THE EFFECTS OF GROUP COHESIVENESS
ON GROUP CONFORMITY AND MEMBER SATISFACTION

by

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ABSTRACT

This study investigated the effects of group cohesiveness on group conformity, and on member satisfaction. In this study, group cohesiveness, group conformity, and member satisfaction were considered to be constructs. The definition of the construct of group cohesiveness included the interrelated components of psychological closeness, interpersonal liking, group affiliation, and trust. The definition of group conformity included the components of compliance and acceptance. The definition of member satisfaction included the components of satisfaction with the group decision, satisfaction with the group process, and satisfaction with the group atmosphere. The major research hypotheses suggested that group cohesiveness has an effect on member satisfaction, on acceptance of social influence, and on compliance with the group. The study examined also the role of the moderating variables of self-esteem, sociometric status, and gender.

A total of 77 undergraduate students at Virginia Tech participated in a decision-making experiment. The students were led to believe they were assigned to congenial work groups based on their responses to pre-experimental questionnaires. In fact, the students were randomly assigned to groups, and randomly assigned to one of the two treatment conditions high or low cohesiveness. Verbal and written manipulation instructions were
used to induce high and low cohesiveness in the groups. This manipulation was significant, and moderately successful. During the experiment, the subjects had to work on two rank-ordering exercises as individuals, and as groups.

The experimental results suggested that group cohesiveness and member satisfaction are significantly correlated. Subjects who perceived their group to be highly cohesive were more satisfied with the experimental group meeting than subjects who perceived their group to be less cohesive. There was no evidence for a relationship between group cohesiveness and acceptance of social influence. This finding, however, should not be generalized since it is possible that group cohesiveness has no immediate impact on acceptance in emerging groups. The results also suggest there is a relationship between group cohesiveness and compliance. Students who were assigned to the high cohesiveness treatment complied more frequently with their group than students who were assigned to the low cohesiveness treatment.
I like to express my appreciation to certain people who provided support, motivation, and encouragement during my graduate research work.

First, I like to thank Dr. Demo, Dr. Hughes, Dr. Shoemaker, Dr. Wimberley, and Mrs. Peters from the Sociology Department, and Dr. Hensley from the Communication Department at Virginia Tech for their immediate cooperation when I needed subjects for my experiment. It was a great experience to do the debriefing presentation in your classes. Special thanks to Dr. Hughes who provided valuable criticism during one of my presentations.

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# TABLE OF CONTENTS

INTRODUCTION...................................................................................................................... 1
  Problem statement ......................................................................................................... 1
  Relevance of study ...................................................................................................... 2
  Who will use this research .......................................................................................... 3
  Research questions ..................................................................................................... 5
  Operational research questions ................................................................................... 5
  Research purpose ........................................................................................................ 6
  Research objective ....................................................................................................... 7
  Delimitations ................................................................................................................ 7
  Assumptions ................................................................................................................ 8
    Decision-making ......................................................................................................... 8
    Group cohesiveness .................................................................................................. 8
    Group conformity ...................................................................................................... 9
  Sub-problems .............................................................................................................. 10
  Outputs ....................................................................................................................... 11

CONCEPTUAL MODELS .................................................................................................... 12
  Group cohesiveness and the group process ................................................................. 17
  Group cohesiveness and group conformity ................................................................. 18
  Group cohesiveness and member satisfaction ............................................................ 21

RESEARCH HYPOTHESES ................................................................................................. 22

VARIABLES ....................................................................................................................... 23
  Independent variables ................................................................................................. 23

*Table of Contents*
Dependent variables .......................................................... 25
  Group conformity .......................................................... 25
  Member satisfaction ....................................................... 26
Moderating variables ....................................................... 26
  Self-esteem .................................................................. 27
  Sociometric status ........................................................ 28
LITERATURE REVIEW ..................................................... 29
  Heider’s theory of balance .............................................. 29
  Festinger’s theory of social comparison ......................... 31
  Group composition and group behavior ....................... 36
  Group cohesiveness ..................................................... 37
  Antecedents of group cohesiveness .............................. 41
  Consequences of group cohesiveness ............................ 42
  Group conformity ........................................................ 45
  Consequences of non-conformity ................................... 49
SPECIFIC HYPOTHESES .................................................. 50
METHODOLOGY ............................................................. 53
  Type of Research ........................................................ 53
  Population .................................................................... 54
Experimental Task ........................................................... 54
  Lost on the Moon exercise ............................................ 55
  Lost at Sea exercise ..................................................... 56
Groups ............................................................................ 56
Manipulation of group cohesiveness .............................. 58
Variables that were controlled for ................................. 60
LIST OF FIGURES

Figure 1. Conceptual model of group cohesiveness (Cartwright, 1968).......................... 12
Figure 2. Conceptual model of group cohesiveness as an independent construct........ 14
Figure 3. My conceptual model is an integral part of Cartwright’s conceptual model...14
Figure 4. My conceptual model transformed into a process model............................. 15
Figure 5. Sets of interacting variables operationalize and represent the constructs......23
Figure 6. Moderating variables mediate between independent and dependent variables.27
Figure 7. Balanced and unbalanced cognitive systems (adapted from Herkner, 1986). 30
Figure 8. Group members converge with their judgments in ambiguous situations
(adapted from Herkner, 1986)...................................................................................... 46
Figure 9. Procedural flowchart for the experiment...................................................... 67
Figure 10. The Wheless Group Solidarity Scale and the modified version of the Evans
and Jarvis Group Attitude Scale are positively correlated................................. 89
Figure 11. Average perceived group cohesiveness in both treatment conditions.........91
Figure 12. Scatterplot of perceived group cohesiveness versus member satisfaction....92
Figure 13. Scatterplot of perceived group cohesiveness versus acceptance............94
Figure 14. Subjects complied more frequently with their group in the high cohesiveness
treatment condition................................................................................................. 96
Figure 15. Females complied more frequently with their group than males............99
Figure 16. Relationship between self-esteem and acceptance................................. 101
Figure 17. Relationship between sociometric status and acceptance.....................102
Figure 18. Relationship between group cohesiveness and time needed to accomplish
the group task.............................................................................................................. 107
Table 1. Conversion of actual individual ranking scores to bogus group ranking scores. ................................................................. 62
Table 2. Example for the calculation of acceptance. ................................. 78
Table 3. Cronbach's alpha values for the measurement instruments. .............. 88
Table 4. Chi-square test of independence between treatment condition and compliance. ..................................................................... 97
Table 5. Separate descriptive statistics for the subjects who complied with their group and for the subjects who did not comply. .......................... 98
Table 6. Chi-square test of independence between gender and compliance. ........ 100
Table 7. Summary of the stepwise selection procedure for the prediction of acceptance. ................................................................. 103
Table 8. Multiple linear regression analysis for the prediction of acceptance. ........ 104
Table 9. Summary of the stepwise selection procedure for the prediction of satisfaction. .................................................................... 105
Table 10. Multiple linear regression analysis for the prediction of satisfaction. .... 105
Table 11. Summary of experimental results.................................................. 108
INTRODUCTION

As managerial problems become increasingly complex, and decisions are made more frequently by groups than by individuals (Huber, 1984), the study of group decision-making becomes vital from both theoretical and practical perspectives. However, theorists and practitioners are commonly concerned with different aspects of group decision-making. Practitioners frequently focus on technical aspects of the decision-making process to improve the quality of the immediate results of the process such as the decision itself. Information sharing, participation, and leadership issues are among the factors that receive their primary attention. Practitioners seem to be most interested in answering the question "What has to be done to gain the best immediate results from a group meeting?" Theorists, on the other side, seem to be concerned with a considerably broader range of issues in the decision-making process. Particular attention has been paid to the social influence process. Some of the questions researchers strive to answer are: "Why do people change their opinions?", "How do people influence one another?", and "Under which circumstances do people change their minds?" Questions of this type will be considered in this study.

Problem statement

With this research, I aim to characterize, conceptualize, demonstrate, and generalize the effects of group predispositions on behaviors in the group decision-making process yielding group conformity and member satisfaction.
Relevance of study

From a managerial perspective, the decision-making group is one primary means by which managers influence individual and group behaviors to achieve organizational goals. Managerial and organizational success can depend on how well members of decision-making groups interact with one another. Group cohesiveness has often been suggested to play a major role in small group interaction, and in the social influence process. For instance, Shaw (1981) summarized that group cohesiveness is related to both quantity and quality of group interaction. I believe group cohesiveness has an impact on group conformity and on member satisfaction, and I consider group conformity and member satisfaction to be key determinants of managerial and organizational success.

Group conformity

To some extent, decision-making groups need conformity to fulfill their group's purpose. Crosbie (1975) argued conformity is necessary for group life since conformity allows groups to function smoothly. Moscovici (1985) suggested group conformity is required for the execution of group objectives. Decision-making groups need to agree upon group decisions, and subsequent courses of action to effectively pursue group goals to meet group responsibilities. At the same time, it has been argued that group uniformity is frequently secured at the expense of group success and group adaptation to the environment. Moscovici (1985) concluded it has been proven that group conformity can be disadaptive and detrimental to group welfare. Shaw (1981) suggested group conformity can have either positive or negative influences on a group. Understanding the variables that affect group conformity in decision-making groups contributes to the improvement of decision-making.
Member satisfaction

For groups to function smoothly, it is necessary that group members are to some extent satisfied with the group process, and with the outcomes of the group process. Satisfaction with the group typically increases when group members perceive their group meeting and its outcomes a success. Presumably, group members who are satisfied with a group meeting are more likely to commit themselves to the group, to group decisions, and to subsequent courses of action. Understanding the variables that affect member satisfaction with the group process can help to promote members' commitment to the group and to group decisions.

From a theoretical as well as a practical perspective, I believe it is relevant to study the relationships between group cohesiveness, group conformity, and member satisfaction in more depth.

Who will use this research

The desired outcome of this study is to promote the understanding of the role of group predispositions in the social influence process. A better understanding of the social influence process in small groups can help managers, convenors, facilitators, and members of decision-making groups to better manage the group process in their group meetings. At the same time, better management of the group process should help to achieve group objectives more effectively, and more efficiently.
Group managers and convenors set the social context for group interaction by establishing formal ties between individuals, by assigning people to work groups, and by assigning responsibilities, tasks, and activities to work groups. From a systems perspective, group managers and convenors influence group decision-making by determining the inputs to the social system "decision-making group" and by allocating resources to the group. The social context for group interaction predetermines individual and group behaviors in the decision-making process, and therefore influences the outcomes of the group process. Group managers and convenors who understand the effects of group cohesiveness on the social influence process in a group meeting are better prepared to help their group achieve group objectives more effectively.

Group facilitators influence group decision-making because they manipulate their group's interaction during the meeting. While monitoring individual and group behaviors, facilitators determine needs for controlling the group process. They intervene in the process if they think it is necessary. Group facilitators who understand how individual and group behaviors affect member satisfaction are better prepared to help their group achieve group objectives more effectively. Through appropriate interventions, facilitators can help their groups be more satisfied with their meeting, and with their decisions.

In decision-making groups, the decision is one result of the group process. Individual and group behaviors determine the nature of this process. Decision-making groups fail if the group process impedes the effective achievement of group goals. Group members who participate in a meeting, and who understand how individual and group behaviors affect the group process and process outcomes are better prepared to help their group be
more productive. They can take corrective action if they recognize the group process becomes detrimental.

Research questions

Three basic research questions guide the design of this study. These questions will be addressed in the literature review. Further, the experimental results of this study should contribute to answering these questions. The questions are:

1) How does group cohesiveness affect the group process?
2) How does group cohesiveness affect group conformity?
3) How does group cohesiveness affect member satisfaction?

Operational research questions

1) What are managerial implications of cohesiveness in decision-making groups?
2) What are individual and group behaviors that managers, convenors, and facilitators of decision-making groups can expect during a group meeting when they work with high or low cohesive groups?

---

1 I aimed to address all operational research questions in the early stages of this study. However, the operational research questions (1), (4), and (5) were not answered in this study. I believe previous research on group cohesiveness failed to adequately conceptualize the phenomenon of group cohesiveness. Without a sound conceptualization of group cohesiveness, any answer to these questions would have low validity.
3) What are outcomes of the group process that managers, convenors, and facilitators of decision-making groups can expect when they work with high or low cohesive groups?

4) What can managers and convenors of decision-making groups do prior to a group meeting with respect to the social context of the meeting, if they want to achieve particular outcomes of the group process, for instance high acceptance of a group decision, or high satisfaction with the group decision?

5) Some conformity is necessary to achieve group objectives, yet, too much conformity can have detrimental results for the group. How do facilitators know when group conformity is beneficial or detrimental for group success?

**Research purpose**

There are two global reasons for doing this research. First, I pursue this study to characterize the phenomenon of group cohesiveness as it pertains to decision-making in small groups. I will investigate possible antecedents and effects of group cohesiveness on individual and group behaviors, and I will examine the possible consequences of group cohesiveness on group conformity, and member satisfaction. Secondly, I intend to explore cause-effect relationships between group cohesiveness and group conformity, and between group cohesiveness and member satisfaction.
Research objective

I have two objectives that I want to accomplish with this study. These objectives are:

1) to provide evidence for a relationship between group cohesiveness and group conformity, and between group cohesiveness and member satisfaction;

2) to examine the role of the moderating variables gender, self-esteem and perceived sociometric status in the relationships between group cohesiveness and group conformity, and between group cohesiveness and member satisfaction.

The results of this study will be useful for managers, convenors, and group facilitators in three ways: (a) to better understand the social influence process in group meetings, (b) to predict individual and group behaviors that possibly occur under given circumstances with regard to the cohesiveness of a group, and (c) to predict group process outcomes under given circumstances with regard to the cohesiveness of a group.

Delimitations

The following delimitations recognize domains which I will not consider in this study. The purpose of these delimitations is to reduce the scope of this study, and to identify the research domain by stating what the problem is not.

1) I am concerned with decision-making task groups, and not with interest groups. Decision-making task groups differ from interest groups since they pursue group tasks and frequently use a group decision-making process. To some extent, the very fact that group members of decision-making task groups have to conclude their meeting with a group decision produces pressures toward uniformity.
2) I will examine the effects of group cohesiveness on several dependent variables in a laboratory experiment working with groups of students. I will not study group cohesiveness in real groups for two reasons. First, random assignment of subjects to groups is not feasible when working with real groups. Yet, random assignment of subjects to the treatment conditions is necessary to make inferences about causation of variables. Secondly, independent and moderating variables can be much better controlled in laboratory experiments than in field experiments.

3) There are numerous possible outcomes of the group process in group decision-making. In this study, I am only concerned with the following outcomes: acceptance of the group decision, satisfaction with the group decision, satisfaction with the group process, and satisfaction with the group atmosphere.

Assumptions

Decision-making

1) High quality decision-making is associated with high member satisfaction, high acceptance, and a balanced amount of compliance. Satisfied group members are more likely to support group decisions, and to develop commitment to their group, and to group decisions.

Group cohesiveness

1) To create highly cohesive and low cohesive groups, group cohesiveness will be manipulated with verbal and written manipulation instructions. The subjects will be led to believe they are assigned to congenial or non-congenial work groups based on

Introduction
their responses to pre-experimental questionnaires\textsuperscript{2}. I assume this technique induces different levels of group cohesiveness. This technique has been proven to be successful in several cohesiveness studies (Back, 1951; Festinger, Gerard, Hymovitch, Kelley, Raven, 1952; Berkowitz, 1954; Pepitone, Reichling, 1955; Exline 1957, Downing, 1958).

**Group conformity**

1) Group conformity consists of at least two components. Most commonly, these components have been called normative social influence and informational social influence (Deutsch, Gerard, 1955), compliance and private acceptance (Kiesler, 1969), and normative conformity and informational conformity (Crosbie, 1975).

2) Shaw (1981) suggested that group conformity may have either positive or negative influences on the group. I assume that compliance, to some extent, is necessary for a group to make decisions. Yet, too much compliance can have detrimental consequences for the group.

3) In general, acceptance has beneficial consequences for the group. Low acceptance of an emerging group opinion, or low mutual acceptance of individual opinions usually has detrimental consequences for the group.

\textsuperscript{2} This technique is described in its details in the methodology section under manipulation of group cohesiveness.
Sub-problems

Sub-problems identify related components of the problem statement. The sub-problems will be addressed in the discussion of the conceptual model, and in the literature review. The sub-problems are to:

1) Develop an operational definition of the construct of group cohesiveness, and identify variables that can be used to represent group cohesiveness.

2) Identify a measurement instrument that is appropriate to assess group cohesiveness in this study. Test the instrument's reliability, and provide some evidence for its validity.

3) Understand the phenomenon of group cohesiveness, and some of the cause-effect relationships between group cohesiveness and the social influence process.

4) Identify managerial implications of group cohesiveness.

5) Develop a methodology useful to study the effects of group cohesiveness on group conformity, and on member satisfaction. In particular, the methodology should be sound with regard to the assessment of the two distinct components of group conformity, which are compliance and acceptance.
Outputs

The following outputs are the desired tangible results of this research. Each output is derived by addressing the respective sub-problem.

1) An operational definition of the construct of group cohesiveness.
2) A measurement tool appropriate to assess group cohesiveness in this study.
3) A conceptualization of group cohesiveness as an independent construct.
4) A list of managerial implications of group cohesiveness.
5) A sound methodology to study the effects of group cohesiveness on group conformity, and on member satisfaction.
Research studies on group cohesiveness can be categorized into two types, (a) studies that look at group cohesiveness as the dependent construct, and (b) studies that look at group cohesiveness as the independent construct. To relate my study to the cohesiveness research that has been done in the past, I will briefly discuss a conceptual model of group cohesiveness introduced by D. Cartwright (1968), and then show how my own conceptual model corresponds to this broader model of group cohesiveness.

**Figure 1. Conceptual model of group cohesiveness (adapted from Cartwright, 1968).**

Figure 1 displays the broad conceptual model for the analysis of group cohesiveness introduced by D. Cartwright (1968). To describe the concept of group cohesiveness, Cartwright used the definition advanced by L. Festinger (1950) that states group cohesiveness is "the resultant of all forces acting on members to remain in the group." This resultant force comprises at least two components, (a) the *attractiveness of the group* for the members, and (b) the *attractiveness of alternative memberships* in other groups.
Cartwright proposed group cohesiveness is determined by four interacting sets of variables: (a) incentive properties of the group, consisting of group goals, programs, characteristics of group members, style of operation, prestige, and other properties of significance for the member, (b) the member's motive base for attraction, consisting of the member's needs for affiliation, recognition, security, money, and values that can be mediated by the group, (c) the member's expectancy concerning outcomes, the subjective probability, that group membership will actually have beneficial, or detrimental consequences, and (d) the comparison level, the member's conception of the level of outcomes that group membership should provide. Considering the variety of factors that supposedly determine the cohesiveness of a group, it is evident why group cohesiveness has often been treated as a construct, and not as a variable in cohesiveness studies.

The consequences of group cohesiveness, as stated in Cartwright's model, are (a) maintenance of group membership, (b) the power the group exerts over its members, (c) group member's participation and loyalty to the group, (d) personal security, and (e) self-evaluation. However, the consequence of group cohesiveness most thoroughly investigated is the power that cohesiveness gives the group to influence its members. The tenor of the studies that investigated the effects of group cohesiveness upon social influence is that members of more cohesive groups more readily exert influence on one another, and are more readily influenced by one another.

In this study, I am concerned with group cohesiveness as an independent construct. The experimental part of this study is designed to demonstrate some effects of group cohesiveness on behaviors in the group decision-making process, and on group process
outcomes. My conceptual model in Figure 2 introduces the relevant constructs I am concerned with in this study, and their proposed causal relationships.

![Conceptual Model of Group Cohesiveness](image)

**Figure 2.** Conceptual model of group cohesiveness as an independent construct.

My conceptual model can be integrated in Cartwright's broader model of group cohesiveness. Figure 3 shows my conceptual model as an integral part of Cartwright's broader model.

![Conceptual Model Integration](image)

**Figure 3.** My conceptual model is an integral part of Cartwright's conceptual model.
So far, my conceptual model introduced the constructs I am looking at in this study, and their proposed causal relationships. My conceptual model can be transformed into a process model by assigning the constructs to three subsequent phases of the group process. These phases are (a) antecedent conditions at the beginning of the group meeting, (b) behaviors that occur during the meeting, and (c) group process outcomes at the end of the meeting. Earlier research (Deutsch, Gerard, 1955; Kiesler, 1969; Crosbie, 1975) has pointed out the construct of group conformity has at least two components, compliance and acceptance. Since compliance is considered to be a behavior (Kiesler, 1969), and acceptance is considered to be a change in belief or attitude rather than a behavior (Kiesler, 1969), the construct of group conformity is split into its two components in my process model. Figure 4 shows my conceptual model as transformed into a process model.

![Diagram](image)

**Figure 4.** My conceptual model transformed into a process model.

The consequences of group cohesiveness in my process model are partitioned into (a) behaviors that occur during the group process, and (b) outcomes of the group process. I make a distinction between the outputs and the outcomes of the group process. Both

*Conceptual Models*
are results of the group process, but outputs are more tangible results than outcomes. For instance, I refer to a group decision as an output of the group process, and to member satisfaction with this decision as an outcome of the process. The reason for partitioning the consequences of group cohesiveness into behaviors and outcomes will be given later in the more detailed discussion of my conceptual model in the section group cohesiveness and group conformity. As for now, a closer look at the consequences of group cohesiveness in Cartwright's model shows that the items listed can be categorized into (a) consequences that imply behaviors, such as maintenance of group membership, the exertion of power over members, and participation, and (b) non-behavioral consequences, such as loyalty to the group, the feeling of personal security, and self-evaluation.

My interest is in group cohesiveness as one antecedent condition for a group meeting. I believe groups that differ in their level of cohesiveness show different individual and group behaviors in group meetings. I am also interested in two outcomes of group meetings, (a) acceptance of a group decision, and (b) member satisfaction with the meeting. I believe that both outcomes of group meetings are dependent on group cohesiveness in the following way: (a) members of highly cohesive groups will accept a group decision to a greater extent, and (b) members of highly cohesive groups will be more satisfied with their meeting. Several studies have demonstrated direct relationships between the constructs mentioned above. However, there are some studies that could not demonstrate these relationships. To relate my conceptual model to the research that has been done in the past, I will now briefly discuss some of the relevant findings, and propositions that have been made in the past.
Group cohesiveness and the group process

Several studies have demonstrated that differences in level of group cohesiveness are associated with different individual and group behaviors. For instance, in studies that investigated small groups under pressure to achieve uniformity on a given problem, it has generally been found that communication within the group tends to be directed more to deviants than to other group members. This effect, however, was more apparent in relatively cohesive groups (Emerson, 1954; Festinger et al., 1952; Festinger and Thibaut, 1951; Schachter, 1951). Further, Altmann and McGinnies (1960) found that both heightened pace of discussion, and frequency of opposition-directed remarks were positively related to group members’ evaluations of their groups. Pepitone and Reichling (1955) used manipulation instructions to create highly and low cohesive groups, and found that members of highly cohesive groups expressed greater hostility toward the instructor than members of low cohesive groups after having been provoked. Similarly, Berkowitz (1958) suggested that liking among group members has the effect of lowering inhibitions with regard to aggressive behavior within the group. Lott and Lott (1965) proposed there is sufficient empirical evidence for a positive relationship between the degree of interpersonal attraction existing among group members and their consequent uniformity with regard to particular opinions, attitudes, judgments, or other behavior. Both attempts to influence and successful influence by liked persons are more frequent in groups characterized by high interpersonal attraction. Even though Deutsch and Gerard (1955) were not concerned with group cohesiveness per se in their variation of the classical conformity experiment developed by Asch (1951), they proposed there is strong support for the prediction that normative social influence upon individual judgments will be greater among individuals forming a group than among individuals who do not form a group. Qualitative data from a post-experimental questionnaire indicated that subjects in
the group condition felt an obligation to agree with the other group members' opinions. It can be argued the development of normative social influence can only be based on actual behaviors that occurred in the group meeting. Something must have happened in the meeting that made the subjects perceive this feeling of obligation to their group.

