A Study of Competitiveness between Sexes and the Effect of Communication Messages upon the Building of Trust

Shirley A. VanHoeven
Western Michigan University

Follow this and additional works at: https://scholarworks.wmich.edu/dissertations
Part of the Educational Administration and Supervision Commons

Recommended Citation
https://scholarworks.wmich.edu/dissertations/2824

This Dissertation-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Dissertations by an authorized administrator of ScholarWorks at WMU. For more information, please contact maira.bundza@wmich.edu.
ACKNOWLEDGMENTS

I am indebted to Dr. Kenneth F. Simon who initially encouraged me to continue my education at Western Michigan University in the Educational Leadership program. His continued support gave me encouragement essential to the fulfillment of the program.

I am grateful to Dr. Rodney W. Roth, Chairperson of the Doctoral Advisory and Dissertation Review Committee, for his careful evaluation and continued support of this study. I also thank other members of the Committee, Dr. Kenneth F. Simon and Dr. Gene S. Booker for their evaluation and analysis of the study. Dr. Carol V. Ryan, who resigned from the Doctoral Advisory and Dissertation Review Committee because of a move to another city, was most helpful in the initial stages of the development of the study.

My colleagues, Dr. Richard J. Dieker, Dr. Steven C. Rhodes, Dr. Ernest L. Stech, and Dr. Shirley C. Woodworth, their students and mine, deserve my greatest appreciation. Their assistance and participation in the research was invaluable to me.

I am deeply appreciative to Doretha E. Mortimore, my typist, for the hours she has spent typing the final manuscript.

My children, Debbie and Jeff, deserve my special thanks for their patience and continued support for me throughout the entire doctoral program. I am most deeply grateful to my husband Don who has been my greatest source of strength, understanding, and encouragement. Without his constant love and support this dissertation would not have been possible.

Shirley A. Van Hoeven
INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in "sectioning" the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from "photographs" if essential to the understanding of the dissertation. Silver prints of "photographs" may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

University Microfilms International
300 North Zeeb Road
Ann Arbor, Michigan 48106 USA
St. John's Road, Tyler's Green
High Wycombe, Bucks, England HP10 8HR

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
VAN HOEVEN, Shirley Ann, 1935-
A STUDY OF COMPETITIVENESS BETWEEN
SEXES AND THE EFFECT OF COMMUNICATION
MESSAGES UPON THE BUILDING OF TRUST.

Western Michigan University, Ed.D., 1976
Education, administration

Xerox University Microfilms, Ann Arbor, Michigan 48106

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. PROBLEM STATEMENT</td>
<td>1</td>
</tr>
<tr>
<td>Need and Significance of Study</td>
<td>3</td>
</tr>
<tr>
<td>Overview of the Study</td>
<td>4</td>
</tr>
<tr>
<td>II. REVIEW OF THE LITERATURE AND THEORETICAL HYPOTHESES</td>
<td>7</td>
</tr>
<tr>
<td>Competition</td>
<td>7</td>
</tr>
<tr>
<td>Trust</td>
<td>10</td>
</tr>
<tr>
<td>Effects of Communication</td>
<td>14</td>
</tr>
<tr>
<td>Prisoner's Dilemma Game</td>
<td>17</td>
</tr>
<tr>
<td>Prisoner's Dilemma Game-Sex Differences</td>
<td>20</td>
</tr>
<tr>
<td>Prisoner's Dilemma Game-Competitiveness and Trust</td>
<td>23</td>
</tr>
<tr>
<td>Prisoner's Dilemma Game-Effects of Communication</td>
<td>28</td>
</tr>
<tr>
<td>III. DESIGN AND METHODOLOGY</td>
<td>31</td>
</tr>
<tr>
<td>Population and Sample</td>
<td>31</td>
</tr>
<tr>
<td>Game Conditions</td>
<td>32</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>32</td>
</tr>
<tr>
<td>The Game</td>
<td>33</td>
</tr>
<tr>
<td>Procedures and Instructions for Collection of Data</td>
<td>35</td>
</tr>
<tr>
<td>Operational Hypotheses</td>
<td>37</td>
</tr>
<tr>
<td>Statistical Procedures</td>
<td>38</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>40</td>
</tr>
<tr>
<td>IV. PRESENTATION AND ANALYSIS OF DATA</td>
<td>41</td>
</tr>
<tr>
<td>Hypothesis One</td>
<td>41</td>
</tr>
</tbody>
</table>

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
**LIST OF ILLUSTRATIONS AND TABLES**

**FIGURE**

1. Prisoner's Dilemma game used in the study .................................................. 33
2. Playing cards used for playing the Prisoner's Dilemma game in the study ............. 34
3. Tables used for scoring Game #1 and Game #2 ........................................... 34

**TABLES**

1. Results of a One-Way Analysis of Variance Showing a Comparison of Male and Female Means for Total Scores of Game #1 ..... 42
2. Results of a One-Way Analysis of Variance Showing a Comparison of Female Total Game #1 Scores from Condition A, Condition C1, and Condition C2 ........................................ 43
3. Results of a One-Way Analysis of Variance Showing a Comparison of Means of Male Total Game #1 Scores from Condition A, Condition C1, and Condition C2 ........................................ 44
4. Results of a One-Way Analysis of Variance Showing a Comparison of Means of Total Scores in Game #1 Between Males and Females in Condition A ........................................ 45
5. Results of a One-Way Analysis of Variance Showing a Comparison of Means between Female and Female Pairs in Condition B ........................................ 46
6. Results of a One-Way Analysis of Variance Showing a Comparison of Means between Male and Male Pairs in Condition C ........................................ 47
7. Results of a One-Way Analysis of Variance Showing a Comparison of Types of Messages Communicated and Frequency of Trust Choices ........................................ 49
8. Results of the Scheffe Multiple Comparison Showing Differences between Group Means According to Types of Messages Sent ........................................ 50
9. A Breakdown of Mean Scores According to Message and Sex ........................................ 51
10. Results of a Two-Way Analysis of Variance Showing the F Value and Probability Level ........................................ 52

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
CHAPTER I

PROBLEM STATEMENT

The purposes of this study are to investigate and measure competitiveness between sexes, to analyze the non-verbal message communicated and to explore whether trust is increased as a result of the type of message sent. For the purpose of this study competition is defined as the desire to rival or contend with another person in order to win, to use strategy. Trust is defined as the assured reliance or faith on the character and truth of a person, to act without fear or misgiving toward a person, a desire to cooperate.

Research in the past has failed to deal specifically with competitiveness and trust that occurs between sex pairs randomly placed into conditions consisting of males and females, females and females, and males and males who have had the opportunity to exchange a written message. These three experimental conditions provided this researcher the opportunity to examine competitiveness and trust from this perspective.

The first part of this investigation was conducted to show the relationship between sex and competitiveness. Competition necessitates that there will be a loser. DeVito (1976) speaks of competition in the following way:

Competition influences and changes the attitudes of the participants, generally in a negative direction. While competing, the individuals often develop negative feelings for each other. In some ways this negative feeling allows for the mobilization of energy and perhaps helps in stimulating that extra effort necessary to win the game. If you are too positive

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
toward your opponent, you may relax your guard and thereby
give him or her an edge. Sometimes this negative feeling is
long lasting and sometimes it is only temporary (pp. 381-382).

Oskamp (1965) in his study of induced high cooperation found that
women gave significantly fewer cooperative responses than men. Rapoport
and Chammah (1965) studied the effects of sex composition of behavior in
the Prisoner's Dilemma game. They found that in the same sex pairs the
males were more cooperative than the females but in mixed sex pairs the
males became less cooperative while the women became more cooperative.

The second part of this empirical research investigation provided
subjects with the opportunity to exchange a written message. This
researcher was interested in examining whether the type of message
communicated made a significant difference in the frequency of trust
choices that the pairs of subjects consequently made. Mellinger (1956)
found that simply increasing the amount of communication between subjects
did not necessarily increase better understanding of one another although
he suggests that an increase in communication may result in greater
accuracy in perceiving the opinions of others, but only when trust and
agreement are high initially. Deutsch (1960) found that when communication
was permitted between subjects there was a significant increase in the number
of cooperative or trust choices. Recipients of highly creditable messages
displayed more "trust" than did other subjects according to Gahagan and
Tedeschi (1967). Swensen (1973) contends that almost any kind of communi-
cation between subjects increases the probability of cooperation between
them.

Trust involves some kind of risk according to DeVito (1976) and as
a result of the trusting behavior some loss may result. He continues by
saying, "trust in others will increase if we first have trust in our-
Need and Significance of Study

Competition involves winning and losing. The news media reinforces this concept to the American public daily. As early as 1929, Maller (1929) in his classic study of competition and cooperation contended that the competitive situation was one which stimulated the individual to strive against other individuals in the group for a goal object of which he or she hoped to be the sole or principal possessor.

Sullivan (1953) contends that children are exposed to compromise and competition at an early age. Swensen (1973) discusses children in competition with other children and at this early age he or she very quickly learns his or her own ability and worth relative to the other children.

Research by Komarovsky (1965) supports the concept that traditionally, females were expected to take the submissive role in a female-male relationship usually beginning with the dating or courtship years. She found that college women were encouraged to participate in sports and engage in serious academic pursuits until the time came when these activities interfered with courtship. Women according to Patton and Patton (1976) have been conditioned to define themselves in terms of, "future marriage, children, and less-valued household skills (p. 11)."

The authors continue by saying that because of recent changes in the society regarding the woman's role, her feelings of need for personal identity are emerging. They discuss competitiveness in relationship to our masculine-oriented society in that failure in such competition produces
anxiety and threat to our worth as people.

According to a report in *Women Today* (1975) more and more women today are perceiving competitive achievement as a route to self-affirmation and self-actualization. Changing societal roles for women confirm the significant value in investigating the present competitiveness occurring between males and females who are of the university age level.

The development of trust is vital to experiencing interpersonal communication and strengthening relationships. Sereno and Bodaken (1975) contend that:

One element that must be present for trust to exist is the idea of predictability; the person you trust can be counted on for certain predictable behaviors. You have absolutely no reason to suspect that he will harm or betray you in any way. Trust refers to feelings you have that the other person won't take advantage of you, has your concerns at heart, doesn't have any ulterior motives, and can keep a secret (p. 192).

The importance of trust in interpersonal relations has been emphasized by philosophers, psychologists, communicologists, and human relations experts for many years. Among those who have placed trust as a bases for building or satisfying interpersonal relationships or of wholesome development of the person through interaction with others have been Maller (1929), May and Doob (1937), Mead (1937), Deutsch (1958), Giffin (1967), Pearce (1974), Giffin and Barnes (1976) and Brooks and Emmert (1976).

