter<br>(without fluid)                | _____       | _____ | _____       | _____ | _____ |
| F. Loaded .45 calibre pistol                           | _____       | _____ | _____       | _____ | _____ |
| G. Sectional air map made of<br>plastic                | _____       | _____ | _____       | _____ | _____ |
| H. Twenty-by-twenty-foot<br>piece of heavy-duty canvas | _____       | _____ | _____       | _____ | _____ |
| I. Extra shirt and pants for<br>each survivor          | _____       | _____ | _____       | _____ | _____ |
| J. Can of shortening                                   | _____       | _____ | _____       | _____ | _____ |
| K. Quart of 100-proof whiskey                          | _____       | _____ | _____       | _____ | _____ |
| L. Family-size chocolate bar<br>(one per person)       | _____       | _____ | _____       | _____ | _____ |
|  | TOTAL       |       | TOTAL       |       |       |
|  | INDIV       |       | TEAM        |       |       |
|  | ERROR _____ |       | ERROR _____ |       |       |



**APPENDIX F-1 SPECIFIC INSTRUCTIONS - CONVENTIONAL TECHNIQUE**

\*\*\* NUMBER THE PACKAGES IN RANDOM ORDER PRIOR TO HANDING THEM OUT.

\*\*\* PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

\*\*\* HANDOUT PACKAGES.

1. Many thanks for agreeing to participate in this study on group decision making. It should take about 1 hour of your time and will be critical to my Master's thesis. Has anyone participated in this Winter Survival Exercise before? If so was one of the items "steel wool". (If yes place in a separate group and mark papers with an X, if no continue).
2. This study is designed to determine the quality and satisfaction of various methods of making decisions in groups. You will be asked to read a case, record your individual answers and then make some decisions in a group setting. When you are working together I would ask you to take the task seriously. Imagine you work at a company and that this is an important business decision. As appreciative as I am for your participation I want you to understand that this is completely voluntary. Should you not wish to participate for any reason you are free to leave and complete a reading assignment I have prepared for you. I can guarantee that your individual answers will remain confidential, only group results or averages will be published.
3. At the end of this exercise I will share the experts answers with you.
4. There is a letter and number on the top right hand corner of your 1st page. Please copy this letter and number onto each page of your package.
5. Please read the Consent form (page 1), and sign it if you agree to participate.
6. Now please complete the Personal Characteristics Measure so that I can get some information about you before you begin the study. Please fill in your name, gender and age.

7. Now please hand in both your Consent form and The Personal Characteristics form.

8. You will first of all complete the assignment as individuals recording your answers in column #1 of the Decision form and then you will complete the assignment as groups of 4.

#### 9 . INDIVIDUAL INSTRUCTIONS

Now I will ask you to complete the exercise on your own. Please do not communicate with any other participant during this portion of the exercise. If you have any questions please ask me. This packet contains the case "Winter Survival", instructions and two copies of the "Winter Survival Individual Decision Form". Utilizing your knowledge of the situation as outlined, rank the 12 items according to each items importance for your survival. Rank the items from 1-12, with 1 being the most important item and 12 being the least important item. Please note; YOU CAN ONLY HAVE ONE #1, ONE #2. ONE #3 ETC. Your objective is to come up with a ranking as close as possible to the solution that the Winter survival training experts came up with when given the same problem to solve. Enter your rankings in Column #1. You have seven minutes to complete this part of the experiment. When you are done copy your answers on both copies of the Decision Form. Ultimately one copy will be handed in. Keep one copy for reference later on. Make sure you have printed your name onto all copies you are handing in. Now that you have completed the individual part of the study do not change your answers in column #1 as a result of your group discussion.

10. As a group you will be working on the same problem you just did individually. The four of you will work together to decide on a one best solution for the group. You can do this any way you want and you may take up to 35 minutes. When you are finished please record your collective ranking of the items in Column #5 of the Decision Form. Any

questions? Divide now into your groups of 4, all the A's here etc.

11. (At the end of the 35 minutes or when the group's completed). Please hand in your Decision Form. Note Column #1 and #5 should be filled in.

12. Please complete the Winter Survival Post-Exercise Questionnaire. Remember to put your letter and number on this Questionnaire.

13. Thank you for your participation.

**APPENDIX F-2 SPECIFIC INSTRUCTIONS - DEVIL'S ADVOCACY  
TECHNIQUE**

\*\*\* NUMBER THE PACKAGES IN RANDOM ORDER PRIOR TO HANDING THEM OUT.

\*\*\* PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

\*\*\* HANDOUT PACKAGES.

1. Many thanks for agreeing to participate in this study on group decision making. It should take about 1 hour of your time and will be critical to my Master's thesis. Has anyone participated in this Winter's Survival Exercise before? If so did it the items include steel wool? (If so set up a separate group with these and mark papers with an X.)
2. This study is designed to determine the quality and satisfaction of various methods of making decisions in groups. You will be asked to read a case, record your individual answers and then make some decisions in a group setting. When you are working together I would ask you to take the task seriously. Imagine you work at a company and that this is an important business decision. As appreciative as I am for your participation I want you to understand that this is completely voluntary. Should you not wish to participate for any reason you are free to leave and complete the reading assignment I have prepared for you. The results of this study are confidential and you will not be able to be identified.
3. At the end of the exercise I will share the results of the experts with you.
4. There is a letter and number on the top right hand corner of your 1st page. Please copy this letter and number on to each page of your package. Do this now.
5. Please read the Consent form (page 1), and sign it if you agree to participate.
6. Now please complete the Personal Characteristic Measure so that I can get some information about you before you

begin the study. Please fill in your name, gender and age.