**Group cohesiveness and group conformity**

In conformity studies, group cohesiveness has often been considered a significant factor affecting group conformity. Yet, the literature on group conformity includes contradictory findings about the impact of group cohesiveness on group conformity. Early studies by Festinger, Schachter, and Back (1950) suggest a direct relationship between these constructs. Festinger's theory of social comparison processes (1954) proposes the more group members are attracted to their group, the stronger will be the pressure toward uniformity concerning abilities and opinions within that group. Further, Festinger's theory maintains that stronger pressures toward uniformity manifest themselves in three ways: (a) an increased tendency to change own positions within the group, (b) an increased effort to change the position of other group members, and (c) a greater restriction of the range within which appreciable comparison is made. Of particular importance for this study is Festinger's proposition that group members who are highly attracted to their group generally tend to influence one another more often, and accept viewpoints from other group members more readily. Festinger's theory is supported by a series of laboratory studies. For instance, Back (1951) showed there were more influence attempts in groups to which the members were highly attracted than in groups to which the members were less attracted. In this study, more frequent influence attempts also produced greater changes of opinion in the groups to which the members
were highly attracted. Other evidence is based on a series of laboratory studies by Festinger et al. (1952). In Festinger's study, members who were highly attracted to their group changed their opinion more frequently than members who were less attracted to their group when they discovered that the group majority disagreed with them. Gerard (1954) also found a positive relationship between group cohesiveness and group conformity. However, later studies (Downing, 1958, Rotter, 1967, Crosbie, Stitt, and Petroni, 1973) yielded contradictory results indicating no evidence for a direct relationship between group cohesiveness and group conformity. There are various possible reasons why those studies failed to demonstrate the hypothesized relationship.

First, it is possible that studies that treated conformity as unitary concept did not account for the variation in conformity that was due to acceptance. There is considerable support for the assumption that group conformity cannot be treated as a variable. It has been suggested that conformity consists of at least two distinct components, which are compliance and acceptance. These components have been identified by several researchers independently. Most frequently, these components have been labeled normative social influence and informational social influence (Deutsch, Gerard, 1955), compliance and private acceptance (Kiesler, 1969), or normative conformity and informational conformity (Crosbie, 1975). In this study, I call these components compliance and acceptance. These components of conformity provide two distinct reasons why a person would conform to a group. Compliance, for instance, refers to a change in behavior as a result of real or imagined group pressure. This behavioral change can occur without change in actual belief. Conversely, acceptance is a change in belief toward others as a result of social influence. Thus, conformity has a behavioral dimension and a non-behavioral dimension. This is also the reason why I partitioned the
consequences of group cohesiveness in my conceptual model into behavioral consequences and non-behavioral consequences. The early conformity studies did not consider these distinct components of conformity. Examples of early conformity studies include Sherif's experiment in which he made use of the autokinetic effect to study conformity behavior (Sherif, 1935), the classical Asch experiment in which one naive individual disagreed with an unanimous majority of confederates on perceptual judgments (Asch, 1951), and Crutchfield's experiments which confronted individuals with electronically manipulated bogus group judgments (Krech, Crutchfield, Ballachey, 1962). These early studies treated conformity as a unitary concept, and the question why a person conformed was not considered explicitly.

Secondly, it is possible that the relationship between group cohesiveness and group conformity changes with the variation of moderating variables that interact with group cohesiveness. For instance, I believe that self-esteem and sociometric status are moderating variables that mediate the relationship between group cohesiveness and group conformity. Any variation of a moderating variable could change the relationship between group cohesiveness and group conformity. It is possible that moderating variables negate the effects of group cohesiveness.

Further reasons why some studies may have failed to demonstrate the hypothesized relationship between group cohesiveness and group conformity include the largely different operationalizations of the construct of group cohesiveness, different measurement approaches to group cohesiveness, and the influence of the relative sizes of group majorities and minorities which have been demonstrated to play an important role in the influence process (Moscovici, 1985).
**Group cohesiveness and member satisfaction**

The results of a field study of decision-making conferences by Marquis, Guetzkow, and Heyns (1951) yielded significant positive correlations between a cohesiveness index and member satisfaction with the group process, and with the group meeting. In a study by Exline (1957), subjects of task groups who were told they are grouped with well-matched, congenial others were more satisfied with their group's progress than subjects who received contrary instructions. In their extensive review of group cohesiveness as interpersonal attraction, Lott and Lott (1965) concluded it appears to be an empirically sound generalization that persons tend to respond favorably to situations in which liked others are present.
Three general alternative research hypotheses propose relationships between the components of my conceptual model. However, these hypotheses are not specific enough to be testable. The three research hypotheses are:

\( H_A \): Members of highly cohesive decision-making groups manifest different behaviors in the group process than members of groups with low cohesiveness.

\( H_A \): Group conformity is greater in groups with high cohesiveness than in groups with low cohesiveness.

\( H_A \): Member satisfaction with a group meeting is greater in groups with high cohesiveness than in groups with low cohesiveness.
Group cohesiveness, group conformity, and member satisfaction are the constructs in this study. Each construct will be operationalized and represented with a set of interacting variables. The three boxes in Figure 5 represent the constructs of my conceptual model. Each box displays a set of variables to operationalize and represent the construct. Like the constructs in the conceptual model, the variables are categorized into independent and dependent variables.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Closeness</td>
<td>Compliance</td>
</tr>
<tr>
<td>Interpersonal Liking</td>
<td>Acceptance</td>
</tr>
<tr>
<td>Group Affiliation</td>
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<tr>
<td>Trust</td>
<td>Member Satisfaction</td>
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<td></td>
<td>- with the group decision</td>
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<td></td>
<td>- with the group process</td>
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<tr>
<td></td>
<td>- with the group atmosphere</td>
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Figure 5. Sets of interacting variables operationalize and represent the constructs.

**Independent variables**

The independent construct in this study is group cohesiveness. I will define group cohesiveness for this study in two different ways. As a broad conceptual definition, I use a definition advanced by Festinger, Schachter, and Back (1950). Festinger, Schachter, and Back suggested group cohesiveness is "the total field of forces that act on members to remain in the group." While this definition adequately recognizes the complexity of
the construct of group cohesiveness, the definition is too general for measurement purposes. The term "total field of forces" neither specifies the number and the type of the forces that act upon a person to remain in the group, nor does it specify the relative importance of the forces for determining the cohesiveness of a group. This can be considered both a weakness and a strength of this definition. It can be considered a weakness since the definition is too general to be usable for measurement purposes. To make it usable, it first has to be operationalized. It can be considered a strength since this definition treats group cohesiveness as a multidimensional entity, and it does not delimit the research focus on a particular aspect of group cohesiveness.

The operational definition of the construct of group cohesiveness needs to be linked to the measure of group cohesiveness that I will use in the experimental part of this study. Group cohesiveness will be measured with the Wheeless Group Solidarity Scale (Wheeless, Wheeless, Dickson-Markman, 1982). I use this scale as a measure for group cohesiveness for two reasons. First, this scale can be used for the assessment of group cohesiveness in emerging groups. Secondly, this scale has been found to be unidimensional (Wheeless, Wheeless, Dickson-Markman, 1982). The Wheeless Group Solidarity Scale includes 18 items assessing the components of psychological closeness, interpersonal liking, group affiliation, and trust. Therefore, I operationally define group cohesiveness as a construct with the interrelated components of psychological closeness, interpersonal liking, group affiliation, and trust.
**Dependent variables**

I am concerned with the dependent constructs of group conformity, and member satisfaction. I believe that group conformity and member satisfaction are dependent on group cohesiveness.

**Group conformity**

Group conformity has been defined as a change in behavior or belief toward a group as a result of real or imagined group pressure (Kiesler, 1969). According to Kiesler, group pressure refers to the process by which a group seeks to impose its influence on a person. Kiesler's definition suggests group conformity can be either a change in behavior, or a change in belief. Of course, change in behavior and change in belief can occur simultaneously. Still, it is necessary to recognize there can be different reasons for conformity behavior. The conformity literature suggests there are two distinct reasons why a group member would conform to a group. First, the group member, after being exposed to influence attempts by the group, may yield to real or imagined group pressure without accepting the group opinion. In this case, a change of behavior occurs without change of belief. The literature refers to this kind of conformity as normative social influence (Deutsch, Gerard, 1955), compliance (Kiesler, 1969), or normative conformity behavior (Crosbie, 1975). Secondly, a group member, after being exposed to influence attempts by the group, may yield to real or imagined group pressure because he or she is really convinced by the arguments advocated by other group members. In this case, a real change of belief occurs. The literature refers to this type of conformity as informational social influence (Deutsch, 1955), private acceptance (Kiesler, 1969), or informational conformity behavior (Crosbie, 1975). In this study, I will not treat conformity as a unitary entity. Instead, I will separately assess and measure the two
distinct components of conformity. Acceptance of social influence, and compliance with the group will be treated as separate variables in this study.

**Member satisfaction**

I am interested in three aspects of member satisfaction in decision-making groups. These aspects are (a) member satisfaction with the group decision, (b) member satisfaction with the group process, and (c) member satisfaction with the group atmosphere. I believe these three aspects of satisfaction are interdependent, and each aspect contributes to some degree to total member satisfaction with the group.

**Moderating variables**

I believe the relationships between the independent and the dependent variables can be mediated by various moderating variables. In this study, I investigated the effect of three moderating variables that have been suggested to mediate group conformity. These variables are gender, self-esteem, and the perceived sociometric status of group members. Further, I believe that other moderating variables can also be important in the social influence process. For instance, interdependency of group members, and expected future interaction have been suggested to affect conformity behavior (Moscovici, 1985). The interdependency of group members, and expected future interaction were not relevant in the experimental part of this study because the subjects were randomly assigned to groups, they did not know one another, and the groups were unlikely to remain groups after the experiment. Figure 6 lists all independent, dependent, and moderating variables that were considered in this study.

*Variables*
Figure 6. Moderating variables mediate between independent and dependent variables.

Self-esteem

Rosenberg (1989) suggested an individual's self-conception influences his behavioral orientation toward the world. To identify characteristics of pure or ideal personality types, Rosenberg used his self-esteem scale to distinguish egophile (high self-esteem) and egophobe (low self-esteem) personalities. Subjects of both categories were extensively interviewed. Their self-descriptions were used to model the conceptual self-image of both egophile and egophobe personalities. Rosenberg concluded egophobes tend to feel threatened by other people, they are hypersensitive to criticism, they don't like to compete with others, and they lack confidence in their own judgment. In contrast to egophile personalities, egophobes tend to describe themselves as "easily led," "usually gives in," "let others make the decision," "too easily influenced," and "lacks self-confidence." They tend to be passive in group discussions and are less likely to assume
group leadership. High self-esteem and low self-esteem personalities are expected to behave differently in the group decision-making process. I believe group members with low self-esteem will comply more frequently with their group than members with high self-esteem in the experimental part of this study.

Sociometric status

I will examine the effects of the moderating variable perceived sociometric status of group members. Moscovici (1985) concluded about the relationship between the social status and social influence: "there is certainly a correlation between one's position on the social scale and the degree of influence exerted or experienced. This is not a linear correlation, however." Moscovici argued further that high status group members don't have anything to gain by conforming to the group, and low status group members don't have anything to loose by not conforming to the group. Consequently, one could expect that only group members who rank in the middle ranks of the social status scale benefit from conforming, or fear a loss from non-conforming. In my experiment, group members who rank in the middle ranks on the social status scale are expected to conform more frequently to their group than members who rank in the upper and lower ranks.
I will explain the relationships between the independent and the dependent constructs of my conceptual model within two theoretical frameworks. These frameworks are Heider's theory of cognitive balance, and Festinger's theory of social comparison processes.

**Heider's theory of balance**

Heider's theory of cognitive balance (1958) describes balanced and unbalanced cognitive systems. A cognitive system consists of cognitive elements and their relations among one another. A cognitive element may be any single identifiable and distinguishable cognitive entity, for instance a group, a person, an object, an opinion, a value, or a behavior. Heider groups all possible relations between cognitive elements into four categories: positive and negative unit relations, and positive and negative sentiment relations. Unit relations exclusively describe factual relationships, whereas sentiment relations involve emotional and evaluational aspects. Examples for positive unit relations are: A is member of the group B, or A holds the opinion B. Examples for negative unit relations are: A doesn't share the opinion B, or opinion A contradicts opinion B. Examples for positive sentiment relations are: group member A likes group member B, or group member A likes the group B. Examples for negative sentiment relations are: group member A doesn't like group member B, or group member A doesn't like the group B, and so forth. Heider's basic concept is that of the balanced state. A balanced state refers to a situation in which perceived cognitive elements "co-exist without stress" (Heider, 1958, p.176). This means that all relations between the cognitive elements are either positive, or negative. Figure 7 shows examples of balanced and unbalanced states of cognitive systems with the cognitive elements P, A, and B. To
show how Heider's theory is relevant in my study, I will illustrate a possible scenario in my experiment. Referring to the cognitive system number (1), P is a member of a highly congenial group. The cognitive element A is the group to which the person P belongs, and the cognitive element B is an opinion the group holds. There is a positive unit relation between the person P and the group A since P is a member of the group A. Now, if the group A holds the opinion B, the cognitive system is only balanced if the person P shares the group opinion B. If the person P doesn't share the group opinion B, the cognitive system would be unbalanced. In that case, the unbalanced cognitive system (7) in Figure 7 appropriately describes the scenario.

Figure 7. Balanced and unbalanced cognitive systems (adapted from Herkner, 1986).

Heider maintains that under most conditions there is a general tendency toward a balanced state. In general, people prefer to achieve balanced cognitive systems. People
can achieve cognitive balance by changing unit or sentiment relations wherever it is possible. In this experiment, one could expect, for example, that deviant members of highly cohesive groups change their position and move closer to their group's position, unless they have strong reasons to maintain their position. One could also expect that deviant members of low cohesive groups change their position less frequently because they do not perceive the cognitive system to be unbalanced.

Another prediction that can be made from Heider’s theory of balance is that people who perceive one another to be similar tend to like one another (Lott, Lott, 1965). The manipulation of group cohesiveness in my experiment is based on this assumption. The subjects in this experiment were led to believe they are assigned to congenial work groups based on their responses to pre-experimental questionnaires. If the manipulation was successful, the students believed they were similar to their group partners. If the subjects in this experiment strive towards balanced cognitive states, they should tend to like one another as a consequence of perceived similarities.

**Festinger's theory of social comparison**

Festinger's social comparison theory (Festinger, 1950, 1954) rests upon the basic assumption that people have a need to evaluate their personal opinions and abilities. Festinger believes that opinions can be ordered on a continuum from physical reality to social reality. Opinions which fall in the domain of physical reality are objectively testable. Opinions which fall in the domain of social reality are not verifiable by any objective means. The verification of opinions in the domain of social reality is of particular importance to people since they are dependent on other people to verify their
opinions. Festinger's theory proposes the means to verify personal opinions are social comparison processes. Festinger proposed that to the extent that objective means are not available, people evaluate their opinions and abilities by comparing them with the opinions and abilities of others. Thereby, the choice of people with whom the comparison is made is critical. According to Festinger, only those people will be chosen for comparison who are similar to the individual in important aspects such as social level, attitudes, educational level, age, or others. Specifically, Festinger argued that the tendency to compare oneself with some other specific person decreases as the difference between the opinions or abilities increases. Consequently, a comparison will not be made with persons holding opinions that are very divergent from one's own opinion. In this case, if both physical and social comparison are impossible, any subjective evaluation or opinion would be unstable. With respect to my study, several derivations from Festinger's theory of social comparison are relevant.

The existence of a discrepancy in a group with respect to opinions or abilities will lead to action on the part of members of that group to reduce the discrepancy (Festinger, 1954, p.124).

When a discrepancy exists with respect to opinions or abilities there will be tendencies to change one's position so as to move closer to others in the group (Festinger, 1954, p.126).

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3 Although most of Festinger's derivations consider abilities and opinions, I am only concerned with opinions in this study.
When a discrepancy exists with respect to opinions or abilities there will be tendencies to change others in the group to bring them closer to oneself (Festinger, 1954, p.126).

In my experiment, I expected group members who make divergent judgments on an experimental rank-ordering task to reduce these discrepancies through social comparison with one another. The group members have no means readily available to verify their personal opinions about their ranking of the items. Therefore, their judgments fall largely in the domain of social reality. I expected group members to move closer to a group judgment when they were instructed to repeat the rank-ordering task as individuals. There are three more derivations from Festinger's theory of social comparison that are relevant in my experiment.

The stronger the attraction to the group the stronger will be the pressure toward uniformity concerning abilities and opinions within that group (Festinger, 1954, p.131).

Any factors which increase the importance of some particular group as a comparison group for some particular opinion or ability will increase the pressure toward uniformity concerning that ability or opinion within that group (Festinger, 1954, p.130)

When a discrepancy exists with respect to opinions or abilities there will be tendencies to cease comparing oneself with those in the group who are very different from oneself (Festinger, 1954, p.128).
Members of highly cohesive groups are probably more attracted to their group than members of low cohesive groups. Therefore, highly cohesive groups are more important for members as comparison groups than low cohesive groups. According to Festinger, pressures toward uniformity are greater in groups to which the members are more attracted. Therefore, I believe that individuals in highly cohesive groups will change their position more frequently, and will try to influence others in their group more frequently than members of low cohesive groups. The group process should last longer because the total amount of communication is expected to be greater. If there are discrepancies between opinions in low cohesive groups, group members are expected to compare their opinions with the opinions of their group partners to a lesser extent. If members of low cohesive groups perceive their group partners to be very different concerning opinions or abilities, they are expected to cease comparisons with one another. One more derivation from Festinger's theory is relevant.

A person will be less attracted to situations where others are divergent from him than to situations where others are close to him for both abilities and opinions (Festinger, 1954, p.123).

If people are less attracted to situations in which others are divergent from them, they are presumably less satisfied with the situation they are in. Members of low cohesive groups, therefore, are generally expected to be less satisfied with a group meeting than members of highly cohesive groups.

Individuals who compare their opinions with the opinions of their group partners can experience one of three situations.
First, there can be agreement about an opinion within the individual's reference group, and between the individual and the group. In that case, the individual is likely to consider the judgments made by the group partners as evidence for reality.

Secondly, there can be agreement about an opinion within the individual's reference group, but a discrepancy between the group opinion and the individual's opinion. In that case, the group most likely tries to persuade the deviant group member. To some extent, the group will exert group pressure upon the deviant group member, and most of the influence attempts will be directed toward the deviant. In that situation, the deviant has to decide whether to conform to the group, or maintain the divergent position. Factors that influence this decision can include the deviant's desire to remain in the group, the strength of the perceived group pressure, the deviant's stake in maintaining the divergent position, the deviant's certainty about the validity of the divergent position, and personality variables if they have behavioral consequences. Deviants who have no objective means available to verify their opinion, and who have no strong reasons to maintain their position are likely to change their opinion by moving closer to the group. The deviant conforms to the group. According to Festinger, the degree to which the deviant accepts the group opinion is largely dependent on the attractiveness of the source of influence. Festinger says the attractiveness of the influencing other mediates acceptance of the influence, whereas most other variables in the social influence process produce compliance without acceptance.

Third, there is no agreement about the issue within the group. Most likely, individual group members advocate positions and try to find support within their group. Frequently, there will be a majority and one or more minorities within the group. How
the group ultimately makes the decision depends on behavioral characteristics of individual group members, it depends on variables such as size of the majority or minority, and it depends on perceptual variables such as independence of members, expertise, objectivity, confidence, consistency, and rigidity.

**Group composition and group behavior**

There have been many arguments about the concept of group behavior. The most obvious definition that has been provided is that group behavior is the total of all individual behaviors that occur in a group process. Any variance in group behavior could simply be considered a consequence of specific personality characteristics of the individuals who are forming the group. However, many researchers have proposed that group composition accounts for at least part of the total variance of group behavior. In an early experiment, Rosenberg, Erlick, and Berkowitz (1955) verified that group assembly is a determinant of group behavior. In their experiment, they isolated the effects of individual personality characteristics upon group behavior with a special experimental design. By shifting the membership of three triads in two experimental conditions, they were able to rule out that differences in the functioning of the triads could be accounted for by differences in attributes of the individuals who formed a triad. The results of their investigation supported the hypothesis that individuals contribute differently to the group product, depending upon the particular other individuals with whom they form a group. The effects of group composition were also investigated in a study of peer learning groups by Shaw, Ackerman, McCown, Worsham, Haugh, Gebhardt, and Small (1979). They found that the performance of students varied depending upon which other students were members of the same group. Shaw (1981)
later proposed there is sufficient empirical evidence that the way groups are assembled from a given set of persons is an important determinant of the group process. He introduced the term "assembly effect" to refer to those variations in group behavior that are consequence of particular combinations of persons, apart from the effects produced by the specific characteristics of group members. The study of the specific factors that contribute to this effect readily leads to the concept of group cohesiveness.

**Group cohesiveness**

Group cohesiveness has been defined in very different ways. The following definitions of group cohesiveness show how this construct has been interpreted differently. Perhaps still most frequently cited are two early definitions of group cohesiveness advanced by Festinger, Schachter, and Back, and by Festinger. Festinger, Schachter, and Back (1950) suggested that group cohesiveness is "the total field of forces that act on members to remain in the group." In the same year, Festinger offered a modified version of this definition. Festinger (1950) proposed group cohesiveness is "the resultant of all forces acting on members to remain in the group." Both definitions are very general, and too comprehensive for measurement purposes. To identify the forces that act on members to remain in their group, researchers developed more specific definitions of group cohesiveness. For instance, Lott and Lott (1965) defined group cohesiveness as a group property which is inferred from the number and strength of mutual positive attitudes among the members of a group. Wolf (1979) defined group cohesiveness as the degree to which group members are affiliated with one another. Sherif and Sherif (1969) used the term cohesiveness as a synonym for solidarity. Sherif and Sherif further proposed group cohesiveness is related to the scope and the importance of group activities in the
lives of the members, to the duration of members' association with the group, and to successes and failures in coping with group problems, or in achieving mutual goals. While Sherif and Sherif noted the determinants of group cohesiveness are manifold and complex, they acknowledged that interpersonal attraction is an important aspect of group cohesiveness. Frequently, researchers offered modifications of Festinger's early definitions. For instance, McGrath (1978) defined group cohesiveness as the sum of positive and negative forces of attraction of group members to each other. Instead of providing an explicit definition, some researchers used metaphors to describe the phenomenon of group cohesiveness. For instance, Sherif and Sherif (1969) suggested cohesiveness is the *cement* binding the members of a group together. Shaw (1981) suggested group cohesiveness is the degree to which the group coheres or *hangs together*. Shaw (1981) proposed further, that group cohesiveness has at least three different meanings: (a) attraction to the group, including resistance to leaving it, (b) morale, or the level of motivation evidenced by group members, and (c) the coordination of efforts of group members. Shaw (1981) noted that most people agree that group cohesiveness refers to the degree to which group members are motivated to remain in the group. Other forces that have been considered to be determinants of group cohesiveness include the involvement and identification with the group, its goals and activities (Cartwright, 1968), the group's ability to satisfy its members' needs (Zander 1982), and member's desire for group success (Zander, 1982).

Frequently, group cohesiveness has been operationalized as the desire to remain in the group. For instance, Zander (1982) suggested that group cohesiveness is the strength of group members' desire to remain group members. I believe the desire to remain a the group is more a consequence of group cohesiveness rather than a component of group
cohesiveness. It is conceivable that components such as closeness, liking, group affiliation, or trust in the group have an immediate impact on the desire to remain in the group. In that perspective, the desire to remain in the group is dependent on the components of group cohesiveness. I believe the desire to remain in the group is an immediate outcome of group cohesiveness. Since it is possible that members' expressed desire to remain in the group is highly correlated with group cohesiveness, I would agree that the desire to remain in a group can reflect the level of cohesiveness in a group. However, I believe the desire to remain in the group should not be used as a measure for group cohesiveness.

More recent definitions of group cohesiveness were no more consistent in the assessment of the construct. Staw (1975) equated group cohesiveness with group spirit. Anderson (1975) defined group cohesiveness in terms of group members' involvement in the group task; Gruen (1981) proposed group cohesiveness relates to the reorganization of need systems and channels of expression arising from the totality of forces encountered in the group, and Carron (1982) defined group cohesiveness as "a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives."

Researchers have never agreed upon which aspects or forces of group cohesiveness are central to the construct. In their extensive review of the early cohesiveness research, Lott and Lott (1965) concluded there is good reason to assume that interpersonal attraction, liking, or positive attitudes among group members, is central to the cohesiveness of small groups. Roark and Sharah (1989) suggested that trust, defined as the sense of confidentiality and security of the members in a group, may underlie the entire small
group process. Further, Roark and Sharah found that the components of empathy, self-disclosure, acceptance, and trust are significantly intercorrelated, and significantly correlated with a measure of group cohesiveness. Johnson and Fortman (1988) factor analyzed the Gross Cohesiveness Scale (Gross, 1957). The analysis yielded a two factor solution, and the factors were labeled "cognitive aspects," and "affective aspects." Johnson and Fortman proposed that the affective aspects of group cohesiveness include the components attraction, and belongingness. Wheeless, Wheeless, and Dickson-Markman (1982) said that group solidarity taps the "togetherness" or "closeness" of a group. They proposed that group solidarity could be considered a good measure of cohesion or the social-affective dimension of a group.