People need others to confirm and support their existence and view of reality. This trust of others is also necessary in order to assure full and undistorted exchange of information. Giffin and Barnes (1976) reinforce this by the following statement:

In many situations a person finds him or herself in a mixed motive situation which promotes both competition and cooperation between associates. Cooperative exchange of information may benefit everyone unless one or more persons decide to withhold or to distort some of their information as a means of gaining a
strategic advantage over others. In this case, the competitive choice of behavior may result in a short-term advantage but will probably result in similar behavior from others. This competitive clash of interests may result in a static condition in which any attempt to alter the relationship may result in a significant disadvantage to the cooperative party (pp. 38-39).

Complex tasks face organizations and institutions today. Likert (1967), a business scholar, contends that only by increasing trust and establishing interpersonal relationships can the necessary cooperation be achieved. Likert further contends that, "competition between individuals, groups, and nations is desired only so long as needed cooperation is not neglected and such cooperation requires interpersonal trust (p. 62)."

Researchers cited previously, have contended that communication when possible does make a difference in increasing cooperation and trust. This study will further investigate and analyze the communication message and its effect upon the increase of trust choices made between subjects when playing the Prisoner's Dilemma game.

Therefore, the following specific objectives were considered in this study:

1. Did sex have an effect on the competitiveness between subjects?
   If so, did males and females compete equally?
2. What effect did the type of written message have on the subjects?
3. Did the type of communication decrease competitiveness and increase trust between subjects?

Overview of the Study

The purpose of Chapter I was to introduce the study, to state the
problem, to define the terms, to clarify the need and significance of the problem, and to give an overview of the study.

Chapter II, Review of the Literature and Theoretical Hypotheses, identifies and organizes the literature related directly to the studies of competitiveness, trust, and the effect of communication upon competitiveness and trust. The Prisoner's Dilemma game, the instrument used in this study, is reviewed. The theoretical hypotheses are stated at the conclusion of each section of the literature that is specifically related.

Chapter III, Design and Methodology, presents the experimental design employed in the study. The population and sample are defined and the instrumentation and game conditions discussed. The procedures are explained for the processing and analyzing of the data.

Chapter IV consists of the presentation and analysis of the results of the data directly related to the testing of the hypotheses. A summary of the results of each hypothesis follows.

Chapter V includes a summary, which reviews the problem, hypotheses and general design, the findings, which summarizes the results of the data and the conclusions that this author has drawn from the results of the study.
CHAPTER II

REVIEW OF THE LITERATURE
OF
THEORETICAL HYPOTHESES

This chapter reviewed selective studies that contributed directly to the research conducted. The reviewed studies concerned: (1) competitiveness; (2) trust; (3) effects of communication; (4) Prisoner's Dilemma game; (5) Prisoner's Dilemma game—sex differences; (6) Prisoner's Dilemma game—competitiveness and trust; and, (7) Prisoner's Dilemma game—effects of communication.

Competition

This section of Chapter II reviews the literature on competition that relates directly to the present study. Writers who have included cooperation in their study of competition will also be included since their study of competition very often depends upon their findings regarding cooperation. The literature on competition alone was scarce since social scientists prefer to study trust and cooperation in relationship to competition.

May and Doole (1937) developed a theory that distinguished between competition and cooperation in the following way:

Competition or co-operation [sic] is directed toward the same social end by at least two individuals. In competition, moreover, the end sought can be achieved in equal amounts by some and not by all of the individuals thus behaving, whereas in co-operation [sic] it can be achieved by all or almost all of the individuals concerned (p. 6).
Mead (1937) in her survey of competition and cooperation among primitive people gave the following definitions:

**Competition**: the act of seeking or endeavoring to gain what another is endeavoring to gain at the same time.

**Co-operation [sic]**: the act of working together to one end (p. 8).

Deutsch (1966) reported his findings on communication and conflict as being:

The greater the competitive orientation of the parties vis-a-vis, ..., the less likely will they be to use such channels [of communication] as do exist. Where barriers to communication exist, a situation in which the parties are compelled to communicate may be more effective than one in which the choice to talk or not is voluntary (p. 40).

Keltner (1973) discussed two types of competition and explained the differences as being that in some situations players can share the rewards, either equally or in some proportion to their relative achievement while in other situations only one team or one player gets the reward of winning. He further defined these types of competition as, "struggles surrounded by rules and procedures that control the behavior of participants. While in both cases the individuals are competing, they are also cooperating; that is, they are jointly maintaining certain enforced decorum in the conduct of the game. Penalties for infractions of rules of the game are applied equally to all participants (p. 222)." Thus, a competitor either wins or loses in a game in which the outcome permits him or her to pick up the challenge again and again.

Three kinds of orientation have been described by Sereno and Bodaken (1975) in communication research: cooperative, competitive, and individualistic. For the purpose of this study only the cooperative and competitive orientations will be discussed. The authors defined a cooperative orientation as one, "which was fostered by a situation in which
both persons recognized that each had something to gain or win if they worked with, rather than against, one another (p. 193)."

A competitive orientation was defined as one, "in which each individual experienced either complete victory or total loss. Unless he preferred to lose less than everything, he had no reason or desire to cooperate (p. 193)."

Research by these authors suggested that mutual trust was most likely to occur under cooperative orientation and least likely to occur given competitive orientations.

Competition involves winning and losing. Brooks and Emmert (1976) discussed competition as follows:

In competition there is a commitment to winning the prize at the expense of the opponent, whereas in controversy each party will be happier if the source of controversy (the disagreement, misunderstanding, misinterpretation of facts, etc.) can be removed so that they may cooperate rather than compete. Although there is a strong motivation in competition, it stops short of destruction of the party to the conflict. Winning the goal is enough. One does not need to destroy his opponent. Many games exist to fulfill the functions of competition and, undoubtedly, competition and controversy play important roles in the growth of persons, groups, or societies (p. 233).

A recent writer, DeVito (1976) discussed competitiveness extensively in his text, The Interpersonal Communication Book. The text resulted from his listening to what a student knows and what a student does not know; what a student wants out of college; and, what a student needs to function effectively now and in the future. His findings explained when competition occurred. For example, there was competition when there were few rewards to go around or when there was only one reward and a number of different people wanted it. There was competition when people attempted to prove that they were better at something than the other person.
DeVito has also explained what results because of competition:

Competition influences and changes the attitudes of the participants, generally in a negative direction. While competing, the individuals often develop negative feelings which allows for the mobilization of energy and perhaps helps in stimulating that extra effort necessary to win the game. Sometimes this negative feeling is long lasting and sometimes it is only temporary (p. 381-382).

DeVito continues by saying that society has taught that competition was always positive. Parents and teachers taught that competition was healthy and that it is what made this country great. DeVito states, "That may be. But we should not ignore the negative consequences of competition. Competition results in a tremendous waste of energy and time (p. 382)." Competition necessitates that there will be a loser and since no one wants to lose, fear and anxiety may result for the would-be competitor. The actual loser may experience punishment of some sort, not getting the reward or losing something important such as a job cutback.

DeVito concluded his study by giving an interesting comparison which follows:

Depending on our system of values and attitudes, competition may increase positiveness for ourselves and for the actual competitive situation. On the other hand, it may decrease positiveness for ourselves, our opponent, and for the competitive situation generally (p. 383).

Trust

This section reviews the literature on trust and reveals that the concept of trust is quite new to researchers. Because of this, some of the literature reviewed in this section will include studies that used the Prisoner's Dilemma game. The final section of Chapter II will include a review of the literature relating specifically to the Prisoner's Dilemma game and trust.
Deutsch (1958) claims to have been the first to investigate experimentally the phenomenon of trust. In searching through indexes of previous textbooks in social psychology (e.g., texts by Cartwright and Zander, Homans, Drech and Crutchfield, Levin, Lindsey, Newcomb) Deutsch could not find the word "trust." His concern was to define "trust" in such a way "as to capture some of the connotations of everyday usage and also permit experimental research on conditions affecting trust (p. 266)."

Deutsch (1958) chose a variation of the Prisoner's Dilemma game for subjects who were all college students who knew what the situation was and understood the implications of any combination of choices that they and the other persons might make. The study concerned itself with the effects of perceived intentions upon the development of trust or suspicion.

The results of the study (Deutsch, 1958) supported the hypothesis tested:

A cooperation orientation will produce trusting (trustworthy) behavior even when the situational facilities do not encourage it---e.g., when no communication is permitted and when one has to choose without knowledge of the other person's choice. On the other hand, even when situational facilities are encouraging, a competitive orientation will result in suspicious and/or untrustworthy behavior rather than trust and trustworthiness (p. 272).

Rapoport (1964) defined the trust variable as the probability of responding cooperatively after both players had responded competitively when playing the Prisoner's Dilemma game. Loomis (1959) and Deutsch (1958, 1960) have shown that subjects must exhibit mutual trust to cooperate in the Prisoner's Dilemma games and that this is facilitated by communication (which will be discussed later under the heading of the Effects of Communication).
Evans (1964) found that if a promisor fulfilled an unenforceable promise more trust was generated in the other person than if no promise was made.

Rothwell and Costigan (1975) discussed trust as being a vital part to any healthy interpersonal relationship. Without trust they believe a relationship will dissolve. Trust indicated a shared confidence and security between the people involved. The authors further indicated, "that trust opens the door for self-disclosure, and appropriate self-disclosure is an important quality in reducing interpersonal barriers (p. 236)."

Trust, according to DeVito (1976) is a behavior that is learned. Because of various previous experiences people learn to trust or distrust. If trusting has been rewarded, then trust is more apt to take place on future occasions. The atmosphere surrounding a situation also influences the trust fact. Trusting behavior will lead to a decrease in anxiety. When there is trust in another individual there is little reason to be anxious. Openness is increased by a trusting behavior which then provides for a relationship between individuals which becomes supportive. DeVito concludes his study by saying that, "trust in others will increase if we first have trust in ourselves. If we do not consider ourselves worthy of trust, we would be much less likely to put our trust in others (p. 409)."

Giffin and Patton (1976) defined trusting behavior in the communication process as, "reliance upon communication behavior (speaking and/or listening) of a person while you are attempting to achieve a desired but uncertain objective in a risky situation (p. 217)."

Various elements in the communication process influence trust. Giffin and Patton (1976) give examples such as, trust of a person is
influenced by his or her reliability as perceived by others or the degree
of trust one has for another person as well as the results of the
interaction. "The relationship between these variables is reflexive,"
states Giffin and Patton, "as trust increases, certain interaction patterns
change; and in turn, their change tends to increase the degree of inter-
personal trust (p. 218).