7. Now please hand in both your Consent form and Personal Characteristics form.

8. Now I will ask you to complete the exercise on your own. Please do not communicate with any other participant during this portion of the study. If you have any questions please ask me. This packet contains the case "Winter Survival", instructions and two copies of the "Winter Survival Decision Form". Utilizing your knowledge of the situation as outlined, rank the 12 items on the Decision Form according to each items importance for your survival. Rank the items from 1-12, with 1 being the most important item and 12 being the least important item. Record your ranking in Column #1. Please note; YOU CAN ONLY HAVE ONE #1, ONE #2. ONE #3 ETC. Your objective is to come up with a ranking as close as possible to the solution that the winter survival training experts came up with when given the same problem to solve. You have seven minutes to complete this part of the study. When you are done copy your answers on the two copies of the Decision Form. Make sure you have printed your name on to all copies.

9. What you will be doing is participating in a group decision making exercise using the Devil's Advocacy technique. The Devil's Advocacy approach develops a solid argument for a reasonable recommendation, then subjects that recommendation to an in-depth formal critique. The critique calls into question the assumptions and recommendations presented to the Devil's Advocate, and attempts to show why the recommendation should not be adopted. Through criticism and revision, the approach leads to mutual acceptance of a recommendation. Here are the guidelines and procedures to follow in using the Devil's Advocate approach.

Follow along on the last page of your handout package.

10. Divide now into your groups of 4. All A's here etc. Within your 4 person group Participant 1 and 2 will be the

initial group and participant 3 and 4 will be the Devil's Advocate. Divide now into your subgroups. You have 7 minutes to discuss the Winter Survival Exercise with your subgroup partner. Use the back of your Decision form to record your mutual ranking with your subgroup partner.

11. The initial group should develop a ranking of the 12 items and build an argument for them, supported by all key assumptions, facts and data that underlie them. Record both the rankings and all key assumptions on the form provided for this purpose. At the same time the Devil's Advocate subgroup should prepare to critique the other subgroup by discussing the case and any critical assumptions, data etc. which they can identify. It is not necessary for the DA group to completely agree on the rankings simply to be able to criticize the initial group.

12. The initial subgroup verbally presents its ranking recommendations and assumptions to the Devil's Advocate subgroup (7 minutes). The Devil's Advocate subgroup then subjects the recommendations to a critique by attempting to uncover all that is wrong with the recommendations and assumptions (7 minutes).

13. Together the two subgroups develop an overall ranking of the 12 items with the Devil's Advocate subgroup continuing to play a critiquing and questioning role. (14 minutes).

14. Record the final collective ranking in Column #5 of the Decision Form. At the end of this 14 minutes or when the group is completed please hand in your Decision Forms. Note Column #1 and #5 should be filled in.

15. Please complete the Winter Survival Post-Exercise Questionnaire. Remember to write your letter and number on this form.

16. Thank you for your participation.

**APPENDIX F-3 SPECIFIC INSTRUCTIONS - STEPLADDER TECHNIQUE**

\*\*\* NUMBER THE PACKAGES IN RANDOM ORDER PRIOR TO HANDING THEM OUT.

\*\*\* PLEASE DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

\*\*\* HANDOUT PACKAGES.

1. Many thanks for agreeing to participate in this study on group decision making. It should take about 1 hour of your time and will be critical to my Master's thesis. Has anyone participated in this Winter Survival exercise before? Did that exercise include steel wool? (If so put these students in their own group and mark their papers with an X. If not continue.)

2. This study is designed to determine the quality and satisfaction of various methods of making decisions in groups. You will be asked to read a case, record your individual answers and then make some decisions in a group setting. When you are working together I would ask you to take the task seriously. Imagine you work at a company and that this is an important business decision. As appreciative as I am for your participation I want you to understand that this is completely voluntary. Should you not wish to participate for any reason you are free to leave and complete a reading assignment I have prepared for you. The results of this study are confidential any you can in no way be identified.

3. At the end of the exercise I will share the experts answers with you.

4. There is a letter and number on the top right hand corner of your 1st page. Please copy this letter and number on to each page of your package. Do this now.

5. Please read the Consent Form (page 1), sign it if you agree to participate.

6. Now please complete the Personal Characteristics Measure so that I can get some information about you before you begin the study. Please fill in your name, gender and age.

7. Now please hand in both your Consent form and The Personal Characteristics form.

8. This packet contains the case "Winter Survival", Instructions and two copies of the Winter Survival Decision Form. Rank the items on the Decision Form from 1-12, with 1 being the most important item and 12 the least, important. Please note you can only have one #1, one #2, one #3 etc. Your objective is to come up with a ranking as close as possible to the Experts. Please follow along on the last page of your package.