While some scientists prefer to define group cohesiveness in a very narrow sense, others provide very comprehensive definitions. Furthermore, while some researchers suggest that group cohesiveness is a unitarian concept, others treat cohesiveness as a multidimensional construct. Based on the literature that was reviewed, it must be concluded that more research is necessary to clarify the construct of group cohesiveness, to identify those components that are central to the construct, and to derive an operational definition for group cohesiveness that is generally applicable. Based on the literature that was reviewed, it is not surprising that group cohesiveness has been considered "a diffuse concept implying more than stated in any of its definitions" (Dubin, 1978). Mudrack (1989) went one step further when he suggested "the construct of group cohesiveness has thus far proven to be, in a very real sense, undefinable."
Antecedents of group cohesiveness

The following list suggests antecedents of group cohesiveness. Researchers concluded there is sufficient evidence for these antecedents.

1) The more the members of a group are attracted to one another, the greater will be the group's cohesiveness (Cartwright, 1968).

2) The more the members of a group are attracted to the group as a whole, the greater will be the group's cohesiveness (Cartwright, 1968).

3) The more the members of a group identify themselves with their group, its goals, and its activities, the greater will be the group's cohesiveness (Cartwright, 1968).

4) The knowledge that others have similar attitudes determines the cohesiveness of a group (Shaw, 1981).

5) The attraction to a group will increase with increasing similarity among members (Cartwright, 1968, Festinger, 1954). Cartwright concluded more explicitly, that similarity with respect to values, interests, attitudes, and beliefs that are important to the members of a group usually heightens attraction to the group, but that dissimilarity may also sometimes be a source of attraction.

6) Homans (1950) has proposed the general hypothesis that if the frequency of interaction between two or more persons increases, the degree of their liking for one another will increase, and vice versa.

7) If members of a group encounter threatening or ambiguous situations, their attraction to the group will increase, unless they believe the group itself to be the source of their disturbance (Cartwright, 1968).

8) Aronson and Mills (1959) demonstrated that subjects who underwent a severe initiation before becoming a group member perceived the group as being
significantly more attractive than did subjects who underwent a mild initiation, or no initiation. It can be expected that group cohesiveness is greater in groups which require sacrifices from their members to maintain group membership. Similarly, Zander (1982) suggested that group cohesiveness can be increased by giving members the chance to make sacrifices for their group.

9) Deutsch (1949) found empirical support for the hypothesis that people who are cooperatively interdependent develop attraction to one another. Cooperative groups displayed more symptoms of high cohesiveness. Compared to competitive groups, the members of cooperative groups liked one another more, made more attempts to influence one another, accepted influence attempts more readily, and were more friendly in their behavior.

10) Sherif and Sherif (1953) found that intergroup competition promotes close interpersonal relations within groups. Cartwright (1968) concluded it is the common threat to the members of a group, posed by a common enemy or opponent, that draws members together.

**Consequences of group cohesiveness**

The following list suggests consequences of group cohesiveness for which researchers have concluded there is empirical support. These consequences are:

1) Members of groups with high cohesiveness more readily exert influence on one another and are more readily influenced by one another (Festinger, 1954; Cartwright, 1968).
2) Group cohesiveness facilitates verbal interaction (Shaw, 1981). Shaw summarized that members of highly cohesive groups are cooperative, friendly, and generally behave in ways designed to promote group cohesiveness, whereas members of low cohesive groups behave more independently, and with little concern for others in their group.

3) Members of groups with high cohesiveness conform more to the norms of a group than members of groups with low group cohesiveness (Cartwright, 1968).

4) Cartwright (1968) concluded that cohesiveness has an effect on participation and loyalty to the group: "several studies have shown that as cohesiveness increases there is more frequent communication among members, a greater degree of participation in group activities, and a lower rate of absences" (Cartwright, 1968, p.104).

5) Cartwright (1968) proposed there is sufficient evidence for several consequences of group cohesiveness. As group cohesiveness increases, the more power has the group to bring about conformity to its norms and to gain acceptance of its goals and assignment to its tasks and roles. Highly cohesive groups provide a source of security for members which can serve to reduce members' anxieties and to increase members' self-esteem.

6) Groups with high cohesiveness manifest a higher sense of social belonging, acceptance, trust, and caring for the individual than groups with low group cohesiveness (Zander, 1982).

7) Groups with high cohesiveness are a more frequently concerned with issues of group maintenance than groups with low cohesiveness (Zander, 1982).

8) Members of groups with high cohesiveness are more likely to adhere to group standards, norms, and rules than members of groups with low cohesiveness (Cartwright, 1968).
9) Members of groups with high cohesiveness are more willing to disregard their own concerns, and sacrifice personal advantages for the benefit of the group than members of groups with low cohesiveness (Zander, 1982).

10) Group member's influence on group decision-making depends on how sympathetic they are perceived to be. Brandstaetter (1976) and Schuler (1975) demonstrated in their experiments that sympathetic group members are more successful in manipulating the group than are neutral, or antipathetic group members.

11) Higher levels of cohesion in groups will lead to higher levels of empathy, acceptance, self-disclosure, and trust (Roark, Sharah, 1989).

Wolf (1979) examined the effects of group cohesiveness\(^4\) upon the capability of a group minority to influence a group majority. Wolf defined group members who deviate from an initial group judgment as group minority. Wolf's experiments demonstrated that minority members have a greater influence on a group decision in groups with high group cohesiveness than in groups with low group cohesiveness. Obviously, the degree to which group members are affiliated with each other determines the degree to which individual group members can influence group decision-making. Heider's theory of balance can be applied to explain Wolf's findings. Under Heider's central assumption that people seek balanced cognitive systems, it could be predicted that group members of groups with high cohesiveness are more willing to tolerate, accept, and support one another's views and suggestions in decision-making situations. In groups with low group cohesiveness, group members who dislike one another are likely to disagree with others' views and suggestions.

\(^4\) Wolf labeled the independent construct group cohesion.
In a field study of 32 R&D groups consisting of 221 technical professionals, Robert T. Keller (1986) investigated predictors of group performance. Keller used questionnaires to gather information about group predispositions like group size, group cohesiveness, group task, physical distance between group members, and individual predispositions like education and age of members, job satisfaction, and innovative orientation. Further, Keller had group members evaluate their group's performance using the performance criteria project quality, budget and cost performance, meeting schedules, and value to the company. The results of Keller's analysis revealed that group cohesiveness was the only variable that was consistently related to the performance factors identified by the groups. Keller's results suggest managers of R&D project groups should foster the development of group cohesiveness.

**Group conformity**

There have been considerable research efforts to study the conditions under which group members conform to their group. Sherif (1935) has been regarded the pioneer in conformity research. He took advantage of a well known perceptual effect, commonly called the autokinetic effect, to examine determinants of conformity. The autokinetic effect refers to the following situation: for a short moment, a person who sits in a darkened room is exposed to a small spot of light; to the person the light appears to be moving even though the light source is in fact stationary. At first, the subject can practice estimating the distance the light is moving without experimental interference. This is done to make sure the subject develops a stable frame of reference for estimating distances of the movement. Then, the subject is confronted with a number of confederates who hold and maintain divergent estimates in a group situation. The
dependent variable in these studies is always the degree to which subjects change their estimate of the light's movement to reduce the difference from the group's estimate. The autokinetic situation is a very ambiguous situation, and the subjects have no objective means available to test the correctness of their judgment. In a series of studies, it could be demonstrated that a greater number of influence attempts leads to greater conformity (Sherif, 1935). Figure 8 shows how individual estimates of the light's movement in an autokinetic situation converge in subsequent group sessions.

![Figure 8](image.png)

**Figure 8.** Group members converge with their judgments in ambiguous situations (adapted from Herkner, 1986).

In other autokinetic experiments, it could be shown that individuals believe in the validity of their group's judgment over a remarkably long time. Bovard (1948) demonstrated that subjects, after 28 days, still gave individual estimates that were close to their group's estimate. Individual estimates in a study by Rohrer, Baron, Hoffman, and Swander (1954) didn't change significantly even after one year. Many more experiments
have employed the autokinetic phenomenon to investigate determinants of conformity. For instance, Mausner (1954) modified Sherif's experiment to investigate the effects of reinforcement of judgments on conformity. In two experimental conditions, he used 82 percent positive reinforcement and 82 percent negative reinforcement plans to manipulate the subjects' confidence in their judgments. Mausner showed that subjects who were confident about the correctness of their judgment were unlikely to change their judgment in a group situation. Only those subjects who were uncertain about their judgments changed their judgment and moved closer to their group. Sampson and Insko (1964) used the autokinetic phenomenon to demonstrate that conformity is dependent on interpersonal attraction. In the experiment, the subjects had to exchange their judgments about the light's movement in a dyad. The group partner who was a confederate of the experimenter never changed his judgment about the light's movement. There were four experimental conditions, (a) sympathetic confederate, similar judgments, (b) sympathetic confederate, dissimilar judgments, (c) antipathetic confederate, similar judgments, and (d) antipathetic confederate, dissimilar judgments. Interpersonal attraction was manipulated by changing the confederate's behavioral orientation toward the subjects. In the sympathy condition, the confederate started a friendly conversation and appeared to be warmhearted. In the antipathy condition, the confederate made nasty remarks and appeared to be cold-hearted. It could be shown that subjects who liked the confederate changed their opinion more often if the confederate advocated a different opinion. As expected, there were no opinion changes in the experimental conditions (a) and (d). Also, subjects who didn't like the confederate but had similar judgments tended to diverge from the confederate's judgment. The experimental results of this study strongly support Heider's theory of cognitive balance.
Experiments by Asch (1951) investigating a group member's independence of judgment showed that group members who are assigned to considerable group pressure are more likely to conform to a group opinion than are subjects who are not assigned to group pressure. Results of a study by Deutsch and Gerard (1955) strongly supported the hypothesis that normative social influence upon individual judgment will be greater among individuals forming a group than among individuals who do not compose a group. Normative social influence was defined as the influence to conform with the positive expectations of another whose fulfillment leads to or reinforces positive rather than negative feelings. The results suggest the mere fact that individuals form a group produces a feeling of obligation to the group. Group members were willing to conform to an obviously incorrect group opinion because they had this feeling of obligation.

Crosbie (1975) defined conformity behavior as a behavior in accordance with the standards and beliefs (including norms) of a group. Depending on a group member's motivation to conform to others' standards and beliefs, conformity behavior can be categorized into three groups: (a) informational conformity, (b) normative conformity, and (c) obedience. Informational conformity refers to the acceptance of the standards and beliefs of others as evidence for reality. Normative conformity refers to the acceptance of the standards and beliefs of others as a means of fulfilling real or imagined expectations of others. In contrast to informational conformity, normative conformity involves the existence or at least the imagined existence of social pressures. Obedience refers to the acceptance of real or imagined leadership expectations. Obedience might properly be regarded as a special case of normative conformity since it also involves conformity to others' expectations. However, obedience is different from normative
conformity since it pertains to uncritical acceptance of authority and suspension of judgment in a leader-follower relationship.

**Consequences of non-conformity**

Group members have to discuss their viewpoints to reach agreement in the group. The greater the discrepancies between individual opinions, the more difficult is it for the group to agree on an issue and to come up with a group decision. It is particularly difficult to reach agreement if group members propose extreme viewpoints and refuse to conform to their group. In this situation, it is critical for the group to manipulate group members with extreme viewpoints. Festinger and Thibaut (1951) demonstrated in an experiment, the greater the deviation of a group members viewpoint from the group average, the higher is this group member's passive communication status in the group. Further, the total communication frequency within the group is dependent on two variables, (a) the importance of the object discussed by the group, and (b) the attractiveness of the group to the group members. The more important the issue to the group, the higher is the total frequency of communication. And, the more attractive the group is to individual group members, the higher is the total frequency of discussion. Festinger and Thibaut (1951) propose a mechanism how group members with extreme viewpoints may be excluded from their group. Initially, the passive communication status of a group member who proposes an extreme viewpoint will rise. However, if the group perceives the deviant sustains the extreme viewpoint, the communication frequency between the group and the deviant will dramatically decrease. In this way, the group may exclude non-conforming group members from the group. As Schachter (1951) noted, the sociometric status of non-conforming deviants decreases significantly.
Eight alternative hypotheses will be tested in the experimental part of this study. For each hypothesis, the specific purpose for testing the hypothesis will be provided.

**H1:** The Wheeless Group Solidarity Scale will be positively correlated with Evans and Jarvis Group Attitude Scale.

**Purpose:** To provide evidence that the Wheeless Group Solidarity Scale is a valid measure for group cohesiveness, I correlated the responses to this scale with the responses to the Group Attitude Scale developed by Evans and Jarvis. Since both measurement instruments have been used to measure and represent the construct of group cohesiveness, I expected them to be highly correlated. For all further analyses, however, the Wheeless Group Solidarity Scale was used as the measure for group cohesiveness since it has been found to be unidimensional.

**H2:** Group members who are assigned to the high cohesiveness treatment will score higher on Wheeless Group Solidarity Scale than group members who are assigned to the low cohesiveness treatment.

**Purpose:** The purpose of this hypothesis was to test whether the technique I used to manipulate group cohesiveness actually induced the subjects to perceive different levels of group cohesiveness. Since the manipulation successfully discriminated between the groups, I labeled the two experimental treatment conditions "high cohesiveness" and "low cohesiveness."
H₃: Group members who score high on the Wheeless Group Solidarity Scale will score higher on the measure of member satisfaction than will those group members who score lower on the Wheeless Group Solidarity Scale.

Purpose: The purpose of this hypothesis was to test, on an individual level of analysis, whether there is a relationship between perceived group cohesiveness and member satisfaction.

H₄: Group members who score high on the Wheeless Group Solidarity Scale will score higher on the measure of acceptance than will those group members who score lower on Wheeless Group Solidarity Scale.

Purpose: The purpose of this hypothesis was to test, on an individual level of analysis, whether there is a relationship between perceived group cohesiveness and acceptance.

H₅: Group members who are assigned to the high cohesiveness treatment will exhibit a higher degree of compliance than group members who are assigned to the low cohesiveness treatment.

Purpose: The purpose of this hypothesis was to test, on an individual level of analysis, whether there is a relationship between the categorical variables of treatment condition and compliance.
H6: The prediction of acceptance will be possible from knowledge of perceived group cohesiveness, gender, self-esteem, sociometric status, and satisfaction.

Purpose: The purpose of this hypothesis was to uncover determinants of acceptance, and to examine the extent to which these determinants affected an individual's acceptance of influence.

H7: The prediction of satisfaction will be possible from knowledge of perceived group cohesiveness, gender, self-esteem, sociometric status, and acceptance.

Purpose: The purpose of this hypothesis was to uncover determinants of satisfaction, and to examine the extent to which these determinants affected an individual's satisfaction with a group meeting.

H8: Groups that are highly cohesive need more time to accomplish a decision-making task than groups that are less cohesive.

Purpose: The purpose of this hypothesis is to test, at the group level of analysis, whether there is a relationship between the cohesiveness of a group and the time the group needed to accomplish a decision-making task.


**Type of Research**

Kerlinger (1986) classified research into four categories: experiments, field or quasi experiments, field studies, and survey research. According to this classification, this research is an experimental study. I chose to do a laboratory experiment since it allowed me to maintain the greatest possible control over the experimental conditions. I derived my hypotheses from relevant theories that have been established in the past. I tested these hypotheses by measuring and comparing the behaviors and responses of subjects in the different treatment conditions. If I had chosen to do a field experiment, I would have to investigate the effects of group cohesiveness in real groups, for instance in fraternity and sorority groups. A field experiment would require the use of low cohesive control groups since I want to draw conclusions about effects of different levels of group cohesiveness on several dependent variables. I would have to make sure both types of groups really differ in their level of cohesiveness. Since real groups are likely to differ from control groups in more aspects than only group cohesiveness, full control of the experimental conditions would not be possible, and extraneous variance would be introduced to the experiment.

Another way to classify research is according to research goals or objectives. One objective of my study is to confirm the hypothesized relationships between group cohesiveness and group conformity, and between group cohesiveness and member satisfaction. I did confirmatory research because I aimed to confirm relationships that have been hypothesized and tested in the past. Another objective of my study is to

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5 Actually, this procedure requires one to look at two different populations.
examine why the research that has been done in the past could not consistently demonstrate the hypothesized relationships. Therefore, I investigated the effect of some moderating variables that have been suggested to mediate between the constructs of interest. With respect to examining moderating variables, I did exploratory research since it has not been understood to what extent and how those variables mediate the relationships.

**Population**

The population I investigated in my experiment were undergraduate students. The students were drawn from seven undergraduate classes in the Sociology Department at Virginia Polytechnic Institute and State University.

**Experimental Task**

In the experiment, the subjects had to work on individual tasks and group tasks. Both individual and group tasks required the subjects to complete rank-ordering exercises. The first exercise was the Lost on the Moon exercise developed by NASA (Appendix G). The subjects had to do this exercise as individuals and as groups. The second exercise was the Lost at Sea exercise developed by Nemiroff and Pasmote (1975) (Appendix K). This exercise is very similar to the Lost on the Moon exercise, the only difference is the scenario that is given in the exercise. The subjects had to work on the Lost at Sea exercise as individuals. NASA experts developed a correct ranking of the items for the Lost on the Moon exercise, and officers of the United States Merchant Marines developed a correct ranking for the Lost at Sea exercise. I used these expert rankings to determine the best individual and group performance on the experimental tasks.
The rank-ordering exercises were chosen for this experiment since they require the subjects to make informational and attitudinal judgments. Frequently, real world decision-making groups have to make decisions based on the relevant information available to the group. However, if the problem is too complex, too ambiguous, or if relevant information is not available, group members of decision-making groups frequently approach the problem by making attitudinal judgments based on their experience, preferences, and personal beliefs. To reach the best group decision in this experiment, the group members had to make informational and attitudinal judgments.

Lost on the Moon exercise:

The Lost on the Moon exercise is a rank-ordering task that is commonly used to demonstrate that the quality of a group decision, on average, is superior to the quality of individual group member's decisions. The Lost on the Moon exercise introduces the subjects to the following scenario:

You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During landing, much of the equipment aboard was damaged, and, since survival depends on reaching the mothership, the most critical items available must be chosen for the 200 mile trip. Below are listed the 15 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance to your crew in allowing them to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, through number 15, the least important.
Lost at Sea exercise:

This exercise is very similar to the Lost on the Moon exercise, and it is used for the same purpose. The Lost at Sea exercise introduces the subjects to the following scenario:

You are adrift on a private yacht in the South Pacific. As a consequence of a fire of unknown origin, much of the yacht and its contents have been destroyed. The yacht is now slowly sinking. Your location is unclear because of the destruction of critical navigational equipment and because you and your crew were distracted trying to bring the fire under control. Your best estimate is that you are approximately one thousand miles south-southwest of the nearest land. Below is a list of fifteen items that are intact and undamaged after the fire. In addition to these articles, you have a serviceable rubber life raft with oars large enough to carry yourself, the crew, and the items listed below. The total contents of all survivors' pockets are a package of cigarettes, several books of matches, and five one-dollar bills. Your task is to rank the fifteen items listed below in terms of their importance to your survival. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, through number 15, the least important.

Groups

Group size plays an important role in the group decision-making process. Generally, the smaller the group, the more stake the group members have in the outcomes of the group process. The larger the group, the greater is the diffusion of responsibility within the group. I assigned the subjects to four-person groups. I chose a group size of four persons for two reasons. First, with the same number of subjects, a smaller group size yields more groups, and the power of the statistical tests I used for data analysis was
greater. A second consideration is based on some characteristics of the influence process in small groups. Researchers concerned with the social influence process have investigated the determinants of power a group majority or minority has to influence the group. Two critical factors have been found: (a) the relative sizes of the majority and the minority, and (b) the sequence of responses reflecting inter-individual consistency within a majority or minority. Moscovici (1985) suggested there are "sufficient grounds for concluding that unanimity - that is the sequence of responses reflecting inter-individual consistency - is more important than the mere number of persons adopting a common response." Further, Moscovici suggested an unanimous majority of three individuals exerts a greater influence on the group than a non-unanimous majority of seven or ten individuals. Another study by Morris and Miller (1975) yielded similar results. The conformity rates of subjects who faced a consistent majority were greater than the conformity rates of subjects who faced a non-consistent majority. Further, the size of the consistent majority had no impact on the conformity behavior of the subjects.

In my experiment, I used a group size of four persons. The groups should not be smaller since it should be possible that any group member faces a consistent majority of three persons, which supposedly has the strongest possible impact on the individual. On the other side, I believe it is not necessary that the groups are larger, because, from the perspective of a group member, a greater majority probably has no stronger impact, and, a more balanced ratio of arguments for and against a viewpoint would always be interpreted as a non-consistent majority which would have less impact on the individual anyway.

6 The larger the sample size, the more information is available about the distribution of a test statistic and hence the smaller is the value of beta.
Manipulation of group cohesiveness

In my experiment, I attempted to induce high and low group cohesiveness using verbal and written manipulation instructions. This technique has been proven to be successful in a number of cohesiveness studies (Back, 1951; Festinger, Gerard, Hymovitch, Kelley, Raven, 1952; Pepitone, Reichling, 1955; Exline 1957, Downing, 1958). The main advantage of using this technique is that random assignment of subjects to the treatment conditions is feasible. Random assignment of subjects to the treatment conditions is a requirement for a sound statistical analysis. Just because two variables are related does not mean one variable causes the other. Inferences about causation are only possible if the subjects are randomly assigned to the treatment conditions.

If I used real groups for the experiment, for instance highly cohesive fraternity or sorority groups, I would have had to compare their responses with the responses of low cohesive control groups. It would have been very difficult to draw conclusions about the causation of variables since the subjects would be drawn from two different populations which would differ, most likely, in more aspects than just group cohesiveness. Under those conditions, it wouldn't be possible to explain the variation in the dependent variables with group cohesiveness. Other factors would probably account for the variation as well. Further, it would be extremely difficult to control the effects of moderating variables in real groups.

At the beginning of the experiment, high and low group cohesiveness were induced by the proctors using the following verbal instructions:

7 The instructions were also projected on a board with an overhead projector. The instructions remained visible throughout the experiment.
High group cohesiveness condition:

Based on the information you provided in the questionnaires last week, we were able to form extremely congenial groups. You fit each other’s description of what type of person you like remarkably well. All of you expressed very similar likes and dislikes in others. There is every reason to believe that you will like the people working with you and that they will like you. Based on the information you provided, you should find one another interesting and get along with one another very well.

Low group cohesiveness condition:

Based on the information you provided in the questionnaires, we tried to form congenial groups. Unfortunately, this was not possible for all groups. You are in a group which is not congenial at all. In your group, it was not possible to bring together people who would fit one another’s description of the kind of people they like. Based on the information you provided, there is no reason to believe that you will like the people working with you or that they will like you.

The manipulation check for successful discrimination between the two treatment conditions was done at the end of the experiment to recognize possible changes in the actual level of cohesiveness during the group meeting. As a manipulation check, I measured perceived group cohesiveness with the Wheeless Group Solidarity Scale immediately after the experimental group meeting, and compared the individual responses to this scale between the two treatment conditions.
Variables that were controlled for

Group process

I partly controlled for the group process the subjects employed to reach group decisions. I suggested the groups use group consensus to make their decisions. Specifically, I offered four guidelines the group members could follow to reach group consensus on the group ranking. For example, I suggested not to use "conflict-reducing" techniques such as majority voting, averaging, or trading in reaching group decisions. By offering these guidelines, I hoped to increase the similarity of the processes employed by the groups in making their decisions. The desired outcome was to increase the accountability for the total variance of responses to dependent variables due to differences in cohesiveness, and moderating variables. Appendix H shows the instructions for group assignment #1, and the guidelines that were suggested to the groups.

Deviation from the group

How much a group member's opinion deviates from the group opinion is critical to that member's conformity behavior. Moscovici (1985) suggested there is a curvilinear relation between the discrepancy of opinions and social influence. Moscovici noted "...as a small discrepancy increases, so does the degree of influence; but if the discrepancy keeps increasing, influence begins to diminish; and finally, when the discrepancy becomes too large, the amount of influence becomes very small and even nonexistent." Similar suggestions have been made by Hovland, Harvey, and Sherif (1957), Whittacker (1964), and Insko, Murashima, and Saiyadain (1966). In this study, I kept this discrepancy constant for each member. I had to make sure the differences in responses to the dependent variables could not be accounted for by differences in the deviation of a member's opinion from the group opinion. The following procedure allowed me to
control for this deviation. The proctors instructed their groups to split up, and each group member was assigned to a different room\textsuperscript{8}. Then, each group member had to work on individual assignment #3, the Lost at Sea exercise. The proctors collected the assignment sheets with the first individuals ranking. For each group member, the proctors pretended to calculate a ranking that was suggested by the other group partners. In fact, the proctors converted each group member's ranking using a pre-determined conversion pattern. Table 1 shows how the individual scores were converted for each group member.

\textsuperscript{8} Only four rooms were needed since members from different groups could share the same room. It was only important that each group be split up.
Table 1. Conversion of actual individual ranking scores to bogus group ranking scores.