Another variable in increasing a person's trust of others is the
behavior of those others. Miller and Steinberg (1975) write about trust
being grounded in a behavioral foundation and from this context say,
"we trust someone when we believe there is a high probability that he
will perform, trustworthy behaviors (p. 252)."

One element that must be present for trust to exist according to
Sereno and Bodaken (1975) is the idea of predictability. Certain
predictable behaviors can be counted on by the person one trusts and when
this prediction doesn't occur, the person who trusts will apparently
suffer or lose out. Positive expectations contribute to the establishment
of mutual trust when present in both communicators. Sereno and Bodaken
state, "if a person expects others to like him or her, then this person
is likely to reciprocate this liking and respect and acceptance (p. 193)."

In examining Giffin's definition of trust (1969) as "reliance upon
the behavior of a person in order to achieve a desired objective, the
achievement of which is uncertain in a risky situation," Brooks and Emmert
(1976) state that there are at least four basic elements in trusting
behavior. They are:

1. There is a risk involved. You are in a situation in which
   the behavior of the other person can help you or hurt you in
terms of your needs and goals. One runs that risk when he
   trusts another. Conversely, if there is no risk involved,
trust is unnecessary. If one operates on the principle of "playing it safe" and never running a risk, then that person never experiences trust. (2) A trusting person realizes that it is the future behavior of the other person that determines whether he, the trusting person, will be harmed or helped; (3) A trusting person recognizes that any loss incurred as a result of misplaced trust will outweigh any gain that can come as the result of a trust fulfilled; (4) The trusting person is confident that the other person will behave in such a way that beneficial consequences will result (pp. 184-185).

Effects of Communication

Trust and cooperation will be used interchangeably throughout this study. This particular section of the review of the literature will review the concept of trust in relationship to the effects of communication which develop or destroy trust.

Loomis (1959) in his study on the use of communication in the development of trust suggests that not only must individuals be aware of their own role in the cooperative relationship, but must know the other person's role and be assured that the other person's thinking is similar to his or her own before there will be any basis for cooperation. Individuals will then have to depend for these awarenesses on communication between him or herself and the other person.

Results of Loomis' study indicated that the probability of establishing perceived mutual trust increased with the increase in communication about the game relationship. A second finding showed that the perceived trust increased as communication increased from a minimal kind of note stating only the writer's expectation to the note that contained the complete statement of the game relationship.

Scodel, Minas, Ratoosh and Lipetz (1959) found that joint cooperative responses resulted because of communication but noted that just

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
competitive responses still predominated.

Berlo (1960) discussed communication effectiveness in relationship to the interpretation of the message. His studies showed that people decided to perform those behaviors that they expect to be "worth the effort." The author states, "communication effectiveness can be increased in one or both of two ways: increasing reward or reducing energy (p. 98)."

This research of Berlo implies that the greater the reward an individual perceives in making a response, the more energy he or she will expend to make the response.

Schelling (1960) developed a theory in tacit communication in games. Tacit communication is defined as communication without words or speech. He contends that it is possible for one subject to influence another by his or her actions rather than words when open and direct communication is not available. Gahagan and Tedeschi (1967) apply this theory to the Prisoner's Dilemma game and explain that one player can attempt to influence the other's strategy choices by his or her own choice. If the other subject cannot interpret these responses clearly, no communication is possible and thereby no preplanned influence is likely to result.

Loomis (1959) obtained similar findings making it clear that explicit communication favored cooperation when the subjects were operating under instructions to maximize the amount of imaginary money won regardless of the other's losses or winnings.

His study also found that many of the subjects placed in a competitive condition chose not to communicate and if they did they tried to mislead their opponents.

The study of Gahagan and Tedeschi (1967) which investigated the
strategy and the credibility of promises indicated that the credibility of promises affected the behavior of subjects on the operationally defined "trust" variable so that when "trusting" behavior diminished so did credibility diminish.

Terhune (1968) concluded that, "the prevention of communication inhibits the development of cooperation and minimizes motivation differences. When no communication is possible, defensiveness and competitiveness is heightened in all motive groups (pp. 18-19)."

The study of Terhune suggested that communication allowed for the subjects to express greater freedom in expressing their intentions, coordinating their future actions and using their messages for deception. He found that the subjects in his study used the communication message mainly to reduce ambiguity of intentions and expectations.

It should be noted that communication does not necessarily increase trust or cooperativeness. Communication provides the opportunity for cooperation according to Terhune (1968) but that opportunity may be used by the person receiving the communication, misunderstood or interpreted incorrectly or used to deceive the other person.

The studies of Pilisuk and Skolnick (1968) showed that when intentions were communicated with integrity, increases in cooperative behavior followed; but when one person was deceptive, there was a decrease in trust and cooperative behavior. Honesty and accuracy seem to be necessary if trust between persons is to be increased.

Pearce (1974) discussed the cognitive state of trust as one in which a person who trusted another expects him or her to avoid those behaviors which resulted in the trusting person's receiving an unacceptably negative outcome. The trusted person according to Pearce, "must know the nature
of the contingency between himself and the other if he is to behave appropriately (p. 242)."

The author further discussed trusting behaviors as being those which increased the vulnerability of one person to the other. A behavior cited was of interpreting ambiguous messages as if they were trustworthy. His example follows:

Consider a person who is surprised at what another said in a specific context. If he trusts the other, he might respond by thinking, "I certainly don't understand why he said that but I will assume that he had a good reason" (pp. 342-343).

This type of trusting behavior indicated that communication increased the person's vulnerability to the other person involved.

Research by Patton and Giffin (1974) supported the conclusions that trust is essential in order to have a reciprocal form of communication taking place. They illustrate this by stating:

Trust both influences and is influenced by various elements in the communication process. For example, our trust of a person is influenced by his/her reliability as we perceive it. On the other hand, the degree of trust we have for this person influences the communication behavior of both of us as well as the results of our interaction. The relationship between these variables is reflexive—as trust increases, certain interaction patterns change; and in turn, their change tends to increase the degree of interpersonal trust (p. 444).

A basis for trust is established through communication as described by Doolittle (1976) and people continue to test the level and limits of that trusting of others. He further indicates that if, "we mistrust the motives of others or if the level of our trust does not permit us to go along with the demands and wishes of others, conflicts will occur (p. 15)."

Prisoner's Dilemma Game

The Prisoner's Dilemma game was the instrument used in this research
study. This section of the literature explains and defines the
Prisoner's Dilemma game in relationship to its use for the present study.

Deutsch (1958) devised a method for studying trust and what he
considered its opposite, suspicion, by observing the way individuals
played matrix games. If an individual expects another to be trustworthy,
he or she engages in "behavior which he perceives to have greater negative
motivational consequences if the expectation is not confirmed than
positive motivational consequences if it is confirmed." "Suspicious
persons," Deutsch goes on to say, "expect the other to be untrustworthy
and select behavior in which less is lost if the other behaves as expected
than if he does not (p. 267)."

The Prisoner's Dilemma game, by a particular matrix of values
meets the requirements of these definitions.

It is necessary to differentiate between the cognitive state of
trust and trusting behaviors. Pearce (1974) contends that the cognitive
state of trust indicates that a person who trusts another expects that
person to avoid behaviors which will result in the trusting person's
receiving an unacceptable negative outcome.

Trust ing behaviors are defined by Pearce (1974) as those which
increase the vulnerability of the person to the other. Some examples
given are:

1. Interpreting ambiguous messages as if they are trustworthy.
2. Deliberately constructing situations in which the other person
must choose between behavior which confers satisfactory out-
comes or which confers extremely positive outcomes on him/herself
but negative outcomes on the trusting person.
3. Communication which increases a person's vulnerability to others.
The Prisoner's Dilemma game provides for these types of situations and also relates to the social interactions that occur in society in which persons must choose what they will disclose about themselves. For example, a person may choose to disclose some significant things about him or herself and then find that this other person uses this as an opportunity to exploit or ridicule, or he or she may reciprocate the disclosure by making possible the building of a caring and helping relationship. A person has demonstrated trust when he or she refuses to exploit the one performing the trusting behavior.

The Prisoner's Dilemma is an example of a non-zero-sum game attributed to A. W. Tucker and has received considerable attention by game theorists. The most popular interpretation given by Luce and Raiffa (1957) of the Prisoner's Dilemma is:

Two suspects are taken into custody and separated. The district attorney is certain that they are guilty of a specific crime but he does not have adequate evidence to convict them at a trial. He points out to each prisoner that each has two alternatives: to confess to the crime the police are sure they have done, or not to confess. If they both do not confess, then the district attorney states he will book them on some very minor trumped-up charge such as petty larceny and illegal possession of a weapon, and they will both receive minor punishment; if they both confess they will be prosecuted, but he will recommend less than the most severe sentence; but if one confesses and the other does not, then the confessor will receive lenient treatment for turning state's evidence whereas the latter will get "the book" slapped at him (p. 95).

A mixed motive game as defined by Gallo and McClintock (1965) is one in which individuals must choose between responses which are assured to serve different motives. The mixed motive game is one in which the goals of the players are partially coincident and partially in conflict. Losses to both result when players attempt to maximize their own scores without regard for the gain scores in others. The Prisoner's Dilemma game is
this type of mixed motive game that fulfills the preceding requirements. In such a game, cooperative behavior is rewarded and competitive behavior is punished.

Gallo and McClintock (1965) in their study of cooperative and competitive behavior in mixed-motive games, concluded that:

---The percentage of cooperative responses that are obtained in the Prisoner's Dilemma game tends to be well below 50 percent and this percentage tends to decrease over a series of trials.

---People who differ on personality variables believed associated with their general interpersonal orientation tend to respond differently to the game.

---The subjects's rate of cooperative responses is apparently not influenced by noncontingent cooperative or competitive strategies played against him.

---And opportunities for communication may, but do not necessarily, ameliorate the conflict present in the game (pp. 15-16).

Prisoner's Dilemma Game--Sex Differences

A review of the literature on sex differences in general would be exhausting. The literature in this section will be concerned with a limited sample of studies which give background to this particular study. These studies will focus on social rather than biological factors affecting competition and cooperation.

Oskamp (1965) in a study of highly induced cooperation, found that women gave significantly fewer cooperative responses than men while Bixenstein and Wilson (1963) found that there was variation in cooperation of the women subjects according to experimental conditions. Both studies used the Prisoner's Dilemma game.