9. What you will be doing is participating in a group decision making exercise using the Stepladder Technique. Participant 1 and participant 2 will be given a packet to complete individually while the other two group members will read the daily newspaper in silence. After seven (7) minutes, participant 3 will be given the packet to complete, participant 4 will continue to read the newspaper, and participant 1 and 2 will work on the problem together. After seven (7) minutes participant 4 will be given the packet to complete individually while participant 3 joins the other two group members. Participant 3 will present his/her preliminary alternatives to the twosome. Then the three group members will discuss both sets of alternatives. At the end of seven (7) minutes participant 4 will join the group of three. Participant 4 will present his/her alternatives to the threesome. The group of four will then have up to 25 minutes to decide on a one best solution. Most importantly, when the 3rd and 4th members join the first two, they (participant 3 and 4) must present their alternatives before they know what the established groups alternatives are.

As you discuss the case with each of your group members keep track of revised rankings on the back of your Decision form but do not record new rankings on the front of the Decision



form until the end of the study when P4 has presented findings to you and you have had an opportunity to discuss them.

10. While working individually record your ranking in Column #1 of the Decision Form. Once you have listed your individual choices in column #1 do not change them in response to your groups discussions.

11. When you are in agreement on the ranking of the survival items please record your collective ranking in Column #5 of the Decision Form. Record your collective ranking on both copies of the Decision Form.

12. (At the end of this 25 minutes or when the group is completed.) Please hand in your Decision Form. Note: Column #1 and #5 should be filled in.

13. Please complete the Winter Survival Post-Exercise Questionnaire. Remember to print your number and letter on this form.

14. Thank you for your participation.

## APPENDIX G WINTER SURVIVAL POST EXERCISE - QUESTIONNAIRE

For each of the following statements, please circle the number that best fits the degree to which the statement describes your reaction to the Winter Survival Exercise. Use the following scale.

| 1          | 2           | 3       | 4          | 5          |
|------------|-------------|---------|------------|------------|
| not at all | to a little | to some | to a great | to a great |
|            | extent      | extent  | extent     | extent     |

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. To what extent does the final solution reflect your input? | 1 | 2 | 3 | 4 | 5 |
| 2. I gave information about the problem:                      | 1 | 2 | 3 | 4 | 5 |
| 3. I made suggestions about doing the task:                   | 1 | 2 | 3 | 4 | 5 |
| 4. I asked others for their thoughts and input:               | 1 | 2 | 3 | 4 | 5 |
| 5. I showed interest and attention in the groups activities:  | 1 | 2 | 3 | 4 | 5 |
| 6. I asked for suggestions from others in the group:          | 1 | 2 | 3 | 4 | 5 |
| 7. I remained silent and did not contribute to the task.      | 1 | 2 | 3 | 4 | 5 |
| 8. I did not ask others for their opinions:                   | 1 | 2 | 3 | 4 | 5 |
| 9. I expressed negative feelings about someone's behaviour:   | 1 | 2 | 3 | 4 | 5 |

- |  | 1          | 2           | 3       | 4          | 5          |
|--|------------|-------------|---------|------------|------------|
|  | not at all | to a little | to some | to a great | to a great |
|  |            | extent      | extent  | extent     | extent     |
| 10. I expressed a different opinion from others in the group:  | 1          | 2           | 3       | 4          | 5          |
| 11. I rejected others' opinions or suggestions:  | 1          | 2           | 3       | 4          | 5          |
| 12. My opinions or suggestions were rejected:  | 1          | 2           | 3       | 4          | 5          |
| 13. Others expressed a negative opinion about my behaviour:  | 1          | 2           | 3       | 4          | 5          |
| 14. I did not express different opinions from the group:   | 1          | 2           | 3       | 4          | 5          |
| 15. I did not reject others' opinions or suggestions:  | 1          | 2           | 3       | 4          | 5          |
| 16. When others expressed an idea that I did not understand or agree with I asked for clarification: | 1          | 2           | 3       | 4          | 5          |
| 17. Others in the group asked me for clarification of my ideas and suggestions:                      | 1          | 2           | 3       | 4          | 5          |
| 18. I felt free to ask other group members for clarification of their ideas:                         | 1          | 2           | 3       | 4          | 5          |
| 19. When I did not understand what was being said I failed to ask for clarification:                 | 1          | 2           | 3       | 4          | 5          |

20. How would you describe your group's  
problem solving process?

- |                |   |   |   |   |                |
|----------------|---|---|---|---|----------------|
| A. efficient   |   |   |   |   | Inefficient    |
| 1              | 2 | 3 | 4 | 5 |                |
| B. coordinated |   |   |   |   | Uncoordinated  |
| 1              | 2 | 3 | 4 | 5 |                |
| C. fair        |   |   |   |   | unfair         |
| 1              | 2 | 3 | 4 | 5 |                |
| D. confusing   |   |   |   |   | understandable |
| 1              | 2 | 3 | 4 | 5 |                |
| E. satisfying  |   |   |   |   | dissatisfying  |
| 1              | 2 | 3 | 4 | 5 |                |