<table>
<thead>
<tr>
<th>Actual ranking score on individual assignment #3</th>
<th>Convert this score to a bogus score</th>
<th>&quot;Your group partner's suggested ranking&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 to 12</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>2 to 10</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>3 to 2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>4 to 14</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>5 to 13</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>6 to 6</td>
<td>6</td>
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<tr>
<td>7</td>
<td>7 to 5</td>
<td>5</td>
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<tr>
<td>8</td>
<td>8 to 7</td>
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<td>9</td>
<td>9 to 8</td>
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<td>10</td>
<td>10 to 9</td>
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<tr>
<td>11</td>
<td>11 to 11</td>
<td>11</td>
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<tr>
<td>12</td>
<td>12 to 4</td>
<td>4</td>
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<tr>
<td>13</td>
<td>13 to 1</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>14 to 3</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>15 to 15</td>
<td>15</td>
</tr>
</tbody>
</table>

After about five minutes⁹ the proctors handed the bogus group ranking sheet to each group member. Appendix L shows the individual assignment #4 with the bogus group

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⁹ Five minutes was a reasonable time to calculate the averages scores for each group member. Any time less than five minutes would have made the students suspicious of the procedure.
ranking\textsuperscript{10}. The subjects were then confronted with a ranking which they believed reflected the actual opinions of their group partners. They realized there were considerable deviations between some of their own judgments and judgments made by their group on a number of critical items. There were a total of seven critical items with a deviation from the group of eight steps or greater, a total of five items with a deviation of two or one steps, and a total of three items with no deviation from the group. The hand-written entries in the table and the time the proctors needed to do their calculations promoted the credibility in the procedure.

**Type of problem**

Problems can be categorized into three types, (a) problems requiring attitudinal judgments, (b) problems requiring informational judgments, and (c) problems requiring perceptual judgments. In this experiment, the type of problem was controlled for because all group tasks and individual tasks were rank-ordering exercises that required mostly informational judgments. Group success depended on the availability of specific knowledge in the group, and on the extent to which group members accepted or complied with one another's judgments. The relationship between group cohesiveness and group conformity might be different if the groups had to solve problems requiring attitudinal or perceptual judgments.

\textsuperscript{10}All entries in this table were handwritten to pretend the group partner's ranking was calculated and written down during the experiment. The subjects had to believe the rankings are real, and the scores reflect the actual opinion of their group partners. Actually, the scores were calculated before the experiment, and the proctors just transferred the scores on the bogus group ranking sheets, thus creating the same deviation from the group for each group member.
Variables that were not controlled for

The following variables were not controlled in this experiment. Still, they may play an important role as mediating variables between the independent construct of group cohesiveness and the dependent constructs of group conformity and member satisfaction. However, since the subjects were randomly assigned to the experimental treatment conditions, I believe these variables didn't have any systematic impact on the relationships between the independent and the dependent constructs in any treatment condition.

Gender

For the purpose of delimiting my research, I only investigated mixed groups. Since the subjects were randomly assigned to groups, I didn't have to control for gender. Random assignment to the experimental groups eliminated possible systematic effects of gender on the dependent variables.

Interdependency of group members

Group members who form a majority or a minority in their group have a stronger total impact on the group if they are perceived to be independent from one another. Moscovici (1985) suggested the psychological size of a group equals the sum of independent individuals in the group and not the sum of individuals who happen to be present simultaneously. Wilder (1977) found that the influence of independent persons increases with their number, stabilizing at three persons. Further, if the subject considers the members of a majority as forming a single group, the influence of that majority does not increase proportionally with the number of its members. The use of laboratory groups instead of real groups reduced the effect of the moderating variable...
interdependency since the members were unacquainted with one another. I believe that members of real groups are always dependent, to some extent, on one another when they form opinions. It would be very difficult to control for interdependency of group members when working with real groups.

**Expected future interaction**

Crosbie (1975) proposed that expected future interaction with the group is an important variable in the conformity process. Conformity can be interpreted as a means for providing stability, and to ensure continuation of the group. Group members who conform to group expectations contribute to the reinforcement of existing group values, norms, and rules. Members who deviate from their group on issues that are vital to the group pose a threat to group stability. Under those circumstances, the group is likely to pressure the deviant to conform to its expectations. It has been shown in various studies, that members who expect future interaction with their group yield more frequently to group pressures, and conform more frequently to group expectations than members who don't expect future interaction. One plausible explanation is that group members who expect future interaction are somewhat dependent on their group, and try to avoid potential conflict with their group. The effects of the moderating variable of expected future interaction were eliminated in this study since the group members didn't know one another, and they will probably never meet again as a group. Therefore, the variation of the dependent variables can not be attributed to the moderating variable expected future interaction.
Leadership

Hollander (1985) suggested leadership involves a process of influence between a leader and followers to attain group, organizational, or societal goals. The type and strength of power a leader exerts over the group presumably plays an important role in the social influence process in small groups. I believe that leadership variables such as leadership style, or type and strength of leadership power mediate the relationship between group cohesiveness and group conformity. However, I decided not to consider leadership variables in my experiment. The subjects in my experiment were randomly assigned to groups. The groups were initially leaderless since the subjects were unacquainted with one another. Further, the decision-making process was guided by written instructions that suggested the groups to use group consensus to make their decisions. Under these conditions, I believe it is very unlikely that developing leadership patterns had a systematic impact on the dependent variables.

Procedural flowchart

The flowchart in Figure 9 shows the sequential steps of the experimental procedure employed in this study. These steps describe either movements that occurred, or interventions that were made. For each step, inputs and outputs are identified.

I announced the experiment to students in seven introductory sociology classes. I pretended the purpose of the experiment was to study effects of verbal behavior on individual and group performance. I invited the students to participate in the experiment, and explained what benefits they could expect from participating. The students received extra class credit, and they had an equal chance of winning monetary individual and
Figure 9. Procedural flowchart for the experiment.

Methodology
group rewards during the experiment. I passed out an invitation sheet (Appendix B), and let the students sign a sign-up sheet for the experiment (Appendix C).

On the day of the experiment, the students met in a classroom, on campus. Each student received a consent form (Appendix D) that had to be signed if the student agreed to participate in the experiment. Then, the students received pre-experimental questionnaires (Appendix F), which they had to answer on computer grading sheets. The students were told that a simulation program would process the information from the questionnaires. They were led to believe they were assigned to work groups based on their responses to these questionnaires. I asserted it was possible to form extremely congenial groups with the simulation program. Actually, the students were randomly assigned to groups, regardless of the information they provided in the pre-experimental questionnaires. The Rosenberg scale of self-esteem was one of the pre-experimental questionnaires. Since it was necessary to trace the information provided in this scale, all questionnaires were numbered. Also, each student received a tag with an experimental ID-number. This number was identical to the number on the questionnaire. One proctor served as a "technical assistant" in the experiment. The technical assistant collected the computer grading sheets and pretended to run the computer simulation. When the technical assistant returned after 10 minutes, he read the experimental ID-numbers of those students who were assigned to a group. Each group had an assigned proctor who administered the experiment. The proctors moved with their groups to their assigned rooms. Then, the proctors induced high and low cohesiveness in the groups with verbal and written manipulation instructions. The instructions were projected on a

11 Anonymity was guaranteed since the subjects were instructed not to put their names on any of the questionnaires, nor on their tags.
board with an overhead projector, and they remained visible throughout the experiment. The proctors also read these instructions to their groups. Then, the proctors handed out the individual assignment #1 (Appendix G), and instructed the students to do the NASA Lost on the Moon ranking exercise. Working on their own, the students had time to think about arguments. When all group members were finished with the exercise, the proctors passed out the group assignment #1 which instructed the students to do the exercise one more time as a group. The purpose of doing the exercise as a group was to expose all group members to social influence. I attempted to induce pressure toward uniformity with the instruction to come up with a group ranking to which each group member had to agree, at least partially. I also attempted to increase the involvement in the experimental task with the remark that performance on the experimental task is highly correlated with intelligence. Poor performance on the ranking exercise would have been a threat to a person's self-concept. Therefore, this remark should have motivated the students to perform as well as possible in the ranking exercise. Also, this remark should have increased their motivation to influence other members of the group.

The experimental conditions were designed to increase one's personal involvement in the experimental task. Several studies demonstrated that a person's commitment to an opinion increases when one's opinion is made public (Gerard, 1964; Deutsch and Gerard, 1955). If a person is committed to an opinion, he or she is likely to defend that opinion. Presumably, the greater the deviation of a judgment from that of the group, the greater are the expectations in the group that the deviant gives reasons for this deviation. Various studies showed the frequency of communication increases under those circumstances. There is a greater exchange of messages, and influence attempts are primarily directed toward the most deviant group member (Festinger, Thibaut, 1951). In this experiment, I attempted to increase the pressure toward uniformity by offering a
monetary reward to the group whose Lost on the Moon ranking was closest to the correct NASA ranking. Pressures toward uniformity increased with the stake the group had in the outcome of the decision. The opportunity of receiving a monetary reward should have increased the motivation to perform well on the ranking exercise. When the groups were finished with group assignment #1, the proctors collected all individual and group ranking sheets, and handed out five questionnaires. These questionnaires included the measures for member satisfaction, group cohesiveness, and sociometric status. The questionnaires were administered at this point, since there was no further group interaction in the experiment. The students were instructed to do the NASA Lost on the Moon ranking exercise one more time, and, as in the first assignment, they had to work on their own. The purpose of this step was to measure the degree to which each member accepted the influence exerted by the group. When the subjects were finished with this assignment, the proctors collected all materials from their groups. Then, the proctors instructed their groups to split up, and the individual members were taken to separate rooms. The proctors passed the individual assignment #3 (Appendix K) that provided the scenario for the Lost at Sea exercise. They subjects were told this exercise was very similar to the Lost on the Moon exercise. Also at this point, the instructions to assignment #3 provided an explanation why the groups were split. The students were told the experiment was designed to test how a group performed on a similar experimental task when the exchange of verbal messages was not possible. This statement should have sufficiently distracted the subject's mind from guessing the real purpose of splitting the groups. In fact, the groups were split to make it possible to confront each subject with a bogus ranking. Compliance with the group was measured by determining the number of subjects who chose the bogus ranking instead of their own ranking when being asked to choose between the two rankings. When the subjects were
finished with their first ranking on the Lost at Sea exercise, the proctors collected these rankings. For each student, the proctors prepared a bogus ranking by simply converting each student's ranking according to a conversion pattern\textsuperscript{12}. Meanwhile, the students had a break of approximately five minutes. Then, the proctors distributed the bogus group rankings to their students. The students should have realized considerable discrepancies between their own ranking and their group partners' ranking on a number of items. On some other items, however, they found the discrepancies were very small, and on some items, there found they were in complete agreement with their group. The critical items were the items on which the subject disagreed with the group. The critical items ranged in the upper and lower ranks. For instance, rank 1 was converted to rank 12, rank 2 was converted to rank 10, and rank 13 was converted to rank 1. There was less disagreement with the group on items ranging in the middle ranks. The more extreme deviations in the upper and lower ranks were designed to create cognitive dissonance in the subjects' minds. The subjects were instructed they had to make a first decision for their group. On individual assignment #4 (Appendix L), they had to decide which of two given alternatives, their own ranking or their group partners' ranking, was the better ranking. To make this decision somewhat important, the instructions pretended this decision would be used to partly determine who received the group reward. Further, the subjects were led to believe their group partners knew they were chosen to make this decision for their group. This manipulation increased the pressure to comply with the group. However, the subjects found themselves in a dilemma since the discrepancies between their own ranking scores and their partners' ranking scores were somewhat extreme\textsuperscript{13}.

\textsuperscript{12} This procedure is explained in detail in the section "variables that were controlled for" under "deviation from the group."

\textsuperscript{13} This deviation must have been perceived to be extreme since, at that point, the subjects already experienced a level of deviation from their group in a similar exercise.
When the subjects were finished with this assignment, they were debriefed, and informed that a debriefing presentation would follow in one of the next class periods.

The experimental procedure is also documented in the materials for the proctors (Appendix E). A proctor training session introduced the proctors to the experiment. The proctors received materials that included a step-by-step description of how to administer the experiment. These materials included instructions on what exactly the proctors had to say during the experiment.

Measures

Cohesiveness

In this experiment, group cohesiveness was operationalized and measured with the Wheeless Group Solidarity Scale (Wheeless, Wheeless, Dickson-Markman, 1982) (Appendix N). The use of this scale in this experiment was appropriate for two reasons. First, the scale can be used to measure the cohesiveness of emerging groups. Secondly, this scale has been found to be unidimensional (Wheeless, Wheeless, Dickson-Markman, 1982). The individual items of this scale assess the components of psychological closeness, interpersonal liking, group affiliation, and trust. All items of this scale were scored from strongly disagree (1) to strongly agree (7) on a Likert-type scale. Possible variations of actual group cohesiveness during the group meeting were taken into account since the questionnaire was administered after the experimental group meeting. The Wheeless Group Solidarity Scale was used to check whether the manipulation of group cohesiveness was successful.
To provide some evidence for the validity of the Wheeless Group Solidarity Scale, group cohesiveness was also measured with a modified version of the Evans and Jarvis Group Attitude Scale (Evans, Jarvis, 1986). Five items of the original scale were omitted to tailor this scale for this experiment. The items had to be omitted because they require a group history. Appendix Q displays the modified version of this scale. It was expected that the Wheeless Group Solidarity Scale and the modified version of the Group Attitude Scale are positively correlated.

**Perceived sociometric status**

A modified version of the ten item sociometric questionnaire developed by Mussen and Porter (1959) was used to measure the perceived sociometric status of group members. This measurement tool was an appropriate instrument in this experimental setting since it was specifically designed to measure the perceived sociometric status of group members in emerging, and initially leaderless groups. One item of the original questionnaire was omitted to better fit the questionnaire to this experiment. One advantage of this measurement instrument was that the answers were categorical. For each item on the questionnaire, each subject had to make a clear decision whom to choose from the group. Each group member had the option to choose himself or herself on any number of items. The group member who was most frequently chosen by the group was the member with the highest sociometric status. The total number of choices a group member received was divided by the number of people in the group. This was done to eliminate the error in the sociometric status scores introduced by three-person groups. The possible scores for sociometric status range from 0 to 9. A score of 0 indicated the lowest possible sociometric status, and a score of 9 indicated the highest possible status in the group. The questionnaire consisted of the following items:
1) Who contributed the best ideas to the group?
2) Who seemed to be most active in participation?
3) Who was best at stimulating discussion?
4) Who was best at explaining his own ideas to others?
5) Who was best at clarifying the ideas of others?
6) Who was the best critic of other's ideas?
7) Who was best at organizing the ideas of the group?
8) Who was most influential in the group's decisions?
9) If you had to chose a leader from this group, whom would you choose?

The questionnaire was administered immediately after the experimental group meeting.
Appendix P shows the complete questionnaire for perceived sociometric status.

**Self-esteem**

Rosenberg's scale of self-esteem was used to measure the moderating variable of self-esteem. This scale was an appropriate measurement tool for the assessment of self-esteem for my population since the scale was specifically developed for young adults. The scale consisted of 10 questions. Five questions indicated positive self-appraisal (items 2, 6, 7, 9, 10), and five questions indicated negative self-appraisal (items 1, 3, 4, 5, 8). Each question was scored from strongly disagree (1) to strongly agree (7) on a Likert-type scale. The items indicating negative self-appraisal were reversibly scored. Rosenberg's scale of self-esteem had been shown to have a stable factor structure (Hensley & Roberts, 1976; Hensley, 1977). The scale consisted of the following items:
1) At times I think I am no good at all.
2) I take a positive attitude toward myself.
3) All in all, I am inclined to feel that I am a failure.
4) I wish I could have more respect for myself.
5) I certainly feel useless at times.
6) I feel that I am a person of worth, at least on an equal plane with others.
7) On the whole, I am satisfied with myself.
8) I feel I do not have much to be proud of.
9) I feel that I have a number of good qualities.
10) I am able to do things as well as most other people.

The Rosenberg scale of self-esteem was one of the pre-experimental questionnaires administered at the beginning of the experiment. To trace the information provided in this questionnaire, the students received an experimental ID-number that was identical to the number on the questionnaires.

**Member satisfaction**

Member satisfaction was treated as a construct in this study. Member satisfaction per se was not measurable since it was not put into a concrete perspective. I believe that three aspects of member satisfaction are relevant in decision-making groups. These aspects are: (a) satisfaction with the group decision, (b) satisfaction with the group process, and (c) satisfactions with the group atmosphere. I believe that group members who are satisfied with a group meeting are more likely to commit themselves to the group, to group decisions, and to subsequent actions. For this experiment, I designed a satisfaction
questionnaire that assessed the three aspects of member satisfaction with the responses to
the following statements:

1) I am satisfied with the decisions that were made by this group.
2) The group atmosphere could have been better.
3) I don’t like the way this group made decisions.
4) I am satisfied with the group atmosphere in this group.
5) I am satisfied with the way the decisions were made by this group.
6) I am not happy with our group decisions.

All questions were scored from strongly disagree (1) to strongly agree (7) on a Likert-
type scale. To reduce response set, the items number 2, 3, and 6 were reversibly scored.
The total score for member satisfaction was the sum of scores on all six questions. The
questionnaire was administered immediately after the experimental group meeting.
Appendix O shows the complete questionnaire for member satisfaction.

Acceptance
Acceptance has been defined as a change in belief toward others as a result of social
influence. Therefore, acceptance reflects the degree to which group members redefine
their own position, and accept social influence exerted by their group during the group
process. I measured acceptance by determining the extent to which the subjects changed
their first ranking as a result of social influence during the experimental group meeting.
A group member may change an opinion either towards the group, or in the opposite
direction, away from the group. The latter case represents a polarization of opinions.
Group members who change their opinion by moving further away from their group

Methodology
indicate they reject influence attempts by taking an even more divergent stand. This is one possible means for individuals to prove they are independent from their group. The measurement of acceptance in this experiment considered both types of opinion change. Table 2 illustrates how a subject's acceptance score was calculated. A simple mathematical procedure was employed to calculate the acceptance scores for each item on the ranking exercise:

1) If the value of the group ranking was greater than the value of the individual's first ranking, then the acceptance score for that item was the value of the individual's second ranking minus the value of the individual's first ranking.

2) If the value of the group ranking was smaller than the value of the individual's first ranking, then the acceptance score for that item was the value of the individual's first ranking minus the value of the individual's second ranking.

3) If there was no difference between the values of the first and second individual ranking, the acceptance score for that item was 0.

The total acceptance score was the sum of the acceptance scores for each item on the ranking exercise. It is theoretically possible that subjects who changed their opinion toward their group took a position that was even more extreme than their group's position. However, this occurred only in some instances on very few items. Generally, the group members moved with their second judgment a little closer to their group, but they didn't take extreme positions.
Table 2. Example for the calculation of acceptance.

<table>
<thead>
<tr>
<th>Item #</th>
<th>First Individual Ranking</th>
<th>Group ranking</th>
<th>Second Individual Ranking</th>
<th>Acceptance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>8</td>
<td>12</td>
<td>10</td>
<td>+2</td>
</tr>
<tr>
<td>Item 2</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>+1</td>
</tr>
<tr>
<td>Item 3</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>+1</td>
</tr>
<tr>
<td>Item 4</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>+3</td>
</tr>
<tr>
<td>Item 5</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>+2</td>
</tr>
<tr>
<td>Item 6</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>+1</td>
</tr>
<tr>
<td>Item 7</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Item 8</td>
<td>11</td>
<td>8</td>
<td>8</td>
<td>+3</td>
</tr>
<tr>
<td>Item 9</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Item 10</td>
<td>5</td>
<td>9</td>
<td>9</td>
<td>+4</td>
</tr>
<tr>
<td>Item 11</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>Item 12</td>
<td>14</td>
<td>13</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Item 13</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>-1</td>
</tr>
<tr>
<td>Item 14</td>
<td>13</td>
<td>15</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Item 15</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>+1</td>
</tr>
</tbody>
</table>

Total acceptance score: +16

Acceptance reflects the extent to which social influence attempts were successful. When measuring acceptance of social influence, it is critical to reduce or eliminate the effects of compliance. Deutsch and Gerard (1955) found strong support for the hypothesis that normative social influence upon individual judgment is reduced when the individual perceives that his judgment cannot be identified, or more generally, when the individual perceives no pressure to conform directed at him from others. When a confrontation with the group is not expected, the group cannot pose a potential threat to the subject. The measurement of acceptance in my experiment required that the students write down

Methodology
only what they really believed was the best ranking. One way to reduce compliance was to assure to the students that their rankings wouldn't be revealed to their groups. I guaranteed this in the written instructions to individual assignment #2 (Appendix I). To reduce compliance, I also offered an additional individual monetary reward of $30 dollars to that person whose ranking was closest to the suggested ranking by NASA.

Compliance

Compliance has been defined as a change in behavior toward a group as a result of real or imagined group pressure. Compliance is a change in behavior toward the group without a change in personal belief. When measuring compliance in my experiment, it was necessary to reduce, or eliminate the effects of acceptance. I attempted to reduce these effects by creating extremely large discrepancies between a subject's ranking and a bogus ranking on the Lost at Sea exercise. I believe subjects who chose the bogus ranking did so for other reasons than acceptance.

In this experiment, I measured compliance with the following setup. When the subjects received the suggested ranking by their group partners (the bogus ranking), they were instructed to make a first decision for their group. They had to decide whether their own ranking or the ranking of their group partners was the better ranking. On the individual assignment #4, the subjects were instructed to make this decision by marking one of the following statements:

_____ For my group, I decide to choose my group partners' ranking.

_____ For my group, I decide to choose my own ranking.

Methodology
I measured compliance by calculating the proportion of subjects who chose the bogus ranking instead of their own ranking. The measurement of compliance with the group concluded the experiment.

**Data Analysis**

**Individual and group level of analysis**

The data that were gathered in this experiment were examined from an individual perspective, and from a group perspective. On the individual level of analysis, I used the individual responses on the measures to test the hypothesized relationships for the variables of interest. On the group level of analysis, I calculated group scores for the measures by averaging the scores of the individual group members. Most of the data analysis was done on the individual level of analysis. The sample size was considerably larger, and the statistical tests were more powerful on the individual level of analysis.

**Internal consistency of the instruments**

I tested the internal consistency of the Wheeless Group Solidarity Scale, the modified version of Evans and Jarvis Group Attitude Scale, the Rosenberg scale of self-esteem, and the satisfaction questionnaire. These were the questionnaires that required responses on a Likert-type scale. The scores of these questionnaires were continuous since the responses to each item had assigned numerical values from 1 to 7. I computed the internal consistency of these questionnaires using Cronbach's alpha. A value for Cronbach's alpha of alpha = 0.50 or greater indicates there is more true variance than error variance in the responses to the instrument. Questionnaires with a Cronbach's alpha value greater than 0.50 are considered to be sufficiently reliable for research purposes.
I did not attempt to assess the internal consistency of the sociometric questionnaire for three reasons. First, the variances in the individual items of the questionnaire as well as the total variance could not be computed since the answers to the sociometric questions were categorical. Secondly, the perceived sociometric status of a group member was dependent on a variety of factors such as contribution of ideas, participation in the discussion, the perceived ability to clarify other’s ideas, the perceived influence on the group discussion, the perceived ability to lead the group, and other factors. Presumably, the greater the number of factors that influence a person’s evaluation of the sociometric status of group members, the greater is the variance in the responses. The sociometric questionnaire, therefore, might not be a very reliable instrument with respect to its internal consistency. Third, I was only interested in measuring the sociometric status of group members in a specific situation based on the particular circumstances in this situation. The sociometric status of group members could vary dramatically in other situations. Even though the sociometric questionnaire may not be a reliable instrument with respect to its stability in test-retest situations, it was still useful for this experiment since it urged group members to choose a high status person from their group based on various criteria.

**Manipulation check for group cohesiveness**

At the beginning of the experiment, the subjects were randomly assigned to groups, and randomly assigned to either one of the two treatment conditions, high or low cohesiveness. The manipulation check for group cohesiveness tested whether the manipulation technique successfully induced high and low cohesiveness in the two treatment conditions. The manipulation check had to be done after the students finished
working as groups to account for possible variations in actual cohesiveness during the experimental group meeting. The alternative hypothesis for the manipulation check is:

$$H_A: \text{Group members who are assigned to the high cohesiveness treatment will score higher on the Wheeless Group Solidarity Scale than group members who are assigned to the low cohesiveness treatment.}$$

I used the non-parametric Wilcoxon rank sum test to test this hypothesis on the individual level of analysis. This test requires the least stringent assumptions for making inferences about the difference of two population means. The Wilcoxon rank sum test requires only that the two samples are independent. This was the case in my experiment since the students were randomly assigned to the treatment conditions. The responses of students in one treatment condition were not dependent in any way on the responses of students in the other condition. I did not assume the two samples have normal distributions or equal variances with respect to the cohesiveness scores. Using the least stringent assumptions reduces the probability of committing a type I error$^{14}$. If the null hypothesis is rejected, it was concluded the manipulation of group cohesiveness at the beginning of the experiment induced the subjects in the two treatment conditions to perceive different levels of cohesiveness in their groups. I labeled these different levels "high cohesiveness" and "low cohesiveness."