The authors interpreted their findings to be that possibly women tended to be initially more trusting and trustworthy but less willing to
forgive violation of their trust. Another interpretation was that male subjects were more willing to take advantage of another's unconditional cooperation and were more willing to forgive such a violation of trust by another man.

The sex of the subject in relation to cooperation and competitiveness is important as shown by Rapoport and Chammah (1965). Their subjects were recruited to play the Prisoner's Dilemma game for $1.35 per hour. Seventy male pairs, seventy female pairs, and seventy male-female pairs played the Prisoner's Dilemma three hundred times in succession.

Results of the study showed that men cooperated more than women when playing the Prisoner's Dilemma game many times in succession with partners of their own sex. Since these differences emerged later in the game Rapoport and Chammah attributed these to the characteristic interaction effects produced by the motivations in the game. There was little or no discernable difference between males' and females' cooperative choices when they played with partners of the opposite sex.

A final factor that proved most interesting in this study was the "leveling" effect. Correlation indices showed that there was a tendency for paired players to become like each other. The effects of the interaction during the course of play seemed to push players in the direction of more cooperation or in the direction of less cooperation.

Wiley (1968) concluded after a survey of the literature on sex differences in competition and cooperation that:

(1) Women are initially more cooperative, but (2) are more prone to retaliation. (3) Women are more sensitive to differences of power and status (they react defensively, that when interacting with same and opposite sex partners); and (5) women tend to take less risky choice which is also less cooperative in a straight Prisoner's Dilemma game (p. 28).
A bargaining game similar to the Prisoner's Dilemma game was used by Wiley. She focused her research on sex differences in interactive strategies, particularly in cooperative behavior. The situational parameters included:

The extent to which the other is dependent on the individual for his outcomes in the situation; the other's pattern of cooperative behavior; the degree to which communication between the parties can take place; and the sex composition of the dyad (p. 1).

Results from her study that relate directly to the present study concluded that sex of the partner did not result in differential main effects and that communication was found to increase cooperation regardless of the measure used or the situational conditions. The perception of the partner's cooperation and trustworthiness was also affected by communication.

Gregovich (1968) ran a similar study to Rapoport and Chammah's. His data showed, "subjects of male-female pairs choosing cooperation more than both male-male and female-female pairs on each of the six trail-blocks, and very little difference was shown between male-female groups on any of the six trail-blocks (p. 45)." A steady rise in cooperative choices occurred in all three groups.

Vinacke (1969) in his review of the research on the Prisoner's Dilemma game regarding sex differences reported men as being more cooperative and women as being more competitive but his studies suggest that men were more exploitive and women more accomodating. He explains that this discrepancy may have resulted because women who were more competitive in the games were actually not competing, but cooperating with the experimenter who put them in a competitive situation--to cooperate they have to compete.
Experimental research by Marwell and Schmitt (1975) suggested that in general females are somewhat less cooperative than males and more likely to avoid situations that entailed risk. The authors used a game similar to the Prisoner's Dilemma game in that the subjects had to push buttons in making either a competitive or a cooperative choice. Ten of the 12 pairs which showed non-cooperation were female. Using a $x^2 \ P<.05$ test, the authors found a statistically significant difference.

**Prisoner's Dilemma Game—Competitiveness and Trust**

This section reviews only those studies which relate directly to the Prisoner's Dilemma game in relationship to competitiveness and trust.

Ryan and Lakie (1965) in their study of motivation had subjects perform in both competitive and cooperative situations. They found that "subjects who were high in need for achievement and low in manifest anxiety performed best in the competitive situation while those who were low in need for achievement and high in manifest anxiety performed best in the cooperative situation (p. 344)."

Komorita (1965), using the Prisoner's Dilemma game, conducted two related experiments to test the hypothesis that individuals would reciprocate cooperative behavior by a simulated partner. All subjects were scheduled in pairs of the same sex for both experiments. The study attempted to show that a person faced with a cooperative partner would show cooperative behavior in return. Results from the first experiment revealed that neither males or females were very likely to reciprocate cooperative behavior. Males responded competitively under all conditions and ignored the responses of the other player.

The second experiment showed that males were more cooperative than

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
females and that the modified instructions, as predicted, increased the
tendency to cooperate—the initial set or orientation of subjects played
a major role in inducing cooperative behavior in the Prisoner's Dilemma
game. It is highly possible for subjects to perceive the situation as
a game and that the purpose is to beat the other player unless subjects
have been told specifically that it is not. The initial choice may
account for the strong competitive tendency shown by subjects in this
study.

Some questions may be raised as to the value of the Prisoner's
Dilemma without the use of some type of a reward system. Wrightsman (1966)
conducted a study, using the Prisoner's Dilemma game, in which subjects
in one game condition were told that they could keep whatever money
they won. Subjects in the money condition could receive as much as $12.00
for 30 minutes' participation. The purpose of the study was to determine
whether the expectation of winning real money versus playing for
imaginary money influences the frequency of trusting and trustworthy
behaviors in a two person non-zero-sum game.

Results of this experiment seemed to confirm Evans' (1964)
conclusion that the size of reward has little effect on the subject's
game behavior. Wrightsman found that the frequency of trusting behavior
was not greatly influenced by playing for real versus imaginary money.

Jones and Gerard (1967) believed that, "resolution of the prisoner's
dilemma is conditioned by each subject's trust in the other (p. 566)."
These same subjects may become more cooperative over a series of trials.
However, it seems more likely that as subjects play more trials they will
be influenced by their impressions of the other subject.

A question often asked of researchers using the Prisoner's Dilemma
game is "why the consistent low proportion of cooperative (trust) choices in studies using this particular game?" One reason given by Komorita (1965) is that in our culture most two-person games are strictly competitive and as a result subjects interpret the game as one in which they are to "beat" the other person. Another reason is that the structure of the game forces players to compete once they have defected from cooperative choices.

Wilson and Bixenstine (1962) suggested that, "when a player gives in to the temptation of maximizing individual gain, a 'bind' develops. Once both players are jointly competing, any attempt by one of the players to return to a cooperative choice results in a still lower payoff for that person while the payoff for the other individual is increased (p. 135 in Komorita, Shepash, and Broner. Power, the use of power, and cooperative choice in a two-person game)."

Rapoport (1962) conducted approximately 200 experimental sessions using the Prisoner's Dilemma game. Subjects were University of Michigan students who were put into pairs and used in one experimental session which consisted of 300-700 consecutive plays of one or several games with no communication allowed between subjects. Various experiments were run and data consisted of nearly 100,000 responses. Stable statistical results were obtained because of the great number of responses and Rapoport cited these in question form using the strategies of cooperation and defection. He uses the letters C for a cooperative response and D for a defection or strategy response. Those questions and answers that pertained to this study follow:

Q₁. What is the typical first response in a Prisoner's Dilemma game? (Note that purely strategic considerations dictate the response DD. Collective interest considerations dictate
the response CC, but no possibility for coordinating the latter response exists.)

A1. The first response is practically random, as evidenced by the nearly equal proportions of CC, CD, DC, and DD responses. These proportions do not vary significantly in the seven games we have used.

Q2. What happens thereafter in the short run?

A2. The immediate trend which sets in is a decrease of C (the percent of cooperative responses) shown by the decrease of a running average of C over ten consecutive plays. The extent of this decrease is such that the average C response over the first 50 plays is reduced from about 50% to about 40%.

Q3. What happens in the long run?

A3. After about 50 plays, the frequency of C responses averaged over the entire population of players steadily rises. This effect was not observed by earlier investigators who confined themselves to about 30-50 plays of Prisoner's Dilemma. The asymptotic value of C for the population is about 65%.

Q4. Is this asymptotic value also modal, i.e., characteristic of most of the player pairs in the population?

A4. No. The modal frequencies are at the extremes. Most pairs either lock in on CC, i.e., achieve a tacit collusion to cooperate, or, on the contrary, lock in on DD, giving up the possibility of achieving the biggest joint pay-off. The 65% is only the average of a strongly bi-modal distribution.

Q5. Are the responses of the two members of a pair typically interdependent?

A5. Definitely yes. Note that there are two possible answers to this question: 1) The responses of one player tend to elicit like responses on the part of the other; 2) The responses alone are interdependent. The two possible answers can be rationalized in plausible terms. The first can be rationalized on the ground of mutually stimulating attitudes—cooperation breeds cooperation and vice versa; the second on the grounds of absence of explicit communication (pp. 13-14).

Terhune (1968) was interested in studying the way "Personal predisposition" affects the development of conflict and cooperation between
subjects playing the Prisoner's Dilemma game. For his investigation he
selected subjects with three patterns of motivation: (1) Subjects high on
need for affiliation; (2) Subjects high on need for power; and, (3) Subjects
high on need for achievement. He then hypothesized that those subjects
high on need for affiliation would be mostly cooperative, those subjects
high on need for power would be mostly competitive and those subjects high
on need for achievement would vary between cooperation and competition,
depending on the situation.

The subjects played three series of thirty games each after which
Terhune questioned the subjects regarding what they thought they were trying
to accomplish during the game. Terhune concluded from game results and the
questions that:

First, three motivational orientations did influence conflict
and cooperation in the Prisoner's Dilemma, although the effects
may not be the same in other contexts. Second, that highly
threatening situations minimize the effects of idiosyncratic
motives, perhaps arousing a common defensive motive. Third,
initial experiences in interaction had a strong effect on
subsequent cooperation and conflict. And fourth, communication
was a facilitator of cooperation, if the actors were pre-
disposed in that direction (p. 22).

The studies in this section have dealt specifically with research
using the Prisoner's Dilemma game in relationship to competitiveness and
trust. These studies have shown that subjects, both male and female, show
a strong tendency to compete when playing the Prisoner's Dilemma game.
Therefore, these studies support the first theoretical hypothesis:

Hypothesis One:

Competitiveness between males and females across all three
experimental conditions will not be significantly different
when subjects play the Prisoner's Dilemma game.
Prisoner's Dilemma Game--Effects of Communication

A review of the literature revealed that studies are limited in regard to the effects of communication when playing the Prisoner's Dilemma game. This section includes those studies that relate directly to the present author's search.

Radlow and Weidner (1966) permitted subjects when playing the Prisoner's Dilemma game, to exchange limited communication in the form of contingent commitments which announced their game strategies prior to beginning the game trials. When comparing the non-communication condition to the condition where communication was permitted, there was substantially more cooperative behavior in the condition where communication was permitted.