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$^{14}$ At the same time, using the Wilcoxon rank sum test increases the probability of committing a type II error (accept the null hypothesis while it is false).
Effects of cohesiveness on compliance

The relationship of cohesiveness and compliance was tested on the individual level of analysis. The alternative hypotheses for this relationship is:

$H_A$: Group members who are assigned to the high cohesiveness treatment will exhibit a higher degree of compliance than group members who are assigned to the low cohesiveness treatment.

I used a Chi-square test of independence to test whether group cohesiveness and compliance were associated. Since the Chi-square test of independence tests for dependencies between categorical variables, I decided to analyze this relationship with the categorical variable of treatment condition. A precondition was that the manipulation of group cohesiveness successfully discriminates the subjects into two groups. Since the subjects were randomly assigned to the treatment conditions, the Chi-square test allowed to conclude that group cohesiveness affected compliance. The strength of this association was measured with the contingency coefficient $c$. The possible values for this coefficient range from 0 to 1, with the value 1 indicating the strongest association possible.
Effects of cohesiveness on acceptance and on member satisfaction

The effects of group cohesiveness on acceptance and on member satisfaction were tested with a similar procedure on the individual level of analysis. The alternative hypotheses are:

H_A: Group members who score high on the Wheeless Group Solidarity Scale will score higher on the measure of member satisfaction than will those group members who score lower on the Wheeless Group Solidarity Scale.

H_A: Group members who score high on the Wheeless Group Solidarity Scale will score higher on the measure of acceptance than will those group members who score lower on Wheeless Group Solidarity Scale.

I used the Spearman's rank order correlation coefficient to test the strength of the relationships between group cohesiveness and acceptance, and between group cohesiveness and member satisfaction. The use of Spearman's rank order correlation was appropriate for this analysis since both independent and dependent variables are continuous, and their relationship is not necessarily linear. Scatterplots of group cohesiveness versus the dependent variables provided first impressions for the relationship between these variables.

Effects of moderating variables

The effects of the moderating variables of gender, self-esteem, and perceived sociometric status were tested with correlational analyses, and with multiple linear regression analyses on the individual level of analysis. For the dependent variable of acceptance, I
ran a multiple linear regression analysis with the predictors of cohesiveness, gender, self-esteem, sociometric status, and satisfaction. For the dependent variable of satisfaction, I will run a multiple linear regression analysis with the predictors of cohesiveness, gender, self-esteem, sociometric status, and acceptance. I used a stepwise variable selection procedure to identify those variables and interactions that were significant in the prediction of the dependent variables.
RESULTS

Due to the unusually low enrollment in the first summer semester, the projected sample size of \( n = 120 \) students could not be obtained. The total sample size was \( n = 77 \) undergraduate students who were drawn from seven classes in the Sociology Department at Virginia Tech. All subjects received extra class credit for participating in this experiment. Further, all participants had an equal chance of winning a monetary individual reward of $30 dollars, and a group reward of $40 dollars. Although it is possible that the incentives had an overall impact on the response set, the results should not be biased because the incentives were the same for each participant.

The experiment was administered on Thursday, May 21, 1992 in two sessions at 6:00 p.m. and at 8:00 p.m. The experiment lasted between 60 and 90 minutes, depending on how long the groups needed to accomplish the individual and group assignments. A total of 42 students attended the first session, 35 students attended the second session. In both sessions, the students were randomly assigned to either one of the treatment conditions: high or low cohesiveness. A total of ten groups were assigned to the high cohesiveness treatment, and another ten groups were assigned to the low cohesiveness treatment. There were 17 four-person groups and 3 three-person groups.

To more easily describe some of the results in the tables and figures, this section sometimes uses abbreviations to refer to the variables of interest. The following legend lists all abbreviations that are used to describe variables.
**Legend:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREAT</td>
<td>Treatment Condition (categorical)</td>
</tr>
<tr>
<td>COHE_W</td>
<td>Perceived Group Cohesiveness as measured by the Wheeless Group Solidarity Scale</td>
</tr>
<tr>
<td>COHE_G</td>
<td>Perceived Group Cohesiveness as measured by the modified Group Attitude Scale</td>
</tr>
<tr>
<td>COHE_AV</td>
<td>Average Group Cohesiveness for a group as measured by Wheeless Group Solidarity Scale</td>
</tr>
<tr>
<td>GEND</td>
<td>Gender (categorical)</td>
</tr>
<tr>
<td>STAT</td>
<td>Sociometric Status</td>
</tr>
<tr>
<td>SELF</td>
<td>Self-Esteem</td>
</tr>
<tr>
<td>SATI</td>
<td>Member Satisfaction</td>
</tr>
<tr>
<td>ACCE</td>
<td>Acceptance</td>
</tr>
<tr>
<td>COMP</td>
<td>Compliance (categorical)</td>
</tr>
<tr>
<td>TIME</td>
<td>Time the group needed to accomplish a decision-making task</td>
</tr>
</tbody>
</table>

**Internal consistency of the measurement instruments**

Internal consistency was tested for the Wheeless Group Solidarity Scale, for the modified version of the Group Attitude Scale developed by Evans and Jarvis, for Rosenberg's Self-esteem Scale, and for the satisfaction questionnaire that was specifically designed for this experiment. All instruments included reversibly scored items to reduce response set. For each instrument, the subjects responded to the questions by marking their choice on a Likert-type scale ranging from strongly disagree (1) to strongly agree (7). Cronbach's alpha was used as a measure for the internal consistency of the instruments. Since the values for Cronbach's alpha were relatively high for all instruments, the instruments were considered to be reliable with regard to their internal consistency. Table 11 shows the number of items each questionnaire included, the sample size for the calculation of Cronbach's alpha, and the value for Cronbach's alpha for each instrument. The sample size for the Group Attitude Scale and for Rosenberg's Self-esteem Scale is reduced. Some of the data was missing or had to be discarded since some subjects made mistakes while answering these questionnaires.

**Results**
Table 3. Cronbach's alpha values for the measurement instruments.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Number of Items</th>
<th>Sample Size</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheeless Group Solidarity Scale</td>
<td>18</td>
<td>77</td>
<td>0.937</td>
</tr>
<tr>
<td>Group Attitude Scale (modified version)</td>
<td>15</td>
<td>69</td>
<td>0.930</td>
</tr>
<tr>
<td>Rosenberg's Self-Esteem Scale</td>
<td>10</td>
<td>73</td>
<td>0.796</td>
</tr>
<tr>
<td>Satisfaction Questionnaire</td>
<td>6</td>
<td>77</td>
<td>0.895</td>
</tr>
</tbody>
</table>

**Hypothesis 1 - Validity of the Wheeless Group Solidarity Scale**

For measurement purposes, group cohesiveness was operationalized with the Wheeless Group Solidarity Scale. To provide evidence for the validity of this scale, group cohesiveness was also measured with the Group Attitude Scale developed by Evans and Jarvis. Since both scales have been used to measure and represent group cohesiveness, these scales were expected to be highly correlated. Both scales were administered immediately after the experimental group session. Figure 10 shows a scatterplot of the responses to both scales. Possible values for the Wheeless Group Solidarity Scale range from 18 for lowest perceived group cohesiveness to 126 for highest perceived group cohesiveness. Possible values for the Group Attitude Scale range from 15 for lowest perceived group cohesiveness to 105 for highest perceived group cohesiveness. The actual values range from 40 to 125 for the Group Solidarity Scale, and from 29 to 104 for the Group Attitude Scale. It appears the variability for both scales is relatively high. As expected, the scales were positively correlated. Based on a sample size of n = 69 observations, alternative hypothesis 1 could be accepted (Spearman's $r_s = 0.724$, $p = 0.0001$).
Figure 10. The Wheeless Group Solidarity Scale and the modified version of the Evans and Jarvis Group Attitude Scale are positively correlated.

**Hypothesis 2 - Manipulation of group cohesiveness**

The manipulation of group cohesiveness was critical to the success of this experiment. Specifically, the technique I used to manipulate group cohesiveness needed to introduce enough variance in perceived group cohesiveness to make it possible to examine effects of high and low cohesiveness. In the cohesiveness literature, no evidence was found that this manipulation technique had ever failed. Furthermore, in the early phases of the research on group cohesiveness, this technique was commonly used to create high and low cohesive groups. In this experiment, as well as in the pilot study, the manipulation of group cohesiveness was successful. The individual scores on the Wheeless Group Solidarity Scale were compared for the subjects in the high and low cohesiveness treatment conditions to check whether the manipulation was successful. Since no
assumption was made with regard to the distribution of perceived group cohesiveness in both treatments, nor with regard to the equality of the measure's variances in both treatments, the non-parametric Wilcoxon rank sum test was used to test whether the subjects perceived group cohesiveness to be different in the two treatments. Since it was hypothesized that perceived group cohesiveness is greater in the high cohesiveness treatment, a one-tailed test was used. The test was performed at the individual level of analysis. The test was significant ($z = 3.649$, $p = 0.00015$), and alternative hypothesis 2 was accepted. Figure 11 displays the average perceived group cohesiveness scores (as measured by the Wheeless Group Solidarity Scale) in both treatment conditions. While the test was significant at a very high confidence level, it appears that the low cohesiveness treatment was not as successful as desired. The average perceived cohesiveness score for the students assigned to the high cohesiveness treatment was 88.66, while the average score for the students assigned to the low cohesiveness treatment was 74.67. Although the treatment means proved to be significantly different, the low cohesiveness treatment did not create truly low cohesive groups. Considering the range of possible values for the cohesiveness measure, the groups in the low cohesiveness treatment could be best described as "moderately cohesive."
Figure 11. Average perceived group cohesiveness in both treatment conditions.

Hypothesis 3 - Relationship between group cohesiveness and member satisfaction

The purpose of the study was to test the effects of group cohesiveness on several dependent variables. The relationship of group cohesiveness and member satisfaction with the group meeting was the first to be tested. This test was performed at the individual level of analysis using the subjects' responses to the Wheeless Group Solidarity Scale and to the satisfaction questionnaire. Possible values for the satisfaction questionnaire ranged from 6 for lowest member satisfaction to 42 for highest member satisfaction. The actual values ranged from 16 to 42, with a sample mean of 34.61 and a sample standard deviation of 4.93. The results indicated there was a general tendency toward high satisfaction with the experimental group meeting. The relationship between perceived group cohesiveness and member satisfaction was not assumed to be linear.
Therefore, not Pearson's correlation, but the more conservative Spearman's rank order correlation was used as a measure for the strength of association between the two constructs. Based on a sample size of \( n = 77 \) observations, the test was significant at a very high confidence level \( (r_s = 0.536, \ p = 0.0001) \). Figure 12 illustrates the results for hypothesis 3 with a scatterplot of perceived group cohesiveness versus member satisfaction. This scatterplot provides some evidence for the assumption that the relationship between perceived group cohesiveness and member satisfaction is not linear. In fact, the line that fits the data best would be curvilinear. It was assumed that group cohesiveness is not the only variable contributing to member satisfaction. The effect of the moderating variables will be discussed shortly under hypothesis 7.

![Figure 12. Scatterplot of perceived group cohesiveness versus member satisfaction.](image-url)
Hypothesis 4 - Relationship between group cohesiveness and acceptance

The relationship between perceived group cohesiveness and acceptance of influence was tested with hypothesis 4. This test was performed at the individual level of analysis based on a sample size of n = 77 observations. Perceived group cohesiveness was measured with the Wheeless Group Solidarity Scale. The combination of the deviation between the first and second individual rankings on the Lost on the moon exercise, and the direction of the opinion change relative to the group opinion yielded a measure for acceptance. The possible values for acceptance ranged theoretically from -112 to +112. However, negative values, and large positive values were very unlikely to occur. An acceptance score of 0 was possible if a subject was not influenced by the group at all, and decided on his or her second individual ranking simply to copy the first ranking of the items. To obtain a negative value for acceptance, a subject had to disagree with the group on most of the items, and had to move further away from the group ranking on most of the items. This seemed to be very unlikely. Therefore, negative values for acceptance were not expected. The actual values for acceptance ranged from 1 to 62, with a mean of 31.66, and a relatively large standard deviation of 12.77. Hypotheses 4 was tested using Spearman’s rank order correlation. It was hypothesized that perceived group cohesiveness and acceptance are positively correlated. The test failed to reach significance ($r_s = 0.199$, $p = 0.0827$), and the null hypothesis which suggested there is no relationship between perceived group cohesiveness and acceptance could not be rejected. Since this result is very surprising, Pearson’s product-moment correlation was also computed for perceived group cohesiveness and acceptance. Pearson’s correlation suggested even a weaker relationship ($r = 0.0967$, $p = 0.403$). Figure 13 shows a scatterplot of perceived group cohesiveness versus acceptance. This plot deserves a closer look on the data points for the subjects with extreme cohesiveness scores. While
the subject with the lowest cohesiveness score of 40 had one of the highest acceptance scores, the five subjects who scored highest on perceived group cohesiveness scored relatively low on acceptance. While no conclusion is possible from looking only at the observations with extreme cohesiveness scores, this result is quite surprising. It was assumed that group cohesiveness is not the only variable contributing to acceptance of influence. The effect of the moderating variables will be discussed shortly under hypothesis 6.

Figure 13. Scatterplot of perceived group cohesiveness versus acceptance.

**Hypothesis 5 - Relationship between treatment condition and compliance**

The relationship between perceived group cohesiveness and compliance was difficult to assess since the independent variable of perceived group cohesiveness was continuous, and the dependent variable compliance was categorical. Using the Two-sample t-test or
the Wilcoxon rank-sum test for the data analysis would have been a violation since the subjects were not randomly assigned to groups with regard to compliance. As an alternative, I decided to analyze the relationship between the categorical variables treatment condition and compliance. Since the manipulation of group cohesiveness was successful, it can be concluded that the subjects in the high cohesiveness treatment condition generally perceived their groups to be more cohesive than the subjects in the low cohesiveness treatment condition. The values for the variable treatment condition were "high cohesiveness," and "low cohesiveness." The values for the variable compliance were "complied with the group," and "did not comply with the group." It was hypothesized that the subjects in the high cohesiveness treatment condition complied more frequently with their group than the subjects in the low cohesiveness treatment condition. Figure 14 illustrates the results of a frequency analysis that provided first evidence for the validity of this hypothesis.
Figure 14. Subjects complied more frequently with their group in the high cohesiveness treatment condition.

Hypothesis 5 was tested with the Chi-square test of independence at the individual level of analysis. Based on a sample size of n = 76 observations, the test was significant (Chi-square = 4.547, $p = 0.033$), and the alternative hypothesis was accepted. The contingency coefficient was used as a measure for the strength of association between the two categorical variables. The contingency coefficient had a value of only 0.238. It can be concluded that there is evidence for a relationship between the variables treatment condition and compliance. However, this relationship is probably not very strong. Table 4 displays the results of the Chi-square test of independence.
Table 4. Chi-square test of independence between treatment condition and compliance.

<table>
<thead>
<tr>
<th>Treatment Condition</th>
<th>Compliance</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Did not comply with the group</td>
<td>Complied with the group</td>
</tr>
<tr>
<td>High Cohesiveness</td>
<td>Frequency</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>36.84</td>
</tr>
<tr>
<td></td>
<td>Row Percent</td>
<td>73.68</td>
</tr>
<tr>
<td></td>
<td>Column Percent</td>
<td>44.44</td>
</tr>
<tr>
<td>Low Cohesiveness</td>
<td>Frequency</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>46.05</td>
</tr>
<tr>
<td></td>
<td>Row Percent</td>
<td>92.11</td>
</tr>
<tr>
<td></td>
<td>Column Percent</td>
<td>55.56</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>82.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Df</th>
<th>Value</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>1</td>
<td>4.547</td>
<td>0.033</td>
</tr>
<tr>
<td>Contingency Coefficient</td>
<td></td>
<td>0.238</td>
<td></td>
</tr>
<tr>
<td>Frequency missing</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Effective Sample Size</td>
<td></td>
<td>76</td>
<td></td>
</tr>
</tbody>
</table>

The effects of the moderating variables that possibly mediate the relationship between group cohesiveness and compliance were not tested explicitly. However, descriptive statistics for the variables perceived group cohesiveness, self-esteem, sociometric status, satisfaction, and acceptance were calculated separately for the subjects who complied with their group, and for the subjects who did not comply. Table 5 lists the descriptive statistics for both categories.
Table 5. Separate descriptive statistics for the subjects who complied with their group and for the subjects who did not comply.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subjects who complied with their group</th>
<th>Subjects who did not comply with their group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Continuous Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived group cohesiveness</td>
<td>88.00</td>
<td>80.349</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>56.50</td>
<td>56.233</td>
</tr>
<tr>
<td>Sociometric Status</td>
<td>1.365</td>
<td>2.593</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>36.538</td>
<td>34.190</td>
</tr>
<tr>
<td>Acceptance</td>
<td>37.462</td>
<td>30.254</td>
</tr>
<tr>
<td><strong>Categorical Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>Females</td>
<td>11</td>
<td>25</td>
</tr>
</tbody>
</table>

As expected, the mean score for perceived group cohesiveness was higher for the subjects who complied with their group than for the subjects who did not comply. Apparently, the variable of self-esteem did not influence compliance. The means for self-esteem were the same for both categories. Further, the subjects who complied seemed to score lower on sociometric status, and higher on acceptance. Most surprisingly, gender seemed to have an important effect on compliance. While only 2 out of 40 males complied with their group, 11 out of 36 females chose the bogus ranking. Figure 15 shows the result of a frequency analysis that provided some evidence that the moderating variable of gender had an effect on compliance.
Figure 15. Females complied more frequently with their group than males.

Since gender is a categorical variable, it was possible to test the relationship between compliance and gender with a Chi-square test of independence. Table 6 shows the results of this test.
Table 6. Chi-square test of independence between gender and compliance.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Did not comply with the group</th>
<th>Complied with the group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>25</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>Percent</td>
<td>32.89</td>
<td>14.47</td>
<td>47.37</td>
</tr>
<tr>
<td>Row Percent</td>
<td>69.44</td>
<td>30.56</td>
<td></td>
</tr>
<tr>
<td>Column Percent</td>
<td>39.68</td>
<td>84.62</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>38</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>Percent</td>
<td>50.00</td>
<td>2.63</td>
<td>52.63</td>
</tr>
<tr>
<td>Row Percent</td>
<td>95.00</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>Column Percent</td>
<td>60.32</td>
<td>15.38</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>13</td>
<td>76</td>
</tr>
<tr>
<td>82.89</td>
<td>17.11</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>df</th>
<th>Value</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>1</td>
<td>8.727</td>
<td>0.003</td>
</tr>
<tr>
<td>Contingency Coefficient</td>
<td>0.321</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency missing</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Sample Size</td>
<td>76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on a sample size of n = 76 observations, the Chi-square test was significant (Chi-square = 8.727, p = 0.003). The contingency coefficient has a value of 0.321. Based on the data gathered in this experiment, it can be concluded there is a moderately strong association between the variables gender and compliance.

**Hypothesis 6 - Prediction of acceptance**

The hypothesized relationship between perceived group cohesiveness and acceptance of influence failed to be significant. However, it was possible that the moderating variables that were considered in this experiment contributed to predict acceptance. Scatterplots and Spearman’s rank-order correlations gave a first impression about the relationship between the moderating variables and acceptance. Figure 16 shows the scatterplot for...
acceptance versus self-esteem. Figure 17 shows the scatterplot for acceptance versus sociometric status. It appears the variables self-esteem and acceptance were not related at all ($r_s = 0.046$, $p = 0.707$). Yet, the scatterplot for sociometric status versus acceptance and Spearman's rank-order correlation between these variables clearly suggest there is a relationship between sociometric status and acceptance ($r_s = -0.465$, $p = 0.0001$).

![scatterplot](image)

**Figure 16. Relationship between self-esteem and acceptance.**
Figure 17. Relationship between sociometric status and acceptance.

The purpose of hypothesis 6 was to uncover determinants of acceptance, and to examine the extent to which these determinants affect acceptance. Hypothesis 6 was tested with a multiple linear regression analysis. After testing the original prediction model, a stepwise variable selection procedure was used to find those variables that were significant in predicting acceptance. Only the significant variables were included in the final prediction model. The original prediction model for the dependent variable acceptance included the variables of perceived group cohesiveness, gender, self-esteem, sociometric status, and satisfaction. Although satisfaction was considered a dependent variable in this experiment, it was included in the original prediction model. Since no correlation was found between the dependent variables of acceptance and satisfaction, it is not assumed that either variable significantly contributes to predict the other dependent variable. The original prediction model for acceptance was significant (F = 6.151,
p = 0.0001). It can be concluded the original prediction model included variables that are significant in predicting acceptance. The stepwise selection procedure suggested only two variables to be significant in predicting acceptance. These variables were sociometric status and gender. This result was verified by the forward selection and backward elimination procedures that were used to cross-check the results suggested by the stepwise procedure. All variable selection procedures suggested the same variables to be included in the final prediction model. No interaction effects of group cohesiveness with any of the moderating variables was significant in predicting acceptance. Table 7 summarizes the results of the stepwise selection procedure. Comparing the partial $r^2$ values for the selected variables, it appears that the variable sociometric status is much more important than the variable gender for the prediction of acceptance.

### Table 7. Summary of the stepwise selection procedure for the prediction of acceptance.

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable entered</th>
<th>Number in</th>
<th>Partial $r^2$</th>
<th>Model $r^2$</th>
<th>C (p)</th>
<th>F</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STAT</td>
<td>1</td>
<td>0.2633</td>
<td>0.2633</td>
<td>4.8625</td>
<td>22.8717</td>
<td>0.0001</td>
</tr>
<tr>
<td>2</td>
<td>GEND</td>
<td>2</td>
<td>0.0697</td>
<td>0.3330</td>
<td>0.5327</td>
<td>6.5878</td>
<td>0.0127</td>
</tr>
</tbody>
</table>

All variables left in the model are significant at the 0.1500 level.

No other variables met the 0.1500 significance level for entry into the model.

The final prediction model for acceptance included the variables sociometric status and gender. The results of the regression analysis with the final prediction model are shown in Table 8. The regression analysis was significant ($F = 14.740, p = 0.0001$). However, the $r^2$ value for the model was relatively small. Roughly thirty percent of the total variability in acceptance could be explained by the variables sociometric status, and

*Results*
gender. For the population, the analysis suggests that about 28 percent of the total variability in acceptance can be predicted by the variables sociometric status and gender.

Table 8. Multiple linear regression analysis for the prediction of acceptance.

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>2</td>
<td>3475.7241</td>
<td>1737.8621</td>
<td>14.740</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>70</td>
<td>8253.2896</td>
<td>117.9041</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>11729.0137</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root MSE</td>
<td>10.8584</td>
<td>R²</td>
<td>0.2963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dep Mean</td>
<td>31.3699</td>
<td>Adjusted R²</td>
<td>0.2762</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.V.</td>
<td>34.6140</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Parameter Estimates

| Variable | Df | Parameter Estimate | Standard Error | T for H0: Parameter = 0 | Prob > |T|
|----------|----|--------------------|----------------|-------------------------|--------|
| Intercept| 1  | 35.3081            | 2.9048         | 12.155                  | 0.0001 |
| STAT     | 1  | -3.0773            | 0.8043         | -3.826                  | 0.0003 |
| GEND     | 1  | 6.6313             | 2.6729         | 2.481                   | 0.0155 |

Hypothesis 7 - Prediction of satisfaction

The purpose of hypothesis 7 was to uncover determinants of satisfaction, and to examine the extent to which these determinants affect satisfaction. The data analysis for this hypothesis was identical with the analysis for hypothesis 6. The original regression model for the prediction of satisfaction included the variables perceived group cohesiveness, self-esteem, sociometric status, gender, and acceptance. The stepwise selection procedure suggested perceived group cohesiveness is the only significant variable for the prediction of satisfaction. No other variable, and no interaction effect met the requirements for entry into the model. Table 9 summarizes the results of the stepwise selection procedure for the dependent variable satisfaction.
Table 9. Summary of the stepwise selection procedure for the prediction of satisfaction.

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable entered</th>
<th>Number entered</th>
<th>Partial $r^2$</th>
<th>Model $r^2$</th>
<th>C (p)</th>
<th>F</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COHE_W</td>
<td>1</td>
<td>0.3547</td>
<td>0.3547</td>
<td>0.5058</td>
<td>35.1726</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

All variables left in the model are significant at the 0.1500 level.

No other variables met the 0.1500 significance level for entry into the model.

The final prediction model for satisfaction included only the variable perceived group cohesiveness. Table 10 shows the results of the regression analysis. The analysis was significant ($F = 37.411$, $p = 0.0001$). The $r^2$ value indicates that 34 percent of the total variability in satisfaction could be explained by perceived group cohesiveness. The $r^2$ values for the data used in this experiment and for the total population are approximately the same.

Table 10. Multiple linear regression analysis for the prediction of satisfaction.

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-Value</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>585.5986</td>
<td>585.5986</td>
<td>37.411</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>71</td>
<td>1111.3603</td>
<td>15.6529</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>1696.9589</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Root MSE       | 3.9564          | $R^2$ | 0.3451
Dep Mean       | 34.2877          | Adjusted $R^2$ | 0.3359
C.V.           | 11.5388          |

Parameter Estimates

| Variable | Df | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > |T|
|----------|----|--------------------|----------------|-----------------------|---------|
| Intercep | 1  | 19.2646            | 2.4994         | 7.708                 | 0.0001  |
| COHE_W   | 1  | 0.1872             | 0.0306         | 6.116                 | 0.0081  |

Results
Hypothesis 8 - Relationship between group cohesiveness and time needed to accomplish a group task

The last specific hypothesis tested the relationship between group cohesiveness and the time the group needed to accomplish the decision-making task. This hypothesis was tested at the group level of analysis. For each group, a group cohesiveness score was calculated by averaging the individual perceived group cohesiveness scores. During the experiment, the proctors measured the time the groups needed to accomplish the group task. The data for the three person groups was discarded since it was possible that smaller groups needed less time to accomplish the group task. Figure 18 shows the relationship between group cohesiveness and time the group needed to accomplish the group task. While the scatterplot suggests the result is in the expected direction, the correlation analysis was not significant ($r_s = 0.129$, $p = 0.623$). The analysis with Pearson's product-moment correlation was also non-significant ($r = 0.392$, $p = 0.119$). However, the limited sample size of $n = 17$ observations is probably not sufficient to draw any conclusions at the group level of analysis.
Figure 18. Relationship between group cohesiveness and time needed to accomplish the group task.

Summary of experimental results

Table 11 summarizes the test results for the eight major alternative hypotheses that were tested in this experiment. Six of these hypotheses were accepted at the significance level of $\alpha = 0.05$. Alternative hypothesis 4 could not be supported, but the results were in the expected direction. Hypothesis 8, the only hypothesis tested at the group level of analysis, was also rejected. However, it is suggested that the limited sample size of $n = 17$ observations at the group level of analysis is not sufficient to draw any conclusions about the relationship between group cohesiveness and time the group needed to accomplish the decision-making task.
Table 11. Summary of experimental results.

<table>
<thead>
<tr>
<th>Alternative Hypothesis</th>
<th>accepted/rejected</th>
<th>Independent Variables</th>
<th>Moderating Variables</th>
<th>Dependent Variables</th>
<th>Test</th>
<th>Test statistic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 1</td>
<td>accepted</td>
<td>COHE_W</td>
<td></td>
<td></td>
<td></td>
<td>Spearman’s Rank Order Correlation</td>
<td>$r_s = 0.724$</td>
</tr>
<tr>
<td>Hypothesis 2</td>
<td>accepted</td>
<td>TREAT</td>
<td>COHE_W</td>
<td></td>
<td></td>
<td>Wilcoxon's Rank Sum Test</td>
<td>$z = 3.649$</td>
</tr>
<tr>
<td>Hypothesis 3</td>
<td>accepted</td>
<td>COHE_W</td>
<td>SATI</td>
<td></td>
<td></td>
<td>Spearman’s Rank Order Correlation</td>
<td>$r_s = 0.536$</td>
</tr>
<tr>
<td>Hypothesis 4</td>
<td>rejected</td>
<td>COHE_W</td>
<td></td>
<td>ACCE</td>
<td></td>
<td>Spearman’s Rank Order Correlation</td>
<td>$r_s = 0.199$</td>
</tr>
<tr>
<td>Hypothesis 5</td>
<td>accepted</td>
<td>TREAT</td>
<td>COMP</td>
<td></td>
<td></td>
<td>Chisquare Test of Independence</td>
<td>$\chi^2 = 4.547$</td>
</tr>
<tr>
<td>Hypothesis 6</td>
<td>accepted</td>
<td>GEND</td>
<td>ACCE</td>
<td></td>
<td></td>
<td>Multiple Linear Regression Analysis</td>
<td>$F = 14.740$</td>
</tr>
<tr>
<td>Hypothesis 7</td>
<td>accepted</td>
<td>COHE_W</td>
<td>SATI</td>
<td></td>
<td></td>
<td>Multiple Linear Regression Analysis</td>
<td>$F = 37.411$</td>
</tr>
<tr>
<td>Hypothesis 8</td>
<td>rejected</td>
<td>COHE_AV</td>
<td>TIME</td>
<td></td>
<td></td>
<td>Spearman’s Rank Order Correlation</td>
<td>$r_s = 0.129$</td>
</tr>
</tbody>
</table>

Legend:
TREAT Treatment Condition (categorical)
COHE_W Perceived Group Cohesiveness as measured by the Wheeless Group Solidarity Scale
COHE_G Perceived Group Cohesiveness as measured by the modified Group Attitude Scale
COHE_AV Average Group Cohesiveness for a group as measured by Wheeless Group Solidarity Scale
GEND Gender (categorical)
STAT Sociometric Status
SELF Self-Esteem
SATI Member Satisfaction
ACCE Acceptance
COMP Compliance (categorical)
TIME Time the group needed to accomplish a decision-making task

Results
While most of the alternative hypotheses were accepted at very high confidence levels, the results generally suggest some of the hypothesized relationships are not as strong as they were expected to be. Furthermore, the results indicate the moderating variables considered in this experiment contributed only in some instances to the variability in the dependent variables. These contributions were also generally smaller than expected. Maybe the most striking result, however, is that the hypothesized relationship between perceived group cohesiveness and acceptance could not be supported. The findings will now be discussed in detail, and possible explanations will be suggested.

**Reliability of the measurement instruments**

The measurement instruments used in this experiment had generally very high reliabilities in terms of their internal consistencies. Similarly, high reliabilities were found for these instruments in the pilot study, where the computation of Cronbach's alpha was based on a smaller sample size of $n = 48$ subjects. All questionnaires but the satisfaction questionnaire were selected among similar instruments because of their applicability in this experiment, and because of their proven reliabilities in various other studies. Specifically, the two measurement instruments for group cohesiveness, the Wheeless Group Solidarity Scale and the Group Attitude Scale, had been found to be highly reliable, and to be highly correlated in a recent cohesiveness study (Keyton, Springston, 1990). Based on Keyton and Springston's finding, and based on the experimental results of this study, it is concluded there is enough evidence that the Wheeless Group Solidarity Scale is a sufficiently reliable and valid instrument for the assessment of group cohesiveness.
The member satisfaction questionnaire was the only instrument specifically designed for this experiment. In the pilot study, as well as in the actual experiment, the reliabilities for this instrument were relatively high. Considering the fact that the satisfaction questionnaire had never been tested before, the reliability values were surprisingly high. It was assumed that three aspects of satisfaction contribute to total member satisfaction. These aspects were (a) satisfaction with the group decision, (b) satisfaction with the group process, and (c) satisfaction with the group atmosphere. Each aspect was measured with two questions, and one of these questions was always reversibly scored to reduce the response set. Because of the high reliability values for the questionnaire, it is concluded that the assessment of the three aspects of member satisfaction provided a sound assessment of total member satisfaction with the experimental group meeting.

**Manipulation of group cohesiveness**

While the manipulation of group cohesiveness significantly discriminated the subjects with regard to their responses to the cohesiveness measure at a very high confidence level, the manipulation was not as successful as desired. Generally, the subjects perceived their groups to be moderately or highly cohesive. Only 24.7% of all subjects scored below the median score of 72 on the Wheeless Group Solidarity Scale. While the manipulation instruction for the high cohesiveness treatment seemed to be very successful, the data suggests the instruction for the low cohesive treatment was not as successful. There are various possible reasons that would explain why the low cohesiveness manipulation instruction did not create truly low cohesive groups.
First, it is not surprising that perceived group cohesiveness was relatively high in both treatment conditions. I believe the students, regardless of the cohesiveness treatment they were assigned to, had somewhat similar preconceptions, similar expectations, and interests. It is possible that the students in both treatment conditions generally had the feeling they were "sitting in the same boat" with their fellow students. For instance, everybody participated for the same reasons: every student received extra class credit, and everybody had a chance to win some money. Further, even though the invitation sheet and the consent form described the experimental tasks, the students didn't know what exactly to expect during the experiment. Also, most of the students said in the debriefing presentation they participated for the very first time in a social science experiment. Considering these circumstances, it seems possible that similar preconceptions, expectations, and interests created a sense of unity in the groups, and it is possible that this feeling of belonging together made the groups cohesive, regardless of the cohesiveness treatment to which they were assigned.

A second possible reason why the low cohesiveness treatment did not create truly low cohesive groups could have been the monetary group incentive. A group reward of $40 dollars was offered to the group whose ranking had the smallest deviation from the correct NASA ranking in the Lost on the Moon experiment. Since the group reward was offered in both treatment conditions, each subject had the same incentive to contribute to the group decision so as to make his or her group most likely to win the reward. The monetary incentive to make the group successful might have negated the effect of the low cohesiveness manipulation instruction. Fisher (1973) identified a task dimension and a social dimension of the group process. He referred to the task dimension as the "relationship between group members and the work they are to perform," and to the
social dimension as "the relationship of group members with each other - how they feel toward each other and about their membership in the group." From Fisher's perspective, the groups that were assigned to the low cohesiveness treatment might have focused more on the group task than on the social issues in the group. Observations made by the proctors indicated that the members of the groups in the high cohesiveness treatment frequently engaged in non-task related talking, laughter and joking, whereas the members of groups assigned to the low cohesiveness treatment seemed to focus immediately on the group task. Also, the proctors of five groups in the low cohesiveness treatment noted in their protocols their groups seemed to be "organized," and the group members used a very "rational" or "logical" approach to rank the items in the group exercise. While no conclusion can be made based on the observations made by the proctors, it is possible that the groups in the low cohesiveness treatment experienced the benefits of task-oriented cooperation. As Fisher (1973) pointed out, the task and social dimensions of the group process are inseparable and interdependent. It is possible that perceived successful problem-solving in the groups that were assigned to the low cohesiveness treatment affected the social dimension of the group process, and increased the cohesiveness in these groups.

A third possible reason why the low cohesiveness manipulation was not very successful could be that the students simply did not believe in the manipulation instruction. It is always uncomfortable to be in a group situation where people don't fit together very well. But making a judgment about other people that is exclusively based on a verbal statement made by a proctor, and not at all based on one's own experience, must be considered to be naive. I believe the students in the low cohesiveness treatment had some doubt in the manipulation instruction. Observations made by the proctors also indicate some students
were suspicious. While some students expressed they really had the feeling of being the "leftovers," other students, when reading the low cohesiveness manipulation instruction, expressed their doubts with statements like "Is this really true?" or "Did the program really suggest we would not get along very well with each other?" Some students were extremely suspicious, and they openly expressed their disbelief in the manipulation instruction. I also believe that most students in the low cohesiveness treatment wanted to judge for themselves whether or not they get along with their group partners. The students could have experienced that they can get along well with their group partners. An increase in actual group cohesiveness during the experimental group meeting would explain the relatively high scores on the cohesiveness measure.

While the responses to the group cohesiveness measure clearly suggest the students must have been influenced by the manipulation, this influence probably was not very powerful. I believe the high cohesiveness manipulation instruction was more successful in influencing the students than the low cohesiveness manipulation instruction.

**Relationship between group cohesiveness and member satisfaction**

The experimental results clearly suggest there is a relationship between group cohesiveness and member satisfaction. Particularly surprising was the result of the variable selection procedure in the regression analysis. The stepwise procedure selected group cohesiveness as the only significant variable in the prediction of satisfaction. The regression analysis with the final prediction model suggested 34 percent of the total variability in satisfaction could be explained by the variability in group cohesiveness.

**Discussion**
Previous research studies by Fisher (1973), Applbaum et al. (1974), and Wheeless et al. (1982) also found a close association between group cohesiveness and satisfaction. Wheeless et al. (1982) suggested there is a reciprocal relationship between cohesiveness and satisfaction: the more cohesive a group is, the greater will be the satisfaction in the group; and the more satisfied the group members are, the more cohesive the group will be. My experiment was designed to treat group cohesiveness as an independent construct. Variability in group cohesiveness was induced with different cohesiveness manipulation instructions in two treatments. The manipulation led the subjects to perceived different levels of group cohesiveness. After the experimental group meeting, the subjects were questioned how satisfied they were with the group meeting. Those group members who perceived their group to be highly cohesive indicated they were also more satisfied with the group meeting. Therefore, the results of this study support Wheeless's notion in one direction: the more cohesive the group is, the more satisfied will be the group members.

None of the moderating variables that were measured in this experiment contributed to the prediction of satisfaction. It was expected that group members who rank very high on sociometric status are generally more satisfied with the group meeting than group members who rank very low. However, the results suggest that satisfaction with the experimental group meeting was independent of the number of choices a subject received on the sociometric questionnaire. It appears that group members who did not receive many sociometric choices by their group partners were not less satisfied with the group meeting.

Discussion
The scatterplot in Figure 12 provided some evidence that the relationship between group cohesiveness and member satisfaction is curvilinear. One possible explanation could be a certain amount of perceived group cohesiveness is necessary for a group member to be satisfied with the group meeting, but any further increase in perceived group cohesiveness does not further increase one's satisfaction with the group meeting.

**Relationship between group cohesiveness and acceptance**

The purpose of hypothesis 4 was to test the effect of perceived group cohesiveness on acceptance. Perceived group cohesiveness was expected to be positively correlated with acceptance. Hypothesis 4 was directly derived from Festinger's social comparison theory (Festinger, 1954). Festinger stated in his theory the more attractive a group is to a member, the more important that group will be as a comparison group for that member. Specifically, Festinger expected that group members who are highly attracted to their group will show an increased tendency to change their own position, and also show greater efforts to change the position of other group members. Hypothesis 4 was not supported, and the data suggests there is no significant relationship between group cohesiveness and the acceptance of influence.

While it is possible that there is in fact no significant relationship between group cohesiveness and acceptance, it is also possible the hypothesized relationship could not be demonstrated because of factors that were not considered in this experiment. For instance, the factors of group history and time were not considered in this experiment. It may be that the impact of group cohesiveness on acceptance is not immediately observable in emerging groups. Intervening variables might play a role in the

*Discussion*
relationship between group cohesiveness and acceptance of influence. Stone (1981) says an "intervening variable is an unobservable process and/or state associated with an organism that helps to explain linkages between an independent and dependent variable." According to Stone, the intervening variable surfaces between the time the independent variable is manipulated and the dependent variable is observed. In my literature review, there is one hint that the factor of time might be important in the social influence process. In the literature review, Figure 8 showed that group members' judgments converged in subsequent group sessions in replication of Sherif's experiment. However, a significant change in the individual judgments was observed only after the third group session. The subjects did not change their minds immediately. The experimental groups in my study had absolute zero history. Furthermore, there was only one experimental group session. It is possible, however, to measure group cohesiveness at any point during the group life cycle, even in the emerging phase of the group. It is possible, for emerging groups, that group cohesiveness alone has no impact on acceptance. Intervening variables that could be important are the perceived trustworthiness of the group, or members' confidence in the group's judgments. Trustworthiness and confidence are variables that are based on one's experience with the group, and they typically increase over time. If trust in the group is considered an intervening variable, it may be that members of highly cohesive groups develop more trust in the group and therefore accept more of the influence than members of low cohesive groups. However, the only conclusion that can be made based on the experimental results is that there is no evidence that group cohesiveness and acceptance of influence are related in emerging groups.
Prediction of acceptance from independent and moderating variables

The moderating variables of sociometric status and gender predicted acceptance. While females accepted generally more of the influence that was exerted in the group, the variable of gender, although included in the final prediction model, played only a minor role in the prediction of acceptance. Sociometric status was far more important than gender. The results indicated the higher the sociometric status of a group member, the less likely he or she was to accept what was agreed upon in the group discussion. Or, the lower the status of a group member, the greater was his or her acceptance of the group decision. To discuss the influence of the moderating variable of sociometric status, the content of the individual items of the sociometric status questionnaire needs to be considered. In general, the questionnaire measured quantity and quality of each member's contribution to the group product. The sociometric status of group members was determined by the number of choices a member received from the group with regard to specific leadership qualities such as being able to provide, clarify, organize, and criticize ideas, and to stimulate the group discussion. The last item of the questionnaire asked directly which group member would be the best leader of the group. The results suggest that those subjects who were perceived to be most influential in the group discussion accepted to a lesser extent what was earlier agreed upon in the group. One possible explanation is that those group members who were perceived to contribute to a great extent to the group product were personally more involved in the group discussion, they provided more ideas and direction to the group, and consequently, they developed greater commitment to their own positions. Conversely, the students who ranked low on sociometric status probably were less active in participation, they advocated their positions less frequently, and they were less likely to develop commitment to their own positions. There are studies that support this explanation. For instance, Deutsch and
Gerard (1955) demonstrated that group members who were required to announce their opinion publicly in a group situation were less likely to change their opinion after being confronted with the judgment of other group members. Deutsch and Gerard reasoned that individuals who advocate an opinion in public develop commitment to their opinion, and are more resistant to changing that opinion.

Another explanation for the negative relationship between sociometric status and acceptance relates to the confidence the subjects had in their own judgment. It is possible that those subjects who were very confident in their first ranking dominated the group discussion, and emerged as task-oriented leaders from the group. Perceived confidence in one's own judgment could be a key determinant for sociometric status. The confidence that high status subjects have in their judgment would explain their tendency to stick to their own ranking of the items. Low status subjects' lack of confidence in their own judgment could have led them to accept more of the opinions that were advocated by their group partners.

It is interesting that self-esteem was not significant in predicting acceptance. In fact, self-esteem and acceptance were virtually uncorrelated ($r_s = 0.046, p = 0.707$). Further, self-esteem and sociometric status were not correlated either ($r_s = 0.066, p = 0.599$). According to Rosenberg (1989), people with low self-esteem tend to describe themselves as being "easily led," "too easily influenced," they "give in," they "lack of self-confidence," and they usually "let others make the decision." According to Rosenberg, people with low self-esteem tend to be passive in group discussions, and they are less likely to assume group leadership. Therefore, self-esteem was expected to be positively correlated with sociometric status, and negatively correlated with acceptance. However,
the results of this experiment provided no evidence at all for any of these relationships. Self-esteem appeared to be entirely independent of sociometric status and acceptance. This result somewhat reinforces the belief that not self-esteem, but confidence in one's first judgment might be the key determinant for the behaviors in the group process.

**Relationship between cohesiveness treatment condition and compliance**

There was a significant relationship between treatment condition and compliance. The subjects in the high cohesiveness treatment condition chose the bogus ranking more frequently than the subjects in the low cohesiveness treatment condition. Also, the subjects in the high cohesiveness treatment condition scored, on average, higher on the cohesiveness measure than the subjects in the low cohesiveness treatment condition. Although the following generalization of these results must be considered with care, it appears that perceived group cohesiveness had an effect on compliance with the group. As a generalization of the results, it is suggested that group members who perceive their group to be highly cohesive are more likely to comply with their group than group members who perceive their group to be less cohesive.

Separate descriptive statistics suggested that those subjects who complied with their group scored, on average, higher on cohesiveness, higher on acceptance, and lower on sociometric status. Self-esteem appeared to have no influence on compliance. The average self-esteem score was almost identical for subjects who complied with their group, and for subjects who did not comply. It is somewhat surprising that gender seems to be related to compliance. While only 2 out of 40 males complied with their group, 11 out of 36 females chose the bogus ranking instead of their own ranking.

*Discussion*
The fact that subjects who complied with their group scored higher on acceptance indicates there is a dependency between acceptance and compliance. It appears that subjects who accept more social influence attempts by their group partners are also more willing to comply with their group, and willing to disregard their own judgments in favor of their group partner’s judgments. The dependency between acceptance and compliance could be explained with Festinger’s theory of cognitive dissonance (Festinger, 1957). Cognitive dissonance occurs when people exhibit behaviors that are not in accordance with their own beliefs. Festinger proposed that people generally seek to reduce cognitive dissonance. One way to reduce cognitive dissonance is to choose behaviors that are in accordance with one’s own beliefs. It is possible that the subjects who complied with their group in this experiment did so because they accepted more influence attempts by their group earlier in the experiment. If they hadn’t complied with their group, they would have created cognitive dissonance.

The results suggest the moderating variable of gender has an impact on compliance. In general, females complied more frequently with their group than males. Furthermore, the results suggest there is an interaction between treatment condition and gender. Gender seemed to have a greater impact on compliance in the high cohesiveness treatment condition. The ratio of females who complied with their group to males who complied with their group was 9 to 1 in the high cohesiveness treatment condition. In the low cohesiveness treatment condition this ratio was only 2 to 1. The difference in these ratios indicates the cohesiveness manipulation had a greater impact on females than on males. Separate descriptive statistics for males and females showed also that females scored on average higher on group cohesiveness, higher on satisfaction, higher on acceptance, and lower on sociometric status. One possible explanation for these findings
is that females were more influenced by the cohesiveness manipulation than males. Greater perceived group cohesiveness would explain the increased tendency to comply with the group.
A major limitation for this study was the sample size of \( n = 77 \) subjects. The subjects were assigned to 17 groups of four persons each, and 3 groups of three persons each. At the group level of analysis, the sample size was \( n = 20 \) groups. For the analysis of the relationship between group cohesiveness and time, the sample size was even further reduced to \( n = 17 \) groups. Because of the limited sample size, the statistical tests were not very powerful. However, the fact that some relationships could be demonstrated at surprisingly high confidence levels with a relatively low sample size provides some evidence that these relationships do in fact exist. A definite weakness was that the effects of group cohesiveness could not be analyzed at the group level of analysis with a sample size of only 17 groups. On the individual level of analysis, however, group cohesiveness is not adequately treated as a group concept. Festinger (1950) suggested "group cohesiveness is the resultant of all forces acting on members to remain in the group." This definition clearly suggests group cohesiveness is a group concept. Consequently, group cohesiveness should be analyzed from a group perspective.

Another limitation of the study is that the experiment was conducted with students. The experimental results may not be generalizable for different populations such as group managers, or convenors and facilitators of decision-making groups. Also, managerial implications of group cohesiveness should not be derived from the experimental results in this study. However, since the results provide some evidence that group cohesiveness has an effect on member satisfaction and on compliance, it might now be appropriate to study these effects in field experiments with real groups.
The purpose of the study was to investigate and demonstrate effects of group cohesiveness. Since group cohesiveness was considered to be independent, the study attempted to create groups that differ only in their cohesiveness. The technique used to manipulate group cohesiveness was successful because it actually induced the subjects to perceive different levels of group cohesiveness. However, one weakness of the study was that group cohesiveness was not truly independent. The categorical variable of treatment condition was the truly independent variable in the experiment. The subjects were randomly assigned to groups, and the groups were randomly assigned to one of the two treatment conditions, high and low cohesiveness. As a consequence of the different manipulation instructions in the two treatments, the subjects perceived different levels of group cohesiveness in the two treatments. While alternative cohesiveness manipulation techniques are available, no technique has been found that treats cohesiveness as truly independent. Treating group cohesiveness as an truly independent construct appears to be very difficult.

Another weakness of the study was the low effectiveness of the low cohesiveness manipulation instruction. The data suggests this instruction was not very powerful in influencing the subjects. The last sentence of this instruction suggested to the subjects that "there is no reason to believe that you will like the people working with you or that they will like you." I believe the students became suspicious because of this sentence. Further, it is possible that this sentence had a boomerang effect for those subjects who did not believe in the manipulation instruction. This sentence might have triggered the desire to prove that the group members can get along well with one another. If this cohesiveness manipulation technique is used in further studies, I recommend to eliminate

_Weaknesses and recommendations for future research_
or to change this sentence. One alternative would be to suggest that low congenial groups might work less effectively together than highly congenial groups.

Another limitation of the study was the experimental groups were not real groups. In the experiment, I attempted to create a sense of real world with individual and group incentives, with some competition between the groups, and with an experimental task that required group cooperation and the exchange of information to be successful as a group. Further, I attempted to increase individual involvement in the experimental task with the remark that the performance on the experimental task is highly correlated with intelligence. However, the groups were emerging groups, and they lacked some important characteristics of real groups such as an established trustworthiness of the group, or a group history with regard to success, or failure on group tasks. Since those group characteristics could be important for the social influence process, I recommend to study group cohesiveness in field experiments using real groups.
This study was done for two purposes: (a) to characterize the phenomenon of group cohesiveness as it pertains to decision-making in small groups, and (b) to demonstrate cause-effect relationships between group cohesiveness and group conformity, and between group cohesiveness and member satisfaction.