Becker and McClintock (1967) in reviewing the literature regarding the effects of communication upon the development of trust or cooperation when playing the Prisoner's Dilemma game wrote:

... communication between subjects prior to playing the Prisoner's Dilemma game increases the level of mutual trust, and as a consequence leads to cooperative behavior reflecting either or both the motives to maximize own gain or joint gain through such behavior (pp. 276-277).

Wrightsman, et al., (1972) following their extensive study of the effects of possibilities of communication concluded that opportunities for communication facilitate the development of cooperation or trust in the Prisoner's Dilemma game but that,

Any favorable effects of communication may be overcome if (1) the other's behavior encourages exploitation, or (2) the previous interactions between players have been such as to instill a spirit of distrust (p. 208).

Pilisuk and Skolnick (1968) hypothesized that a renewed strategy of small conciliatory moves preceded by honest prior announcements will induce reciprocation from an adversary. They used a version of the Prisoner's state.
Dilemma game that permitted gradations in cooperative response and cast the subjects in simulated settings of an arms race. Results of the task indicated that:

(1) both matching strategies and conciliatory strategies, with or without prior honest expression of intentions, increase cooperation, (2) the communication opportunity tends to be used deceptively in the natural condition, reducing cooperation, and (3) that the combination of conciliatory strategy with honest prior announcement of moves presents, by a small margin, the most effective strategy, among those tried, for inducing reciprocal cooperation (p. 121).

Swensen (1973) investigated various studies that tried to discover strategies that stimulated trust and cooperation and found that almost any kind of communication between opponents increased the probability of cooperation between them but then went on to point out that the effect of the communication depended on its content. He gave as an example that feedback in the form of keeping a cumulative score of the two players would tend to increase the competition between them.

He also found that players were more likely to respond with trust than to initiate responses that would lead to trust. Procedures that expressed an intention to cooperate increased the likelihood of cooperation occurring between players and shifts in strategy had the greatest effect on the opponent's behavior. For example, "the opponent is more competitive at the beginning and then shifts to a cooperative strategy, than if the player starts the game with a cooperative strategy (p. 364)."

This section reviewed studies based on the supposition that trust, between subjects, will increase when an opportunity for communication has occurred. These studies, using the Prisoner's Dilemma game, showed that in the majority of research examined, an increase of trust or cooperative choices occurred. The second and third theoretical hypotheses are supported by these studies.
Hypothesis Two:

The type of message that is communicated between subjects will influence the building of trust between these subjects.

Hypothesis Three:

There will be no significant interaction effect between Condition A, Condition B, and Condition C and the message variable.
CHAPTER III

DESIGN AND METHODOLOGY

This chapter provides a description of the research design and methodology employed in conducting this study. The following areas are discussed: (1) population and sample; (2) game conditions; (3) instrumentation; (4) procedures and instruction for collection of data; (5) hypotheses tested; and, (6) statistical procedures.

Population and Sample

Students attending Western Michigan University comprised the population for this study. The approximately 20,000 students who attend Western Michigan University are largely from the southwestern and southeastern sections of the State of Michigan. The University, because of its size and complexity, ranks fourth in Michigan.

Prior to Winter term 1976, the researcher contacted instructors in the Department of Communication Arts and Sciences who were scheduled to teach sections of Interpersonal Communication, Winter term 1976 (Appendix A). They were asked if the researcher could administer the Prisoner's Dilemma game to their classes the second week of the term, January 12-16, 1976. All of the instructors responded positively and arrangements were made that the researcher would administer the instrument to their entire class population during the regularly scheduled class time. The experimental session would take forty to fifty minutes.
The Interpersonal Communication course is the basic course in the Department of Communication Arts and Sciences and students select the course for a variety of reasons: (1) required for a major or minor course of study in the Department; (2) required by other departments on campus; and, (3) elected by students.

During the class session prior to the day of the administering of the Prisoner's Dilemma game, subjects were told only that an instructor in the Department of Communication Arts and Sciences would be in charge of the next class period and that this instructor was working on her dissertation and desired to have the students participate in a research project.

**Game Conditions**

The Prisoner's Dilemma game was administered to three conditions within each of the eleven class sections. A total of 228 subjects were used for the study. Condition A was used with 38 male subjects and 38 female subjects. Condition B was used with 38 pairs of female subjects and Condition C was used with 38 pairs of male subjects.

Subjects in each class were randomly placed in one of the three conditions and then were randomly paired opposite each other.

**Instrumentation**

The instrument used for this study was the Prisoner's Dilemma game, a non-zero-sum mixed-motive game, attributed to A. W. Tucker (1957). The game provides for a well controlled interaction situation plus provides the subjects with the fact that choices or decisions that have to be made by the subjects in the game are very similar to decisions that are
made in real-life bargaining and conflict situations (Gallo and McClintock, 1965).

Figure 1 shows the game used in the present study. The cell entries shown in Figure 1 represent points gained or lost. The matrix in Figure 1 indicates that if Player A,B chooses A and Players 1,2 chooses 1, both players lose 5 points. If Player A,B chooses B while Player 1,2 chooses 1, Player 1,2 gains 10 points and Player A,B loses 10 points. If Player A,B chooses A while Player 1,2 chooses 2, Player 1,2 loses 10 points and Player A,B gains 10 points. If Player A,B chooses B while Player 1,2 chooses 2, both players gain 5 points.

The Game

The following squares list the scores each player will receive:

<table>
<thead>
<tr>
<th>Player 1,2</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Player 1,2</td>
<td>-5</td>
<td>-10</td>
</tr>
<tr>
<td>Player A,B</td>
<td>-5</td>
<td>+10</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Player 1,2</td>
<td>+10</td>
<td>+5</td>
</tr>
<tr>
<td>Player A,B</td>
<td>-10</td>
<td>+5</td>
</tr>
</tbody>
</table>

Figure 1. Prisoner's Dilemma game used in the study.

Figure 2 shows the playing cards used for playing the game in the study. Player A,B received one A card and one B card while Player 1,2 received one 1 card and one 2 card. Players held their playing cards out of sight of their partner while making the decision regarding their individual
cell choice (a competitive or trust choice). When ready, players looked up at their partner and flipped their card choices simultaneously. Each player could take as much time as needed in making his or her competitive or trust cell choice.

![Figure 2. Playing cards used for playing the Prisoner's Dilemma game in the study.](image)

Figure 3 shows the tables used for scoring Game #1 and Game #2. Game #1 and Game #2 consisted of nine trials each. Players recorded both their own score and their partner's score following each trial. Scores were totaled at the conclusion of each game.

![Figure 3. Tables used for scoring Game #1 and Game #2.](image)
Procedures and Instructions for Collection of Data

The researcher and classroom instructor arrived approximately ten minutes ahead of the scheduled class time. Subjects entered the classroom and sat in seats of their own choice. The classroom instructor introduced the researcher to the class by name and said that she would explain the procedures that would follow. The researcher randomly placed subjects into Condition A, Condition B, and Condition C. Once the subjects knew what condition they were in they were randomly paired together. Paired subjects were asked if they knew one another and if they did they were asked to change partners. There was no verbal communication allowed between subjects from this point on through the entire experimentation process.

Armed desks were used by the subjects and subjects sat directly across from each other.

The game materials (Appendix B) were then passed out to the subjects with the following verbal instructions:

The object of the game is for each person to maximize one's positive score. Read the rules for the game silently and thoroughly. Take your time. When you have understood and finished reading the game procedures look up at your partner and nod your head affirmatively. Play nine trials for Game #1, recording both your score and your partner's score. Total both scores and wait for further instructions. Do not talk to anyone during any time of the experiment.

The rules for the game were as follows:

1. Each will get two cards. One set of two cards will have an "1" and "2" on them; the second set will have an "A" and "B" on them.

2. Within each trial, the players will simultaneously hold up one of his/her cards. That is, one player will hold up either "1" or "2" and the other player will hold up either "A" or "B".

3. Each player should independently determine which strategy will best maximize one's positive score. Players should...
not indicate which card is going to be held up until the trial begins.

4. If Player 1,2 holds up "1" and Player A,B holds up "A", then record the scores listed in box 1A. In this instance, both players lose 5 points.

If Player 1,2 holds up "2" and Player A,B holds up "A", then record the scores listed in box 2A. In this instance, Player 1,2 loses 10 points and Player A,B gains 10 points.

If Player 1,2 holds up "1" and Player A,B holds up "B", then record the scores listed in box 1B. In this instance, Player 1,2 gains 10 points and Player A,B loses 10 points.

If Player 1,2 holds up "2" and Player A,B holds up "B", then record the scores listed in box 2B. In this instance, both players would gain 5 points.

5. After each trial, record the appropriate scores in the tables. There will be 9 trials within each game. You will play 2 games.

6. Please do not talk to your partner at any time during the game.

7. After you finish each game, wait for further instructions.

Subjects then proceeded to play Game #1 according to the rules and instructions given. When all subjects had finished playing Game #1, a white 3 x 5 card was passed out to the subjects with the following instructions:

You may write your partner a one-sentence message before playing Game #2. Write the message and when both you and your partner have finished, exchange the cards simultaneously. Read the message you received from your partner and go on to play Game #2. Play the nine trials recording both scores following each trial and at the conclusion of trial nine total both scores.

When subjects completed Game #2, the materials were collected by pairs within Condition A, Condition B, and Condition C. Subjects were then thanked for participating in the experiment and told that their instructor would discuss the experiment with them following the completion of gathering the data for the present research.
Operational Hypotheses

The primary purposes of this study were to investigate: (1) the effect of sex in relationship to competitiveness between males and females; and, (2) what effects the nonverbal written message has upon decreasing competitiveness and increasing trust between subjects. The theoretical hypotheses will be stated in operational terms in this section.

Hypothesis One:

Competitiveness between males and females across all three experimental conditions will not be significantly different when subjects play the Prisoner's Dilemma game.

The operational hypotheses for theoretical Hypothesis One are:

1. No significant difference in competitiveness will be found between males and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

2. No significant difference in competitiveness will be found among the females when the means for their respective total game scores in Condition A, Condition B₁, and Condition B₂ of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

3. No significant difference in competitiveness will be found among the males when the means for their respective total game scores in Condition A, Condition C₁, and Condition, of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

4. No significant difference in competitiveness will be found between males and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

5. No significant difference in competitiveness will be found between females and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.
6. No significant difference in competitiveness will be found between males and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

**Hypothesis Two:**

The type of message that is communicated between subjects will influence the building of trust between these subjects.

The operational hypothesis for theoretical Hypothesis Two is:

Significant differences between the mean trust choices in Game #1 and Game #2 will result from the type of message communicated. The means of the trust choices in Game #2 will indicate a decrease when "no trust messages" have been communicated, an increase when a "1-trust message" has been communicated and a high increase when "2-trust messages" have been communicated.