Characterizing the phenomenon of group cohesiveness proved to be difficult since group cohesiveness has been defined, operationalized, and measured in many different ways. Consequently, research on group cohesiveness has frequently yielded inconsistent and contradictory results. However, in this study, I depicted antecedents and consequences of group cohesiveness for which researchers have concluded there is sufficient evidence for their relation to group cohesiveness. One conclusion of this study is that the phenomenon of group cohesiveness needs to be investigated more thoroughly. Further research on group cohesiveness is necessary to identify those components that are central to the construct of group cohesiveness. A generally applicable operational definition of group cohesiveness has yet to be developed.

With regard to the second purpose, the experimental part of this study provided strong evidence for a relationship between group cohesiveness and member satisfaction, and moderately strong evidence for a relationship between group cohesiveness and compliance. No evidence was found for a relationship between group cohesiveness and acceptance. However, no conclusion about these findings should be made without considering the specific conditions in this experiment. Maybe the most important point to keep in mind is that this experiment dealt with laboratory groups, and not with real
groups. With regard to the relationship between group cohesiveness and acceptance, the only conclusion that can be made based on the experimental results of this study is that group cohesiveness and acceptance appear to be unrelated in emerging groups.

In this study group cohesiveness was measured with the Wheeless Group Solidarity Scale. Therefore, the operationalization of the construct of group cohesiveness included those components that were assessed by the individual items of this scale. These components were psychological closeness, interpersonal liking, group affiliation, and trust. While the Wheeless Group Solidarity Scale appeared to be a reliable instrument for the assessment of group cohesiveness in this study, future research needs to investigate the applicability of this scale for populations other than undergraduate students. If the Wheeless Group Solidarity Scale is used to measure group cohesiveness in real-world decision-making groups, it would be interesting to know whether the relationships that were found in this study can be demonstrated for different populations as well.
REFERENCES


References


References


APPENDIX A: DEFINITION OF TERMS

Compliance
Compliance is a change in behavior as a result of real or imagined group pressure. The change in behavior is not in accordance with one's personal beliefs.

Conformity
Conformity is a change in behavior or belief toward a group as a result of real or imagined group pressure. Conformity has at least two components: compliance, and private acceptance (Kiesler, 1969).

Group
Two or more persons who are interacting with one another in such a manner that each person influences and is influenced by each other person (Shaw, 1981).

Group cohesiveness (conceptual definition)
Group cohesiveness is the total field of forces that act on members to remain in the group (Festinger, Schachter, and Back 1950).

Group cohesiveness (operationalized definition)
Group cohesiveness is a construct with the interrelated components of psychological closeness, interpersonal liking, group affiliation, and trust.

Group convenor
A person who initiates a group meeting, and brings the group together for some purpose.

Group facilitator
A person whose assigned task is to help the group achieve group goals more effectively and efficiently by facilitating group interaction.

Group manager
A person who maintains the overall responsibility over a group. A group manager establishes the group, assigns group responsibilities, and usually sets group goals.
Group pressure
Group pressure is a psychological force operating upon a person to fulfill others' expectations of him, including especially those expectations of others relating to the person's roles or to behaviors specified or implied by the norms of the group to which he belongs (Kiesler, 1969).

Group process
A group process is the total of all individual and group behaviors that occur during a group meeting.

Perceived sociometric status
The perceived sociometric status in the worth of a group member as estimated by the group. The estimate of worth is determined by the extent to which a member's attributes or characteristics are perceived to contribute to satisfying the needs of the group.

Private acceptance
Private acceptance is a change in belief toward others as a result of social influence.

Social context
The social context refers to the social circumstances under which group interaction occurs.

Social influence
Social influence is a change in individuals induced by individuals (Kiesler, 1969).

Sociometric method
A measurement procedure assessing the sociometric status of group members. The measurement is usually based on choice, or preference with respect to certain criteria.
APPENDIX B: INVITATION SHEET

Invitation To A Decision Making Experiment

To: Virginia Tech undergraduate students
From: Wilfried Kern
Graduate student in ISE
Phone: 951-3823
Date: May 18, 1992

I am looking for students to participate in my Master's thesis experiment about group decision making. This experiment involves three steps. First, the participants need to fill out a questionnaire. The purpose of the questionnaire is to assign people to highly congenial work groups. In the second step, the participants will be assigned to work groups based on their responses to the questionnaires. In the third step, the participants work on several rank-ordering tasks as individuals, and as a group. The experiment lasts about 60 to 90 minutes. During the experiment, every participant has an equal chance of winning a monetary reward of $40. There will be one "big" winner who wins $30, and at least four "small" winners who win $10 each. In case of a tie, the rewards will be split equally. There can be as many as 10 winners! Every participant will also receive extra class credit for participating in this experiment.

REQUIREMENT: If you have ever participated in the Lost At Sea experiment, or in similar ranking type experiments, you may not participate in this experiment.

Date: Decision making experiment on Thursday, May 21, 1992
Time: First session at 6:00 pm; second session at 8:00 pm;
Place: McBryde 209
Duration: 60 to 90 minutes
Preparation: Please, bring a pencil!
Questions: If you have any questions, please call Wilfried 951-3823 anytime. If I am not at home, please leave a message on the answering machine. I will call you back!

If you signed up for the experiment but you cannot make it for any reason, please call me and let me know as soon as possible. Thank you!
Sign-Up Sheet for the Decision Making Experiment

Thursday, May 21, 6:00 pm (first session)

McBryde 209

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APPENDIX D: CONSENT FORM

Informed Consent

*Project title:* Decision making experiment  
*Principal investigators:* Wilfried Kern, Dr. Pat Koelling

The purpose of this experiment is to study group decision making. During the experiment, you will work on two rank-ordering exercises, the "Lost on the Moon" exercise, and the "Lost at Sea" exercise. You will work as individuals, and as groups. Throughout the experiment, you have to make several decisions. Some decisions have to be made on an individual basis, others have to be made by your group. Also, you have to fill out several questionnaires. Should you decide to participate in this experiment, please note the following:

- You will not be exposed to any psychological or physical harm as a result of your participation in this experiment.
- The experiment should last approximately ninety minutes.
- All data collected in this experiment will be used for research purposes only. All data will be treated confidentially. It will not be possible to identify any participant with the data collected. To provide total anonymity, an experimental ID number will be given to you at the beginning of the experiment. This number serves to combine the data obtained from the assignments and questionnaires. Please, refer always to your experimental ID number, and never write your name on any of the sheets handed to you.
- Your participation in this experiment is voluntary and may be discontinued at anytime. No penalty will be imposed.
- If you have any problems with, or questions about the experiment please contact Wilfried Kern 951-3823.
- If you have any questions about your rights as a participant, you may contact Dr. Bob Beaton (IRB representative for the ISE department) at 231-5936, or Dr. Ernie Stout (Chairman of the IRB) at 231-9359.

This research has been approved by the Institutional Review Board On Research Involving Human Subjects of Virginia Tech. If you consent to participate voluntarily and with an understanding of the conditions outlined above, please print and sign your name below.

__________________________  __________________________
Name (please print)  Date

__________________________  __________________________
Signature  Student ID

*Appendix D - Consent form*
General Instructions for Proctors

- Never reveal the true purpose of the study! Avoid making comments about the study, and always focus on the procedure when you talk to the students. Never mention the terms "group cohesiveness", "group conformity", "compliance", "social influence", "manipulation", and other terms that might reveal the purpose of the study. Pay particular attention to your folder! Never leave your folder open, and don't "forget" it anywhere!

- Overall professional appearance is absolutely necessary to promote credibility in the experiment. Proctors' behavior is critical with regard to how professional the experiment is perceived to be. Don't make a lot of fun, and generally be serious. Stay calm when problems arise!

- Don't waste any time! You have to run the second shift at 8:00 pm. Advise the students to conclude their work if you run behind your time schedule, but don't take anything away from them if they are not finished yet! If you have to advise them to conclude their work, make a note in your protocol.

- Help the students if they have technical questions, for instance *what* they have to do, or *how* they have to do something, but avoid answering questions *why* they have to do something.

- If anything unusual happens - this is anything you think might be important for me to know (dramatic example: a student refuses to continue with the experiment and leaves the room) - please write this down in you protocol. Gather as much information as possible (ID#, why did he leave? what did he/she say? what happened? ...).

- If the students want to know how exactly they can win the money, tell them that the written instructions you will pass out will explain this during the experiment.

- If the students want to know "what the rules are", tell them the written instructions will explain everything step by step during the experiment. Generally, don't try to explain what will happen later in the experiment. Focus on the current step of the procedure!
Experimental Procedure and Proctor Text

1) Come to McBryde 209 at 6:00 pm. Be on time. The students sit in the classroom, and the proctors wait in the front of the room.

2) Take one folder with the experimental materials. Take the label with your name from the folder, and stick it on your shirt so that you can be identified by your subjects.

3) The experimenter (Wilfried) reads the experimental ID numbers of four subjects, introduces a proctor to the subjects, and asks them to follow their proctor to the assigned room. On the front of the folder, you find a label with your name, and a McBryde room number on it. This is your assigned room.

4) Take the four students to your assigned room, ask them to sit in a half circle not too close to one another (they should not be able to see what their group partners are writing down on assignment sheets and questionnaires!), but in a way that they clearly can see their labels with their experimental ID numbers. Take your seat behind the front table. You should sit not too close to the group, but so that you still can read their ID numbers.

5) Briefly, introduce yourself as their proctor: "I am your proctor for this experiment tonight. I am here to tell you what exactly you have to do during the experiment. Throughout the experiment, I will give you several assignments you have to work on. On some assignments you have to work as individuals, on others you have to work as a group. If you have any questions during the experiment about what you have to do, or how you have to do something, please ask me anytime. I will sit right behind this table here, and since this experiment is about verbal communication, I will take some notes. But please, don't be bothered by me."

6) Take the transparency with the manipulation instruction from your folder, put it on the overhead projector, and switch it on. Read out loud, clearly, and slowly the manipulation instruction. Leave the overhead projector on all the time.

7) Take the five copies of individual assignment #1 from your folder, and hand them out. One copy is for you. Instruct your group: "Your first assignment is the NASA Lost On The Moon ranking exercise. You have to work on this assignment on your own. Please don't talk while you are working on this assignment. Write down you experimental ID# on the upper right corner of the sheet and read with me the remarks and instructions."

8) Read out loud, clearly, and slowly the remark and the instructions for individual assignment #1. Then, instruct your group: "You have about 10 minutes time to rank the 15 items, and you may start now."

Appendix E - Materials for proctors
9) After about ten minutes, check whether your subjects are finished with their work, and hand out the five copies of group assignment #1. One copy is for you. Do not collect the completed sheets of individual assignment #1. Instruct your group: "Now, you have to work on your first group assignment. I do not collect the sheets you just worked on since you might need them as a reference. Please, write down you experimental ID# on the upper right corner of the sheet, and read the remarks and the instructions for group assignment #1 together with me!"

10) Read out loud, clearly, and slowly the remarks and the instructions for group assignment #1. Instruct your group: "Now, as a group, take some time to discuss the importance of the items, and decide as a group what is the best ranking of the 15 items. You may start now." Look at your watch and record the time your group starts the discussion in you protocol.

11) Now, you have some time to fill out your protocol which is the last page of your proctor materials. Observe the group process!

12) Check the time schedule but don't intervene in the group process unless your group seems to discuss the items forever. After 25 minutes of interaction, tell them they should come to a conclusion within five minutes. If you intervene, make a note in your protocol.

13) Check whether your group finished the group ranking, look at your watch, and record the time the group ended the discussion in your protocol.

14) Instruct your group:
"I want you to make sure that you all have the same group ranking on your group worksheet. Please, compare your rankings quickly item by item!"

15) Hand out the four copies of the stapled questionnaires. Do not collect any of the assignments your subjects have worked on so far. Instruct your group: "Now, you have to fill out some questionnaires. These questionnaires are stapled together, and please, do not separate them. You have about 10 minutes time to work on the questionnaires. Please, write your experimental ID# on the upper corners of the questionnaires, and read the instructions carefully. You may start now."

16) Check the time schedule!
17) After about 10 minutes, check whether your subjects finished their questionnaires. Collect the questionnaires, but do not collect the individual and group assignment sheets. Then, hand out the five copies of individual assignment #2. Keep one copy for yourself, and instruct your group:

"This is your individual assignment #2. Again, you have to work on your own. Please, write your name on the upper right corner of this sheet, and read the remark and the instructions with me."

18) Read out loud, clearly, and slowly the remark and the instructions for individual assignment #2. Instruct your group: "You have about ten minutes time to work on this assignment, and you may start now."

19) After about 10 minutes, check whether your subjects are finished with their assignment. Then, collect all materials from your group. Put together the four copies of group assignment #1 and the four copies of individual assignment #2. You'll need these sheets to determine the performance score of your group, and to find out who is the best individual in your group. Switch off the overhead projector, and put the transparency back in your folder.

20) Instruct your group:

"Since this study investigates the effects of verbal communication, this group will be split up, and all of you have to move to a different room. Then you have to work on the Lost At Sea exercise, an exercise very similar to the Lost On The Moon exercise. All communication which is necessary for you to come up with decisions will be non-verbal. I will be your means to exchange information. So, let us go, and I bring you to your rooms."

21) Leave one subject in your assigned room with a copy of individual assignment #3, and instruct him/her to read the instructions and to start with the assignment. Bring the other three subjects to the rooms listed on the label "subject - room assignment" which you will find inside your folder. If possible, try to find adjacent empty rooms other than the ones listed on your label (some groups might take longer than others, and there should be no interference). Have your subjects seated, hand them a copy of individual assignment #3, and ask them to take about ten minutes to work quietly on this assignment.

22) If you have time, take the evaluation sheets, and calculate the deviation from the correct NASA ranking for your group, and for each member in your group. Sum up the differences on all items to determine the total deviation score. The group member with the smallest total deviation from the NASA ranking is the best in your group. Transfer your group's score and your best individual's score on the protocol.
23) Check with your students whether they are finished working on their assignment. Use your calculator in a way that your subjects get the impression that you really use it. Carry it around, and be busy with it. Collect the assignment sheets, leave the room, transfer the individual rankings on assignment sheet #4, and prepare the bogus rankings using the conversion table.

24) Hand out individual assignment #4 to your subjects, and tell them they have about five minutes time to make their decision.

25) Collect the assignment sheets from your subjects, and tell them the experiment is over. Let them sign the "Credits for participation" sheet, and tell them they get their class credit by signing this sheet. Tell them also that Wilfried will come to class next week to hand out the monetary rewards, to give a presentation about the experiment, and to answer any further questions they have.
APPENDIX F: PRE-EXPERIMENTAL QUESTIONNAIRES

Please, write the first digit of your experimental ID number (the number on your label) in the first row of the box in the upper left corner of the data coding sheet, and the second digit in the second row.

Please, read each question carefully and mark your responses on the data coding sheet. You select an adjective by marking the choice "A" for that particular item. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel at this moment. Do not think too long about any question. Please make sure you answer all questions. Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed.

Please, take some time to think about the type of person you would like to work with in a small group. What are the personality characteristics of this type of person? Please, describe the type of person you would enjoy working with by selecting any number of the adjectives listed below.

| (1) aggressive | (20) worldly | (39) reasonable |
| (2) talkative | (21) emotional | (40) inflexible |
| (3) independent | (22) cold | (41) cooperative |
| (4) tactful | (23) subjective | (42) defensive |
| (5) unemotional | (24) skilled in business | (43) unrealistic |
| (6) gentle | (25) dependent | (44) closed minded |
| (7) objective | (26) decisive | (45) assertive |
| (8) supportive | (27) interested | (46) self centered |
| (9) dominant | (28) self confident | (47) rational |
| (10) religious | (29) passive | (48) unfair |
| (11) not easily influenced | (30) honest | (49) flexible |
| (12) neat and orderly | (31) open minded | (50) unfriendly |
| (13) calm | (32) self serving | (51) unreasonable |
| (14) submissive | (33) intelligent | (52) offensive |
| (15) logical | (34) irrational | (53) tense |
| (16) sensitive to feelings | (35) fair | (54) active |
| (17) competitive | (36) conservative | (55) realistic |
| (18) warm | (37) ambitious | (56) hesitant |
| (19) insecure | (38) friendly |  

Appendix F - Pre-experimental questionnaires
Now, take some time to think about the type of person you would not be able to work with in a small group. What are the personality characteristics of this type of person? Please, describe the type of person you could not enjoy working with by selecting any number of the adjectives listed below.

<table>
<thead>
<tr>
<th>(57) aggressive</th>
<th>(66) religious</th>
<th>(95) reasonable</th>
</tr>
</thead>
<tbody>
<tr>
<td>(58) talkative</td>
<td>(67) not easily influenced</td>
<td>(96) inflexible</td>
</tr>
<tr>
<td>(59) independent</td>
<td>(68) neat and orderly</td>
<td>(97) cooperative</td>
</tr>
<tr>
<td>(60) tactful</td>
<td>(69) calm</td>
<td>(98) defensive</td>
</tr>
<tr>
<td>(61) unemotional</td>
<td>(70) submissive</td>
<td>(99) unrealistic</td>
</tr>
<tr>
<td>(62) gentle</td>
<td>(71) logical</td>
<td>(100) closed minded</td>
</tr>
<tr>
<td>(63) objective</td>
<td>(72) sensitive to feelings</td>
<td>(101) assertive</td>
</tr>
<tr>
<td></td>
<td>(73) competitive</td>
<td>(102) self centered</td>
</tr>
<tr>
<td></td>
<td>(74) warm</td>
<td>(103) rational</td>
</tr>
<tr>
<td></td>
<td>(75) insecure</td>
<td>(104) unfair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(105) flexible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(106) unfriendly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(107) unreasonable</td>
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<tr>
<td></td>
<td></td>
<td>(108) offensive</td>
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<tr>
<td></td>
<td></td>
<td>(109) tense</td>
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<tr>
<td></td>
<td></td>
<td>(110) active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(111) realistic</td>
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<tr>
<td></td>
<td></td>
<td>(112) hesitant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(113)</td>
</tr>
</tbody>
</table>
Please, read each question carefully and mark your responses on the data coding sheet. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel at this moment. Do not think too long about any question. Please make sure you answer all questions. Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed! Thank You!

1 = strongly disagree
2 = disagree
3 = moderately disagree
4 = neither agree nor disagree
5 = moderately agree
6 = agree
7 = strongly agree

(113) At times I think I am no good at all.
(114) I take a positive attitude toward myself.
(115) All in all, I am inclined to feel that I am a failure.
(116) I wish I could have more respect for myself.
(117) I certainly feel useless at times.
(118) I feel that I am a person of worth, at least on an equal plane with others.
(119) On the whole, I am satisfied with myself.
(120) I feel I do not have much to be proud of.
(121) I feel that I have a number of good qualities.
(122) I am able to do things as well as most other people.
This questionnaire examines your interpersonal behavioral preferences in group situations. Please, refer to situations when you were a member of a small group other than a group of your family members or relatives. How do you usually respond in those situations? Please, read each question carefully and mark your responses on the data coding sheet. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel at this moment. Do not think too long about any question. Please make sure you answer all questions. Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed! Thank You!

<table>
<thead>
<tr>
<th>No</th>
<th>Sometimes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(123) I reveal my feelings to others.
(124) I show understanding of others.
(125) I clarify others' feelings.
(126) I suggest or set limits.
(127) I offer my friendship to others.
(128) I challenge others' behavior.
(129) I conceptualize ideas.
(130) I elicit others' reactions.
(131) I manage my time and that of others.
(132) I confront others.
(133) I interpret others' statements.
(134) I praise others.
(135) I accept others.
(136) I exhort (strongly urge) others.
(137) I manage activities involving others.
(138) I explain situations involving others.
(139) I participate actively with others.
(140) I question others.
(141) I give emotionally to others.
(142) I summarize others' statements.
(143) I suggest procedures.
(144) I am genuine with others.
(145) I take risks with others.
(146) I translate behavior to ideas.
(147) I develop close relationships with others.
(148) I deal with decision making.
(149) I help others understand their experience.
(150) I inspire others.

Appendix F - Pre-experimental questionnaires
INDIVIDUAL ASSIGNMENT #1

NASA Exercise Lost On The Moon: Individual Worksheet

**Remark:**
Recent research has shown that performance on the NASA Lost on the moon exercise is highly correlated with intelligence.

**Instructions:**
You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During landing, much of the equipment aboard was damaged, and, since survival depends on reaching the mothership, the most critical items available must be chosen for the 200 mile trip. Below are listed the 15 items left intact and undamaged after landing. Your task is to rank order them in terms of their importance to your crew in allowing them to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, through number 15, the least important.

- Box of matches
- Food concentrate
- 50 feet of nylon rope
- Parachute silk
- Portable heating unit
- Two .45 caliber pistols
- One case dehydrated Pet Milk
- Two 100 lb. tanks of oxygen
- Stellar map (of the moon's constellations)
- Life raft
- Magnetic compass
- 5 gallons of water
- 3 signal flares
- First aid kit (with injection needles)
- Solar-powered FM receiver-transmitter
GROUP ASSIGNMENT #1
NASA Exercise Lost On The Moon: Group Worksheet

Remarks:
1) Recent research has shown that performance on the NASA Lost on the moon exercise is highly correlated with intelligence.
2) Group performance on this group assignment will partly determine which group receives the group reward of $40.00. Your group's deviation from the correct solution suggested by NASA will be used to determine group performance. In case of a tie, the group reward will be split equally.

Instructions:
This is an exercise in group decision-making. Your group is to employ the method of group consensus in reaching its decision. This means that the prediction for each of the 15 survival items must be agreed upon by each group member before it becomes a part of the group decision. Consensus is difficult to reach. Therefore, not every ranking will meet with everyone’s complete approval. Try, as a group, to make each ranking one with which all group members can at least partially agree. Here are some guides to use in reaching consensus:
1. Avoid arguing for your own individual judgments. Approach the task on the basis of logic.
2. Avoid changing your mind only in order to reach agreement and avoid conflict. Support only solutions with which you are able to agree somewhat, at least.
3. Avoid “conflict-reducing” techniques such as majority vote, averaging, or trading in reaching your group decision.
4. View differences of opinion as helpful rather than as a hindrance in decision-making.

_____ Box of matches
_____ Food concentrate
_____ 50 feet of nylon rope
_____ Parachute silk
_____ Portable heating unit
_____ Two .45 caliber pistols
_____ One case dehydrated Pet Milk
_____ Two 100 lb. tanks of oxygen

_____ Stellar map (moon’s constellations)
_____ Life raft
_____ Magnetic compass
_____ 5 gallons of water
_____ 3 signal flares
_____ First aid kit (with injection needles)
_____ Solar-powered FM receiver-transmitter

Appendix H - Group assignment #1
APPENDIX I: INDIVIDUAL ASSIGNMENT #2

INDIVIDUAL ASSIGNMENT #2
NASA Exercise Lost On The Moon: Individual Worksheet

Remark:
Recent research has shown that performance on the NASA Lost on the moon exercise is highly correlated with intelligence.

Instructions:
Consensus is difficult to reach! During the group exercise you just completed, you might have experienced that not every ranking can meet the complete approval of all group members. There is always some disagreement.

You are asked to do the ranking exercise one more time for yourself. Consider the arguments that were brought up in your group discussion as well as your own first ranking. Try to come up with the best ranking possible.

All work sheets will be collected by your proctor immediately after you complete this task. Of all participants in today’s experiment, an individual reward of $30.00 will be given to that person whose ranking of the 15 items is closest to the correct ranking as suggested by NASA. In case of a tie, this reward will be split equally.

___ Box of matches
___ Food concentrate
___ 50 feet of nylon rope
___ Parachute silk
___ Portable heating unit
___ Two .45 caliber pistols
___ One case dehydrated Pet Milk
___ Two 100 lb. tanks of oxygen
___ Stellar map (of the moon’s constellations)
___ Life raft
___ Magnetic compass
___ 5 gallons of water
___ 3 signal flares
___ First aid kit (with injection needles)
___ Solar-powered FM receiver-transmitter
APPENDIX K: INDIVIDUAL ASSIGNMENT #3

INDIVIDUAL ASSIGNMENT #3
Exercise Lost At Sea: Individual Worksheet

Remarks:
You are asked to do an exercise similar to the Lost on the moon exercise. However, your group is split, and each member of your group is assigned to a different room. All communication necessary for your group to come up with a decision will be non-verbal. Your proctor will be your means to exchange information. First, however, you will work again for your own.