The analysis of variance statistic will be used to test operational Hypothesis Two. Supplementary analysis of the data for operational Hypothesis Two will be completed through the Scheffé method testing procedure.

**Hypothesis Three:**

There will be no significant interaction effect between Condition A, Condition B, and Condition C and the message variable.

The operational hypothesis for theoretical Hypothesis Three is:

The F value as obtained by the analysis of variance will fail to indicate significant interaction effects between Condition A, Condition B, and Condition C and the message variable.

**Statistical Procedures**

The following steps were followed in carrying out the statistical

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
procedures: (1) coding system and, (2) data analysis.

Coding System

A coding system was devised by the researcher regarding the interpretation of the data prior to computer processing. The coding system is included in the study under Appendix C.

Condition A consisted of paired subjects numbered 1-38, Condition B consisted of paired subjects numbered 39-76, and Condition C consisted of paired subjects numbered 77-114. Columns 1-12 were coded as follows:

Column 1 = sex of Player 1,2
   1 = female
   2 = male

Column 2-4 = total Game #1 score of Player 1,2

Column 5 = type of message Player 1,2 sent

Column 6 = sex of Player A, B
   1 = female
   2 = male

Column 7-9 = total Game #1 score of Player A, B

Column 10 = type of message Player A, B sent

Column 11 = Game #1 frequency trust choices (0-9 possible) for pairs of subjects. A trust choice was defined as both subjects receiving 5 points—the B-2 choice.

Column 12 = Game #2 frequency trust choices (0-9 possible) for pairs of subjects. A trust choice was defined as both subjects receiving 5 points—the B-2 choice.

The types of messages were defined and explained as follows:

0 = miscellaneous
1 = competitive
2 = trust

Examples of messages analyzed by the researcher as miscellaneous follow:

"Better luck next time (smile)."
"I don't think Friday will ever come."
"What do you think about the snow today?"
"I hope you have a good day today."
"I wonder what the purpose of this game is."

Examples of messages analyzed by the researcher as competitive follow:
"Are you ready to lose?"
"I sure showed you how this game is played didn't I?"
"I am going to win this time."
"Play consecutively A, B, A, B."
"You are going to have to hustle to catch me in the second game because I am going to play safe."
"The will to win is much stronger than the will to cooperate."

Examples of messages analyzed by the researcher as trust follow:

"Let's both use the positive cards, 2 and B."
"Always play number 2."
"Use card 2 and I'll break the tie."
"Why don't you try a B a lot and I'll do a 2 and we can get more points that way."
"Hold up (2) as much as possible."
"Please always use a B and I will use a 2."

Data Analysis

The statistics used for this study were the analysis of variance and the Scheffé method testing procedure. The one-way analysis of variance was used to test the operational hypotheses one through six. The one-way analysis of variance was also used to test the operational hypothesis two plus a supplementary analysis of the data was made with the Scheffé method testing procedure. A two-way analysis of variance was used to test operational hypothesis three.
CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter will report and discuss the results of the data analysis. The chapter is divided into three sections. The three sections deal with the test of the operational hypotheses for the three theoretical hypotheses. The results of supplementary analysis of data will be reported in the second section, hypothesis two. A summary will conclude each section.

Hypothesis One

Competitiveness between males and females across all three experimental conditions will not be significantly different when subjects play the Prisoner's Dilemma game.

Operational Hypothesis One

No significant difference in competitiveness will be found between males and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means of 114 male total scores with 114 female total scores in Game #1 of the Prisoner's Dilemma game.

Table 1 contains the results of this analysis.
Results of a One-Way Analysis of Variance  
Showing a Comparison of Male and Female  
Means for Total Scores of Game #1

<table>
<thead>
<tr>
<th>Sex</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>114</td>
<td>-1.667</td>
<td>24.13702</td>
<td>226</td>
<td>.0008</td>
<td>.9774</td>
</tr>
<tr>
<td>Female</td>
<td>114</td>
<td>-1.579</td>
<td>22.47236</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of this analysis of variance, having 1 and 226 degrees of freedom, produced an F Value of .0008 and a probability of .9774. The pre-determined probability level of .05 was exceeded; therefore, the results did not show any apparent significant differences between male and female mean scores.

Operational Hypothesis Two

No significant difference in competitiveness will be found among the females when the means for their respective total game scores in Condition A, Condition B₁, and Condition B₂ of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means of 38 female total scores from Condition A with 38 female total scores from Condition B₁ with 38 female total scores from Condition B₂ in Game #1 of the Prisoner's Dilemma game.

Table 2 contains the results of this analysis.
Table 2
Results of a One-Way Analysis of Variance Showing a Comparison of Means of Female Total Game #1 Scores from Condition A, Condition B₁, and Condition B₂

<table>
<thead>
<tr>
<th>Sex and Condition</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female-Cond. A</td>
<td>38</td>
<td>-4.342</td>
<td>21.25047</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female-Cond. B₁</td>
<td>38</td>
<td>4.211</td>
<td>23.06062</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female-Cond. B₂</td>
<td>38</td>
<td>-4.605</td>
<td>22.52271</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of this analysis of variance, having a 2 and 111 degrees of freedom, produced an F Value of 1.924 and a probability of .1509. The pre-determined probability level of .05 was exceeded. Therefore, the results failed to show any significant differences among the female mean scores of the groups who used Condition A, Condition B₁, or Condition B₂.

Operational Hypothesis Three

No significant difference in competitiveness will be found among males when the means for their respective total game scores in Condition A, Condition C₁, and Condition C₂ of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means of 38 male total scores from Condition A with 38 male total scores from Condition C₁ with 38 male total scores from Condition C₂ in Game #1 of the Prisoner's Dilemma game.

Table 3 contains the results of this analysis.
Table 3

Results of a One-Way Analysis of Variance Showing a Comparison of Means of Male Total Game #1 Scores from Condition A, Condition C₁, and Condition C₂

<table>
<thead>
<tr>
<th>Sex and Condition</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male-Cond. A</td>
<td>38</td>
<td>.6579</td>
<td>17.20980</td>
<td>111</td>
<td>1.626</td>
<td>.2013</td>
</tr>
<tr>
<td>Male-Cond. C₁</td>
<td>38</td>
<td>-7.368</td>
<td>23.98594</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male-Cond. C₂</td>
<td>38</td>
<td>1.711</td>
<td>24.33650</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of this analysis of variance, having a 2 and 111 degrees of freedom, produced an F Value of 1.626 and a probability of .2013. The pre-determined probability level of .05 was exceeded. Therefore, the results failed to show any significant differences among the male mean scores of the groups who used Condition A, Condition C₁, or Condition C₂.

Operational Hypothesis Four

No significant difference in competitiveness will be found between males and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means between the 38 paired male and female total scores of Game #1 of the Prisoner's Dilemma game in Condition A.

Table 4 contains the results of this analysis.
Results of a One-Way Analysis of Variance Showing a Comparison of Means of Total Scores in Game #1 between Males and Females in Condition A

<table>
<thead>
<tr>
<th>Sex</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>38</td>
<td>0.6579</td>
<td>17.20980</td>
<td>1</td>
<td>1.270</td>
<td>.2633</td>
</tr>
<tr>
<td>Female</td>
<td>38</td>
<td>-4.342</td>
<td>21.25147</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of this analysis of variance, having a 1 and 74 degrees of freedom, produced an F Value of 1.270 and a probability of .2633. The pre-determined probability level of .05 was exceeded; therefore, the results did not show any significant differences between male and female mean scores in Condition A.

**Operational Hypothesis Five**

No significant difference in competitiveness will be found between females and females when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means between the 38 paired female and female total scores of Game #1 of the Prisoner's Dilemma game in Condition B.

Table 5 contains the results of this analysis.

The results of this analysis of variance having a 1 and 74 degrees of freedom, produced an F Value of 2.842 and a probability of .0960. The
Table 5
Results of a One-Way Analysis of Variance Showing a Comparison of Means between Female and Female Pairs in Condition B

<table>
<thead>
<tr>
<th>Sex</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>38</td>
<td>4.211</td>
<td>23.06062</td>
<td>1</td>
<td>2.842</td>
<td>.0960</td>
</tr>
<tr>
<td>Female</td>
<td>33</td>
<td>-4.605</td>
<td>22.52271</td>
<td>94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pre-determined probability level of .05 was exceeded; therefore, the results did not show any significant differences between female and female mean scores in Condition B.

Operational Hypothesis Six

No significant difference in competitiveness will be found between males and males when the means for their total game scores in Game #1 of the Prisoner's Dilemma game have been analyzed through the application of the analysis of variance statistic.

A one-way analysis of variance was used to test this hypothesis. This one-way analysis of variance compared the means between the 38 paired male and male total scores of Game #1 of the Prisoner's Dilemma game in Condition C.

Table 6 contains the results of this analysis.

The results of this analysis of variance having a 1 and 74 degrees of freedom, produced an F Value of 2.187 and a probability of .1425. The pre-determined probability level of .05 was exceeded; therefore, the results did not show any significant differences between male and male mean scores.
Table 6
Results of a One-Way Analysis of Variance
Showing a Comparison of Means between
Male and Male Pairs in Condition C

<table>
<thead>
<tr>
<th>Sex</th>
<th>Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>38</td>
<td>-7.368</td>
<td>28.98594</td>
<td>1</td>
<td>2.187</td>
<td>.1425</td>
</tr>
<tr>
<td>Male</td>
<td>38</td>
<td>1.711</td>
<td>24.33650</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

scores in Condition C.

Hypothesis One Summary
The statistical results presented in all six operational hypotheses failed to reject the hypothesis that average subject competitiveness scores according to sex in Game #1 across the three experimental conditions would not be significantly different. The results further indicated that males and females show competitiveness with the same sex as well as with the opposite sex, therefore, suggesting that sex is not a variable when subjects are placed in a game situation.

Hypothesis Two
The type of message that is communicated between subjects will influence the building of trust between these subjects.

Hypothesis two is supported if the following operational hypothesis is accepted.

Operational Hypothesis Two
Significant differences between the mean trust choices in Game #1...
and Game #2 will result from the type of message communicated. The means of the trust choices in Game #2 will indicate a decrease when "no trust messages" have been communicated, an increase when a "1-trust message" has been communicated and a high increase when "2-trust messages" have been communicated.

Analysis of the data basic to the second hypothesis was tested through the use of the one-way analysis of variance. This one-way analysis compared the means of paired subjects according to types of messages exchanged between subjects and their frequency of trust choices in Game #1 as compared to their frequency of trust choices in Game #2.