Instructions:
You are adrift on a private yacht in the South Pacific. As a consequence of a fire of unknown origin, much of the yacht and its contents have been destroyed. The yacht is now slowly sinking. Your location is unclear because of the destruction of critical navigational equipment and because you and your crew were distracted trying to bring the fire under control. Your best estimate is that you are approximately one thousand miles south-southwest of the nearest land. Below is a list of fifteen items that are intact and undamaged after the fire. In addition to these articles, you have a serviceable, rubber life raft with oars large enough to carry yourself, the crew, and the items listed below. The total contents of all survivors' pockets are a package of cigarettes, several books of matches, and five one-dollar bills. Your task is to rank the fifteen items listed below in terms of their importance to your survival. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, through number 15, the least important.

____ Sextant
____ Shaving mirror
____ Five-gallon can of water
____ Mosquito netting
____ One case of U.S. Army C rations
____ Maps of the Pacific Ocean
____ Seat cushion (flotation device approved by the Coast Guard)
____ Two gallon can of oil-gas mixture
____ Small transistor radio
____ Shark repellent
____ Twenty square feet of opaque plastic
____ One quart of 160-proof Puerto Rican rum
____ Fifteen feet of nylon rope
____ Two boxes of chocolate bars
____ Fishing kit

Appendix K - Individual assignment #3  149
INDIVIDUAL ASSIGNMENT #4

Exercise Lost At Sea: Individual Decision

**Instructions:**
In the table below, you find the items of the exercise, your own ranking of the items, and the ranking of your group partners as a rounded average of their individual rankings. As part of the experiment, you have to make a first decision for your group. You have to decide for your group whether your own ranking, or the ranking of your partners is the better choice. Your decision affects your group since it will be used to determine who receives the group reward. Your group partners know that you make this decision for the group. So be prepared to answer the question how you decided for your group.

Please, look carefully at the table below, and make your decision by marking one of the following statements:

- For my group, I decide to choose my group partners' ranking.
- For my group, I decide to choose my own ranking.

<table>
<thead>
<tr>
<th>Lost at Sea Items</th>
<th>Your Ranking</th>
<th>Your group partners' suggested ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sextant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaving mirror</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five-gallon can of water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mosquito netting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One case of U.S. Army C rations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maps of the Pacific Ocean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seat cushion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two gallon can of oil-gas mixture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small transistor radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shark repellent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twenty square feet of opaque plastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One quart of Puerto Rican rum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fifteen feet of nylon rope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two boxes of chocolate bars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing kit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For the data analysis, we need some demographic information. Please, mark your responses on this sheet. Make sure you answer all questions. Your proctor will collect these questionnaires immediately after you have completed them. Don't write down your name on any of these sheets! Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed! Thank You!

1) What is your age? ______.

2) What is your gender?
   ______ Male
   ______ Female

3) Are you a
   ______ Freshman, ______ Sophomore,
   ______ Junior, ______ Senior?

4) What is your major? _________________________________

5) Have you ever worked on the Lost On The Moon exercise, or a similar rank ordering exercise (for instance Lost At Sea, Lost In Canada, Lost In The Cascades, Lost In The Wilderness)?
   ______ Yes
   ______ No

Appendix M - Questionnaire: Demographic information
APPENDIX N: QUESTIONNAIRE - GROUP SOLIDARITY SCALE

Please, read each question carefully and mark your responses on this sheet. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel. Do not think too long about any question. Please make sure you answer all questions. Your proctor will collect the questionnaires immediately after you have completed them. Nobody but the experimenter will read your answers. Total anonymity will be guaranteed! Thank You!

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This group is very close.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strongly disagree</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>disagree</td>
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<td>3. The group members do not really understand each other.</td>
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<td>4. I distrust this group.</td>
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<td>5. I like this group much more than other groups I have participated</td>
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<td>6. I really enjoy this group.</td>
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Appendix N - Questionnaire: Group Solidarity Scale
<table>
<thead>
<tr>
<th></th>
<th>I understand the people in this group.</th>
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<tbody>
<tr>
<td>1</td>
<td>strongly disagree</td>
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<td>2</td>
<td>disagree</td>
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<tr>
<td>3</td>
<td>moderately disagree</td>
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<td>4</td>
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<td>5</td>
<td>moderately agree</td>
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<td>6</td>
<td>agree</td>
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<tr>
<td>7</td>
<td>strongly agree</td>
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<table>
<thead>
<tr>
<th></th>
<th>I dislike this group.</th>
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<tbody>
<tr>
<td>1</td>
<td>strongly disagree</td>
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<td>2</td>
<td>disagree</td>
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<tr>
<td>3</td>
<td>moderately disagree</td>
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<td>4</td>
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<td>moderately agree</td>
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<td>agree</td>
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<tr>
<td>7</td>
<td>strongly agree</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>I interact / communicate with this group much better than with most groups I have been in.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>strongly disagree</td>
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<tr>
<td>2</td>
<td>disagree</td>
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<tr>
<td>3</td>
<td>moderately disagree</td>
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<td>moderately agree</td>
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<td>agree</td>
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<td>7</td>
<td>strongly agree</td>
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<table>
<thead>
<tr>
<th></th>
<th>This group is not very close at all.</th>
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<tbody>
<tr>
<td>1</td>
<td>strongly disagree</td>
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<td>2</td>
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<td>3</td>
<td>moderately disagree</td>
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<td>moderately agree</td>
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<td>7</td>
<td>strongly agree</td>
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<thead>
<tr>
<th></th>
<th>The members of this group share a lot in common.</th>
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<tr>
<td>1</td>
<td>strongly disagree</td>
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<td>2</td>
<td>disagree</td>
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<td>moderately disagree</td>
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<td>7</td>
<td>strongly agree</td>
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<thead>
<tr>
<th></th>
<th>The group members do a lot of helpful things for each other.</th>
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<tr>
<td>1</td>
<td>strongly disagree</td>
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<td>7</td>
<td>strongly agree</td>
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<thead>
<tr>
<th></th>
<th>I feel very close to this group.</th>
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<tbody>
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<td>1</td>
<td>strongly disagree</td>
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<td>2</td>
<td>disagree</td>
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<td>3</td>
<td>moderately disagree</td>
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<td>strongly agree</td>
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<th></th>
<th>The group members feel very close to each other.</th>
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<td>agree</td>
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15. We (this group) share some private ways of communicating with each other.

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16. Our group relationship satisfies an important need for group affiliation.

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<td>moderately agree</td>
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17. There is a great deal of hostility and aggression between the group members.

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<td>moderately agree</td>
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18. I feel an important need for affiliation with this group.

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### APPENDIX O: QUESTIONNAIRE - MEMBER SATISFACTION

Please, read each question carefully and mark your responses on this sheet. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel. Do not think too long about any question. Please, make sure you answer all questions. Your proctor will collect the questionnaires immediately after you have completed them. Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed! Thank You!

<table>
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<th>Question</th>
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<tbody>
<tr>
<td>1) I am satisfied with the decisions that were made by this group.</td>
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<td>strongly disagree</td>
<td>moderately disagree</td>
<td>neither agree nor</td>
<td>moderately agree</td>
<td>strongly agree</td>
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<td>2</td>
<td>disagree</td>
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<td>2) The group atmosphere could have been better.</td>
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<td>strongly disagree</td>
<td>moderately disagree</td>
<td>neither agree nor</td>
<td>moderately agree</td>
<td>strongly agree</td>
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<td>3) I don't like the way how this group made decisions.</td>
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<td>strongly disagree</td>
<td>moderately disagree</td>
<td>neither agree nor</td>
<td>moderately agree</td>
<td>strongly agree</td>
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<td>4) I am satisfied with the group atmosphere in this group.</td>
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<td>strongly disagree</td>
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<td>5) I am satisfied with the way the decisions were made by this group.</td>
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<tr>
<td>6) I am not happy with our group decisions.</td>
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<td>moderately agree</td>
<td>strongly agree</td>
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APPENDIX P: QUESTIONNAIRE - PERCEIVED SOCIOMETRIC STATUS

Please, read each question carefully and write down your answers on this sheet. For each question, choose only one of the four members of your group. You can choose yourself if you think it is the most appropriate answer. For each question, select one of the members of your group and write down the experimental ID number of the person you selected. Don't write down any names! Do not think too long about any question. Please make sure you answer all questions. Your proctor will collect the questionnaires immediately after you have completed them. Nobody but the experimenter will have access to your answers. Total anonymity will be guaranteed! Thank You!

1) Who contributed the best ideas to the group? __________

2) Who seemed to be most active in participation? __________

3) Who was best at stimulating discussion? __________

4) Who was best at explaining his own ideas to others? __________

5) Who was best at clarifying the ideas of others? __________

6) Who was the best critic of other's ideas? __________

7) Who was best at organizing the ideas of the group? __________

8) Who was most influential in the group's decisions? __________

9) If you had to chose a leader from this group, whom would you choose? ________

Appendix P - Questionnaire: Perceived sociometric status
APPENDIX Q: QUESTIONNAIRE - GROUP ATTITUDE SCALE

Please, read each question carefully and mark your responses on this sheet. There are no "right" or "wrong" answers to these questions. Please, select the response which more accurately reflects the way you think or feel. Do not think too long about any question. Please make sure you answer all questions. Your proctor will collect the questionnaires immediately after you have completed them. Nobody but the experimenter will read your answers. Total anonymity will be guaranteed! Thank You!

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<tr>
<th></th>
<th>1. I enjoy being a member of this group.</th>
<th>2. I like this group.</th>
<th>3. I don't care what happens in this group.</th>
<th>4. I feel involved in what is happening in this group.</th>
<th>5. If I could drop out of the group now, I would.</th>
<th>6. I wish it were possible for the group to end now.</th>
<th>7. I am dissatisfied with this group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
<td>strongly disagree</td>
</tr>
<tr>
<td>2</td>
<td>disagree</td>
<td>moderately disagree</td>
<td>neither agree nor disagree</td>
<td>moderately disagree</td>
<td>moderately disagree</td>
<td>moderately disagree</td>
<td>moderately disagree</td>
</tr>
<tr>
<td>3</td>
<td>moderately disagree</td>
<td>neither agree nor</td>
<td>neither agree nor disagree</td>
<td>moderately disagree</td>
<td>agree</td>
<td>agree</td>
<td>agree</td>
</tr>
<tr>
<td>4</td>
<td>neither agree nor disagree</td>
<td>agree</td>
<td>agree</td>
<td>moderately agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
</tr>
<tr>
<td>5</td>
<td>moderately agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
<td>strongly agree</td>
</tr>
<tr>
<td>6</td>
<td>agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix Q - Questionnaire: Group Attitude Scale
8. If it were possible to move to another group at this time, I would.
   1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

9. I feel included in this group.
   1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

10. In spite of individual differences, a feeling of unity exists in this group.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

11. Compared to other groups I know of, I feel this group is better than most.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

12. I do not feel being a part of this group.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

13. I feel it would make a difference to the group if I were not here.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

14. I feel distant from this group.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

15. It makes a difference to me how this group turns out.
     1 strongly disagree  2 moderately disagree  3 neither agree nor disagree  4 moderately agree  5 agree  6 strongly agree

_Appendix Q - Questionnaire: Group Attitude Scale_
APPENDIX R: SAS PROGRAM

OPTIONS LS=120 NODATE NUMBER MISSING = ' ';

* PART1;
* DEFINE TITLES FOR ALL PRINTED OUTPUT;
  TITLE1 'DECISION MAKING EXPERIMENT';
  TITLE3 'MASTER THESIS';

* PART2;
* INFILE DATAFILE ORG_DATA DATA A;
CMS FI RAW DISK ORG_DATA DATA A;
DATA ORG_DATA;
INFILE RAW FIRSTOBS=8;

* PART 3;
* DEFINE INPUT VARIABLES FROM ORG_DATA DATA A;
INPUT IDS
  GROUPS TREATS TIME AGE GENS LEVS MAJS
  SE1 SE2 SE3 SE4 SE5 SE6 SE7 SE8 SE9 SE10
  SAT1 SAT2 SAT3 SAT4 SAT5 SAT6
  COH1 COH2 COH3 COH4 COH5 COH6 COH7 COH8 COH9
  COH10 COH11 COH12 COH13 COH14 COH15 COH16 COH17 COH18
  GAS1 GAS2 GAS3 GAS4 GAS5 GAS6 GAS7 GAS8
  GAS9 GAS10 GAS11 GAS12 GAS13 GAS14 GAS15
  IA1_1 IA1_2 IA1_3 IA1_4 IA1_5 IA1_6 IA1_7 IA1_8
  IA1_9 IA1_10 IA1_11 IA1_12 IA1_13 IA1_14 IA1_15
  GA_1 GA_2 GA_3 GA_4 GA_5 GA_6 GA_7 GA_8
  GA_9 GA_10 GA_11 GA_12 GA_13 GA_14 GA_15
  IA2_1 IA2_2 IA2_3 IA2_4 IA2_5 IA2_6 IA2_7 IA2_8
  IA2_9 IA2_10 IA2_11 IA2_12 IA2_13 IA2_14 IA2_15
STAT COMPS;

* PART 4;
* DEFINE THE FORMAT FOR PRINTED OUTPUT FOR VARIOUS VARIABLES;
PROC FORMAT;
VALUE $STREAFMT 'H' = 'HIGH COHESIVENESS'
  'L' = 'LOW COHESIVENESS';

VALUE $GENFMT 'M' = 'MALE'
  'F' = 'FEMALE';

VALUE $LEVFMFT '1' = 'FRESHMAN'
  '2' = 'SOPHOMORE'
  '3' = 'JUNIOR'
  '4' = 'SENIOR';

VALUE $COMPFMT 'N' = 'DID NOT COMPLY'
  'Y' = 'COMPLIED';
* PART 5;
* FILE TRANS.DATA CALCULATES THE TOTAL SCORES FOR ALL QUESTIONNAIRES;
* AND REVERSES THE NEGATIVELY SCORED ITEMS OF THE QUESTIONNAIRES;
DATA TRANS.DATA;
SET ORG.DATAN;
SE = (8-SE1)+(8-SE2)+(8-SE3)+(8-SE4)+(8-SE5)+SE6+SE7+(8-SE8)+SE9+SE10;
SAT = SAT1+(8-SAT2)+(8-SAT3)+SAT4+SAT5+(8-SAT6);
COH = COH1+COH2+(8-COH3)+(8-COH4)+COH5+COH6+COH7+(8-COH8)+COH9+(8-COH10)+COH11+COH12+COH13+COH14+COH15+COH16+(8-COH17)+COH18;
RESE1 = 8 - SE1;
RESE3 = 8 - SE3;
RESE4 = 8 - SE4;
RESE5 = 8 - SE5;
RESE8 = 8 - SE8;
RESAT2 = 8 - SAT2;
RESAT3 = 8 - SAT3;
RESAT6 = 8 - SAT6;
RECOH3 = 8 - COH3;
RECOH4 = 8 - COH4;
RECOH8 = 8 - COH8;
RECOH10 = 8 - COH10;
RECOH17 = 8 - COH17;
REGAS3 = 8 - GAS3;
REGAS5 = 8 - GAS5;
REGAS6 = 8 - GAS6;
REGAS7 = 8 - GAS7;
REGAS8 = 8 - GAS8;
REGAS12 = 8 - GAS12;
REGAS14 = 8 - GAS14;

* PART 6;
* CALCULATE THE TOTAL ACCEPTANCE SCORE FOR EACH SUBJECT;
ACCE = 0;
IF GA_1 GT IA1_1 THEN ACCE = ACCE + (IA2_1 - IA1_1);
IF GA_1 LT IA1_1 THEN ACCE = ACCE + (IA1_1 - IA2_1);
IF GA_2 GT IA1_2 THEN ACCE = ACCE + (IA2_2 - IA1_2);
IF GA_2 LT IA1_2 THEN ACCE = ACCE + (IA1_2 - IA2_2);
IF GA_3 GT IA1_3 THEN ACCE = ACCE + (IA2_3 - IA1_3);
IF GA_3 LT IA1_3 THEN ACCE = ACCE + (IA1_3 - IA2_3);
IF GA_4 GT IA1_4 THEN ACCE = ACCE + (IA2_4 - IA1_4);
IF GA_4 LT IA1_4 THEN ACCE = ACCE + (IA1_4 - IA2_4);
IF GA_5 GT IA1_5 THEN ACCE = ACCE + (IA2_5 - IA1_5);
IF GA_5 LT IA1_5 THEN ACCE = ACCE + (IA1_5 - IA2_5);
IF GA_6 GT IA1_6 THEN ACCE = ACCE + (IA2_6 - IA1_6);
IF GA_6 LT IA1_6 THEN ACCE = ACCE + (IA1_6 - IA2_6);
IF GA_7 GT IA1_7 THEN ACCE = ACCE + (IA2_7 - IA1_7);
IF GA_7 LT IA1_7 THEN ACCE = ACCE + (IA1_7 - IA2_7);
IF GA_8 GT IA1_8 THEN ACCE = ACCE + (IA2_8 - IA1_8);
IF GA_8 LT IA1_8 THEN ACCE = ACCE + (IA1_8 - IA2_8);
IF GA_9 GT IA1_9 THEN ACCE = ACCE + (IA2_9 - IA1_9);
IF GA_9 LT IA1_9 THEN ACCE = ACCE + (IA1_9 - IA2_9);
IF GA_10 GT IA1_10 THEN ACCE = ACCE + (IA2_10 - IA1_10);
IF GA_10 LT IA1_10 THEN ACCE = ACCE + (IA1_10 - IA2_10);
IF GA_11 GT IA1_11 THEN ACCE = ACCE + (IA2_11 - IA1_11);
IF GA_11 LT IA1_11 THEN ACCE = ACCE + (IA1_11 - IA2_11);
IF GA_12 GT IA1_12 THEN ACCE = ACCE + (IA2_12 - IA1_12);
IF GA_12 LT IA1_12 THEN ACCE = ACCE + (IA1_12 - IA2_12);
IF GA_13 GT IA1_13 THEN ACCE = ACCE + (IA2_13 - IA1_13);
IF GA_13 LT IA1_13 THEN ACCE = ACCE + (IA1_13 - IA2_13);
IF GA_14 GT IA1_14 THEN ACCE = ACCE + (IA2_14 - IA1_14);
IF GA_14 LT IA1_14 THEN ACCE = ACCE + (IA1_14 - IA2_14);
IF GA_15 GT IA1_15 THEN ACCE = ACCE + (IA2_15 - IA1_15);
IF GA_15 LT IA1_15 THEN ACCE = ACCE + (IA1_15 - IA2_15);

* PART 7;
* CALCULATE THE AVERAGE STATUS SCORE FOR EACH SUBJECT;
IF GROUP = '16' OR
   GROUP = '20' OR
   GROUP = '24' THEN STAT = STAT / 3;
ELSE STAT = STAT / 4;

* PART 8;
* SORT AND PRINT THE DATA SET;
PROC SORT DATA=TRANS.DATA;
   BY BATCH ID;
PROC PRINT DATA=TRANS.DATA;
VAR ID GROUP BATCH TREAT TIME AGE GEN LEV MAJ
   SE SAT COH STAT ACCE COMP;
TITLE 'PARTIAL CODED DATA SET';

* PART 9;
* EXAMINE THE DISTRIBUTION OF THE VARIABLES BY PLOTTING THE DATA;
PROC CHART DATA=TRANS.DATA;
VBAR COH SAT ACCE SE STAT;
TITLE 'DISTRIBUTION OF THE VARIABLES';

* PART 10,
* EXAMINE RELATIONSHIPS BETWEEN VARIABLES BY PLOTTING THE DATA;
PROC PLOT DATA=TRANS.DATA;
PLOT ACCE * COH = TREAT;
PLOT SAT * COH = TREAT;
PLOT ACCE * SE = TREAT;
PLOT ACCE * STAT = TREAT;
PLOT ACCE * SAT = TREAT;
PLOT SAT * SE = TREAT;
PLOT SAT * STAT = TREAT;
PLOT SE * STAT = GEN;
TITLE 'SCATTERPLOTS';
* PART 11;
* DESCRIPTIVE STATISTICS;
PROC MEANS DATA=TRANS.DATA;
VAR COH GAS SE STAT SAT ACCE;
CLASS TREAT GEN;
CLASS TREAT;
CLASS GEN;
CLASS COMP;
TITLE5 'DESCRIPTIVE STATISTICS';

* PART 12;
* CALCULATE CRONBACHS ALPHA FOR THE QUESTIONNAIRES;
* SELF ESTEEM, SATISFACTION, GROUP SOLIDARITY, GROUP ATTITUDE;
PROC CORR DATA=TRANS.DATA ALPHA NOCORR;
VAR RESE1 SE2 RESE3 RESE4 RESE5 SE6 SE7 RESE8 SE9 SE10;
TITLE5 'CRONBACHS ALPHA FOR THE SELF-ESTEEM QUESTIONNAIRE';
PROC CORR DATA=TRANS.DATA ALPHA NOCORR;
VAR SAT1 RESAT2 RESAT3 SAT4 SAT5 RESAT6;
TITLE5 'CRONBACHS ALPHA FOR THE SATISFACTION QUESTIONNAIRE';
PROC CORR DATA=TRANS.DATA ALPHA NOCORR;
VAR COH1 COH2 RECOH3 RECOH4 COH5 COH6 RECOH7 COH9 RECOH10
  COH11 COH12 COH13 COH14 COH15 COH16 RECOH17 COH18;
TITLE5 'CRONBACHS ALPHA FOR THE GROUP SOLIDARITY SCALE';
PROC CORR DATA=TRANS.DATA ALPHA NOCORR;
VAR GAS1 GAS2 REGAS3 GAS4 REGAS5 REGAS6 REGAS7 REGAS8
  GAS9 GAS10 GAS11 REGAS12 GAS13 REGAS14 GAS15;
TITLE5 'CRONBACHS ALPHA FOR THE GROUP ATTITUDE SCALE';

* PART 13;
* CALCULATE CORRELATION BETWEEN ALL VARIABLES;
PROC CORR DATA=TRANS.DATA PEARSON SPEARMAN;
VAR COH GAS SE STAT ACCE SAT;
TITLE5 'CORRELATIONS BETWEEN THE VARIABLES';

* PART 14;
* TEST FOR SUCCESSFUL MANIPULATION OF COHESIVENESS;
PROC NPARIWAY DATA=TRANS.DATA WILCOXON;
CLASS TREAT;
VAR COH;
TITLE5 'TEST FOR SUCCESSFUL MANIPULATION OF COHESIVENESS';
TITLE6 'WITH WILCOXON RANK SUM TESTS';
* PART 15;
* REGRESSION ANALYSES;
PROC REG DATA=TRANS.DAT A;
MODEL ACCE = COH GEND SE STAT SAT;
MODEL SAT = COH GEND SE STAT ACCE;
TITLE5 'REGRESSION ANALYSIS FOR THE DEPENDENT VARIABLES';
PROC STEPWISE DATA=TRANS.DAT A;
MODEL ACCE = COH GEND SE STAT SAT / FORWARD BACKWARD STEPWISE;
MODEL SAT = COH GEND SE STAT ACCE / FORWARD BACKWARD STEPWISE;
TITLE5 'SELECTION PROCEDURES TO FIND THE BEST PREDICTORS';
TITLE6 'FOR THE DEPENDENT VARIABLES';
PROC REG DATA=TRANS.DAT A;
MODEL ACCE = STAT GEND;
MODEL SAT = COH;
TITLE5 'FINAL REGRESSION ANALYSES';

* PART 16;
* CHISQUARE TEST OF INDEPENDENCE OF COHESIVENESS AND COMPLIANCE;
PROC FREQ DATA=TRANS.DAT A;
TABLES TREAT*COMP / CHISQ;
FORMAT TREAT STREAMT.
COMP $COMPFT.;
TITLE5 'TEST OF INDEPENDENCE OF COHESIVENESS AND COMPLIANCE';

* PART 17;
* CHISQUARE TEST OF INDEPENDENCE OF GENDER AND COMPLIANCE;
PROC FREQ DATA=TRANS.DAT A;
TABLES GEN*COMP / CHISQ;
FORMAT GEN $GENFMT.
COMP $COMPFT.;
TITLE5 'TEST OF INDEPENDENCE OF GENDER AND COMPLIANCE';
Wilfried Kern was born on December 15, 1962 in Jever, Germany. After having finished high school at the Gymnasium Unterhaching in May 1982, he served in the German Bundeswehr for 15 months. Wilfried pursued a three-year apprenticeship in cabinet-making, and he received a professional degree in cabinet-making and woodworking in July 1986. To build on his skills and interest, Wilfried studied Wood Science and Technology at the Fachhochschule Rosenheim from September 1986 to July 1989. As a recipient of a Fulbright scholarship, Wilfried came to the United States in August 1989, and he enrolled in the Industrial and Systems Engineering Department at Virginia Tech to pursue a Masters Degree in Management Systems Engineering.

Wilfried will return to Germany in July 1992 and start working for a consulting company offering consulting services in the woodworking industry.