The types of messages cited in Table 7 were defined in the following way:

- **No trust message**—neither of the paired subjects sent a trust message to their partner.
- **1-trust message**—one of the paired subjects sent a trust message to their partner.
- **2-trust message**—both paired subjects sent a trust message to each other.

The frequency of trust choices cited in Table 7 indicate the increase or decrease of trust choice means in Game #2 when compared to the frequency of trust choice means in Game #1. A trust choice was defined in Chapter III as both subjects receiving 5 points—the B-2 choice. There were 9 trials in each game, therefore the possibility of 0-9 trust choices in each game.

The size of the sample in the table is cited by pairs of subjects.

Table 7 contains the results of this analysis.

The results of this analysis of variance, having a 2 and 111 degrees of freedom, produced an $F$ Value of 40.46 and a probability of .0001. The probability level of .0001 did not exceed the established .05 level of
Results of a One-Way Analysis of Variance Showing a Comparison of Types of Messages Communicated and Frequency of Trust Choices

<table>
<thead>
<tr>
<th>Message</th>
<th>Size By Pairs</th>
<th>Frequency</th>
<th>Standard Deviation</th>
<th>Degrees of Freedom</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Trust</td>
<td>41</td>
<td>-.9268</td>
<td>1.539322</td>
<td>111</td>
<td>40.46</td>
<td>.0001</td>
</tr>
<tr>
<td>1-Trust</td>
<td>49</td>
<td>2.184</td>
<td>3.295663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Trust</td>
<td>24</td>
<td>5.000</td>
<td>2.519489</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

significance. The high F Value of 40.46 supported the operational hypothesis which stated that a change in trust choices would occur in Game #2 because a communication message had been exchanged between subjects.

Results cited in the frequency column in Table 7 show that when no trust messages were sent between subjects, trust choices decreased in Game #2. When one trust message was sent between paired subjects, the mean of Game #2 increased by 2.184 more trust choices when compared to Game #1. The most significant results occurred when both subjects sent trust messages. Game #2 showed an increase in the mean score by 5.000 more trust choices having occurred when compared to Game #1.

Further analysis of the data for operational hypothesis two was completed through the use of the Scheffé method testing procedure which is defined as a multiple comparison statistic. The S-Method indicates for the purpose of this study whether the mean of Group 1 differs significantly from the mean of Group 2, or the mean of Group 1 differs significantly from the mean of Group 3, or the mean of Group 2 differs significantly from the mean of Group 3.
In Table 8, Group 1 is defined as the no trust message group. Group 2 is the 1-trust message group and Group 3 is the 2-trust message group.

Table 8 contains the results of this analysis.

Table 8

Results of the Scheffé Multiple Comparison
Showing Differences between Group Means
According to Types of Messages Sent

<table>
<thead>
<tr>
<th>Group</th>
<th>Size by Pairs</th>
<th>Means</th>
<th>Differences Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41</td>
<td>-0.927</td>
<td>Group 1 - 2 = 3.111**</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
<td>2.184</td>
<td>Group 1 - 3 = 5.927**</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>5.000</td>
<td>Group 2 - 3 = 2.816**</td>
</tr>
</tbody>
</table>

**Significant at 1 per cent.

The results of the Scheffé test show that there were significant differences among all three groups. These added findings further support the hypothesis that the type of message sent influences the frequency of trust choices between subjects when playing Game #2 of the Prisoner's Dilemma game.

Hypothesis Two Summary

The statistical evidence presented in the operational hypothesis significantly supported the hypothesis that the frequency of trust choices in Game #1 plus the communication message would result in a change in frequency of trust choices in Game #2 from Game #1.

Hypothesis Three

There will be no significant interaction effects among Condition A,
Condition B, and Condition C and the message variable.

Hypothesis three is supported if the following operational hypothesis is accepted.

**Operational Hypothesis Three**

The _F_ Value as obtained by the analysis of variance will indicate no significant interaction effects between Condition A, Condition B, and Condition C and the message variable.

To test this hypothesis, a two-way analysis of variance was used. This two-way analysis of variance was used to determine if the change in trust choices was due to factor one—the type of communication message sent, factor two—the sex of the paired subjects, or, an interaction effect by both type of message and sex.

Table 9 and Table 10 contains the results of this analysis.

**Table 9**

A Breakdown of Mean Scores According to Message and Sex

<table>
<thead>
<tr>
<th>No Trust</th>
<th>MF (Condition A)</th>
<th>FF (Condition B)</th>
<th>MM (Condition C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size by Pairs</td>
<td>13</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Mean</td>
<td>-.42</td>
<td>-.62</td>
<td>-1.56</td>
</tr>
<tr>
<td>1-Trust</td>
<td>Size by Pairs</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>1.35</td>
<td>2.13</td>
<td>3.06</td>
</tr>
<tr>
<td>2-Trust</td>
<td>Size by Pairs</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Mean</td>
<td>4.56</td>
<td>4.60</td>
<td>6.60</td>
</tr>
</tbody>
</table>
Table 10
Results of a Two-Way Analysis of Variance Showing the F Value and Probability Level

<table>
<thead>
<tr>
<th>Cells</th>
<th>F Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Effect (Message)</td>
<td>41.52</td>
<td>.0001</td>
</tr>
<tr>
<td>Column Effect (Sex)</td>
<td>.60</td>
<td>.5484</td>
</tr>
<tr>
<td>Interaction Effect (Message and Sex)</td>
<td>1.61</td>
<td>.1765</td>
</tr>
</tbody>
</table>

A significant row effect between the type of message sent and the change in the frequency of trust choices in Game #2 was obtained. The analysis produced an F Value of 41.52 and a probability of .0001. The pre-determined probability level of .05 was not exceeded.

Results of the column effect between the sex of the paired subjects and the change in the frequency of trust choices in Game #2 indicated no significant effect because of the sex of the subject. The analysis produced an F Value of .60 and a probability of .5484. The pre-determined probability level of .05 was exceeded.

The interaction effect between sex of the paired subjects and the change in the frequency of trust choices in Game #2 because of the type of message sent was not significant. The analysis of variance produced an F Value of 1.61 and a probability of .1765. The pre-determined level of .05 was exceeded.

Hypothesis Three Summary

The statistical results presented failed to show that there would be a significant interaction effect between Condition A, Condition
B and Condition C and the message variable. The results further indicated that the type of communication message sent between paired subjects in all three message type groups highly influenced their frequency of trust choices in Game #2.
CHAPTER V

SUMMARY, FINDINGS AND CONCLUSIONS

The Problem

The purposes of this study were: (1) to investigate and measure competitiveness between sexes; (2) to analyze the nonverbal message communicated; and, (3) to explore whether trust was increased as a result of the type of message sent.

A review of the related literature on competitiveness and trust produced a general agreement by most writers that a competitive situation necessitates winning or losing. Competition influences and changes the attitudes of participants toward each other, generally in a negative direction. Participants are less likely to communicate with each other while in the competitive situation. Studies of trust revealed that various elements in the communication process influence trust. Trust in others occurs when individuals believe that the other person will perform trustworthy behaviors. Trust involves risk. Without this risk, individuals may never experience trust.

Various studies specifically related to competitiveness between males and females indicated that, in general, males and females tend to show equal competitiveness when they played with partners of the opposite sex. Males and females tended to act differently when playing with a partner of the same sex.

The literature contained evidence that the perception of the sub-
Object's competitiveness or trustworthiness was affected by the communication message. Studies were somewhat limited in this field until the late sixties. Researchers agreed that opportunities for communication facilitate the development of trust but that these favorable effects of communication may be overcome if the other's behavior encourages exploitation or distrust. An increase in communication may result in greater accuracy in perceiving the actions or opinions of others.

**Hypotheses**

The hypotheses investigated by this study were:

1. Competitiveness between males and females across all three experimental conditions will not be significantly different when subjects play the Prisoner's Dilemma game.

2. The type of message that is communicated between subjects will influence the building of trust between these subjects.

3. There will be no significant interaction effect between Condition A, Condition B, and Condition C and the message variable.

**General Design**

Instructors in the Department of Communication Arts and Sciences at Western Michigan University were asked if this researcher could administer the Prisoner's Dilemma game to their Interpersonal Communication classes. The instructors responded positively and arrangements were made that this researcher would administer the instrument during regular class time.

Two hundred and twenty-eight students attending Western Michigan University, Winter term 1976, participated in the experiment. These students were randomly selected into three game conditions. Condition A
was used with 38 males and 38 females. Condition B was used with 38 females and 38 females and Condition C was used with 38 males and 38 males. Subjects were then randomly paired opposite each other.

The Prisoner's Dilemma game, a non-zero-sum mixed-motive game, was the instrument used in this study.

Subjects were instructed to read game directions silently and when ready, to nod to their partner. They then played Game #1 which consisted of nine trials. Scores were then totaled allowing for subjects to see who had won, lost, or tied. Before playing Game #2, subjects were told that they could send a one-sentence nonverbal written message to their partner. These messages were exchanged simultaneously. Following the reading of the message, subjects were instructed to play Game #2. Again subjects totaled their scores when finished with Game #2. Subjects were not allowed to verbalize aloud with their partner during the entire experiment.

The use of this experimental design of the Prisoner's Dilemma game provided for the researcher three sets of data: (1) the total scores of Game #1; (2) the frequency of trust choices in Game #2 as compared with Game #1; and, (3) the interaction effect between Condition A, Condition B, and Condition C and the message variable.

Appropriate statistical techniques were used to analyze the data. Hypothesis one required that the total scores in Game #1 be evaluated in the following ways:

1. One hundred fourteen male mean scores be compared with one hundred fourteen female mean scores.

2. Thirty-eight female mean scores from Condition A, be compared with 38 female mean scores from Condition B, be compared with 38 female mean scores from Condition C.
3. Thirty-eight male mean scores from Condition A be compared with 38 male mean scores from Condition C1 be compared with 38 male mean scores from Condition C2.

4. Thirty-eight male mean scores be compared with 38 female mean scores in Condition A.

5. Thirty-eight female mean scores be compared with 38 female mean scores in Condition B.

6. Thirty-eight male mean scores be compared with 38 male mean scores in Condition C.

Operational hypothesis two required an evaluation of the frequency of trust choices occurring in the nine trials of Game #2 and the analyzing of the message communicated to the frequency of trust choices in Game #1. The means of paired subjects were compared according to the type of message sent. Supplementary analysis of the data was completed to examine whether the means of the message groups differed significantly.

The third operational hypothesis examined whether the effect of the type of message communicated, the sex of the paired subjects and the interaction effect by both type of message and sex determined the change in the frequency of trust choices in Game #2. Again these frequency choices were compared to the frequency choices in Game #1.

Findings

The data analysis testing results of the three hypotheses were presented in Chapter IV. A summarization of the findings follows.

Hypothesis One

A testing of hypothesis one indicated that there were no significant differences between male and female mean scores in Game #1 across all three game conditions. No significant difference in competitiveness was shown when all the male mean scores were compared with all the female mean scores. A comparison of the mean scores of the female total Game #1
scores of Condition A, when compared with the female mean scores of Condition B\textsubscript{1} when compared with the female mean scores of Condition B\textsubscript{2}, showed no significant differences in competitiveness among the female mean scores.

When the male mean scores were compared in the same way, again no significant difference in competitiveness was found among their mean scores.

Results of testing the mean scores of Condition A, Condition B, and Condition C indicated that all three produced no significant differences in mean scores. This evidence indicated that the sex of the subject made no apparent significant difference in competitiveness when playing Game #1 of the Prisoner's Dilemma game.

**Hypothesis Two**

The results from testing the second hypothesis indicated that the frequency of trust choices changed in Game #2 when compared with Game #1 because of the type of communication message exchanged between subjects. This message was exchanged just prior to the playing of Game #2. This significant difference in frequency of trust choices in Game #2 when compared with Game #1 suggested that the content or type of the nonverbal message communicated played an important role in the way subjects chose to play Game #2 of the Prisoner's Dilemma game. These results showed that when "no trust" type of messages were exchanged between subjects their trust choices decreased in Game #2 when compared to Game #1. When a "1-trust" type of message was sent between paired subjects a mean increase of two trust choices occurred in Game #2 when compared to Game #1. The most significant results occurred when both subjects sent trust messages. The frequency of trust choices increased the mean score by five more trust choices in Game #2 when compared with Game #1.
Supplementary Analysis of Hypothesis Two

A further study of the message type groups was completed for the purpose of examining whether there were any significant differences between the means of groups 1, 2, and 3. Results indicated: (1) that the mean of Group 1 differed significantly from the mean of Group 2; (2) that the mean of Group 1 differed significantly from the mean of Group 3; and, (3) that the mean of Group 2 differed significantly from the mean of Group 3.

These added findings reinforce the hypothesis that the content or type of message sent significantly influences the frequency of trust choices between subjects when playing Game #2 of the Prisoner's Dilemma game.

Hypothesis Three

The findings which resulted from testing hypothesis three indicated that there was no significant interaction effect between Condition A, Condition B, and Condition C and the message variable. These results indicated: (1) that there was a significant effect in the frequency of trust choices in Game #2 when compared with Game #1 because of the content or type of nonverbal message communicated between paired subjects; (2) that there was no significant effect between the sex of the paired subjects and the change in the frequency of trust choices in Game #2 when compared with Game #1; and, (3) that there was also no significant interaction effect between the sex of the paired subjects and the change in frequency of trust choices in Game #2 when compared with Game #1 because of the content or type of nonverbal message communicated.

Conclusions

The empirical data from this study produced three initial conclusions: (1) that the sex of students attending Western Michigan
University makes no significant difference in their desire to compete with each other; (2) that the content or type of message communicated between students increased or decreased trust between these same students; and, (3) that the sex of the student sending the message had no significant effect upon the increase or decrease in trust between these same students.

This study suggests that male and female students are basically competitive and that the sex of the student does not change this desire to compete. Studies by Wiley (1968), Vinacke (1969), and Marwell and Schmitt (1975) support these findings. Results of this study confirm reports that women today are not threatened by a masculine-oriented competitive society. Female students did not take the submissive role when playing against the males but seemed to perceive themselves as capable of being as competitive as their male counterparts.

A possible reason for the highly competitive results in Game #1 may also be due to the fact that students could not communicate with each other before and throughout the game. Terhune (1968) concluded that when the opportunity for communication does not occur, competitiveness is heightened. Another reason may have been that an initial reaction to any game situation is that someone must win or lose although if students had read the game instructions thoroughly this was clearly not stated.

The second section of the study investigated the effect communication would have upon the increase or decrease of trust among students. The author agrees with Sereno and Bodaken (1975) when they state that "trust is an interpersonal communication factor consisting of feelings that the other person will not take advantage of you and has your concerns at heart; crucial to the development of meaningful intimate communication (p. 192)."
This researcher concludes, on the basis of the data analysis, that when communication took place between students, this communication increased or decreased the trust variable among these students. Of greater importance to this study were the findings regarding the type of message being communicated. These findings indicated that just the opportunity to communicate with another student did not mean that trust would increase or even occur; therefore, the content of the message communicated became the important variable in this study.

The results of the data showed that when students did not include trust in their communication message, their trust of each other decreased while if one of the students communicated a trust message, their trust of each other showed an increase. When both students communicated a trust message, trust increased significantly. These findings support the author's conclusions that the opportunity for communication among students is necessary if trust is to be increased among these same students. The content of that communication then determines the increase or decrease of trust between these same students. Loomis (1959), Berlo (1960), Terhune (1968), and Doolittle (1976) found similar results in their studies of the effect of communication in increasing or decreasing trust between persons.

Further support for the third hypothesis was indicated by the results of data investigating the effect sex may have had on the increase or decrease of trust between students. This researcher could not find other related studies comparing the relationship of sex and the effect the communication message had upon increasing or decreasing trust. Thus the final conclusions were drawn supporting the third hypothesis. The sex of the student sending or receiving the communication message did not effect
the increase or decrease of trust but the content of the message communicated significantly effected the increase or decrease of trust.

This study seems to confirm the author's belief that competition is a basic behavior in students on Western Michigan University's campus. Today's student, male and female, realizes that jobs are scarce, education is expensive and therefore one must compete to prove self-identity and self-worth. Yet, when these same students have an opportunity to communicate their feelings, ideas, and intentions they will be more enabled to make decisions and to live lives based on mutual trust. It is this mutual trust which will provide the atmosphere necessary for students to face the complex tasks of the human enterprise.
APPENDIX A

Date: December 19, 1976
To: Instructors of Interpersonal Communications 170
From: Shirley A. Van Hoeven
Regarding: Prisoner's Dilemma game

I have received the "go ahead" sign from my doctoral committee to run the data, January 12-16, 1976. Thanks to you the dissertation is now possible. We talked in October about my using your Interpersonal Communication 170 classes to play the Prisoner's Dilemma game. I hope that you are still with me on this verbal agreement.

The Prisoner's Dilemma game should take about 40 to 50 minutes to administer to your class. I will administer the game.

I need the following information from each of you the first week of Winter term:

1. Size of class ___________________________.
2. Number of males and females ________________.
3. Class meeting time _________________.
4. Classroom number _____________________.

When I receive this information, I will let you know when I will administer the game.

Thanks so much for your support.

Shirley A. Van Hoeven
APPENDIX B

THE GAME

OBJECT: The object of the game is for each person to maximize one's positive score.

RULES

1. Each will get two cards. One set of two cards will have a "1" and "2" on them; the second set will have an "A" and "B" on them.

2. With each trial, the players will simultaneously hold up one of his/her cards. That is, one player will hold up either "1" or "2" and the other player will hold up either "A" or "B".

3. Each player should independently determine which strategy will best maximize one's positive score. Players should not indicate which card is going to be held up until the trial begins.

4. If Player 1,2 holds up "1" and Player A,B holds up "A", then record the scores listed in box 1A. In this instance, both players lose 5 points.

   If Player 1,2 holds up "2" and Player A,B holds up "A", then record the scores listed in box 2A. In this instance, Player 1,2 loses 10 points and Player A,B gains 10 points.

   If Player 1,2 holds up "1" and Player A,B holds up "B", then record the scores listed in box 1B. In this instance, Player 1,2 gains 10 points and Player A,B loses 10 points.

   If Player 1,2 holds up "2" and Player A,B holds up "B", then record the scores listed in box 2B. In this instance, both players would gain 5 points.

5. After each trial, record the appropriate scores in the tables. There will be 9 trials within each game. You will play 2 games.

6. Please do not talk to your partner at any time during the game.

7. After you finish each game, wait for further instructions.
THE GAME

The following squares list the scores each player will receive:

**PLAYER 1,2**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Player 1,2 = -5</td>
<td>Player 1,2 = -10</td>
</tr>
<tr>
<td></td>
<td>Player A,B = -5</td>
<td>Player A,B = +10</td>
</tr>
<tr>
<td>B</td>
<td>Player 1,2 = +10</td>
<td>Player 1,2 = +5</td>
</tr>
<tr>
<td></td>
<td>Player A,B = -10</td>
<td>Player A,B = +5</td>
</tr>
</tbody>
</table>

**PLAYER A,B**

**GAME #1**

<table>
<thead>
<tr>
<th>(1,2)</th>
<th>(A,B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
</tbody>
</table>

**GAME #2**

<table>
<thead>
<tr>
<th>(1,2)</th>
<th>(A,B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>TOTAL</td>
</tr>
</tbody>
</table>
REFERENCES


Deutsch, M. A. Theory of cooperation and competition. Human Relations, 1949, 2, 129-152.


66


Loomis, J. L. Communication, the development of trust and cooperative behavior. *Human Relations*, 1959, 12, 305-315.


Rapoport, A. & Chammah, A. M. Sex differences in factors contributing to
the level of cooperation in the prisoner's dilemma game. Journal of

Rapoport, A. Formal games as probing tools for investigating behavior
motivated by trust and suspicion. Mental Health Research Institute,
University of Michigan, December 1962. Reported in Women Today,
March 17, 1975, 5, no. 6, 35-36.

Rothwell, J. D. & Costigan, J. I. Interpersonal communication. Columbus,
Ohio: Charles E. Merrill, 1975.

Ryan, E. D. & Lakie, W. L. Competitive and noncompetitive performance in
relation to achievement, motive and manifest anxiety. Journal of

Scadel, A., Minar, J. S., Ratoosh, P. & Lipetz, M. Some descriptive
aspects of two-person non-zero-sum games. Journal of Conflict

Schelling, T. C. The strategy of conflict. Cambridge: Harvard University

Serenko, K. K. & Bodaken, E. M. Trans-per understanding human communication.

Sullivan, H. S. The interpersonal theory of psychiatry. New York: Norton,
1953.


Terhune, K. W. Motives, situation, and interpersonal conflict within the
prisoner's dilemma. Journal of Personality and Social Psychology,

Vinacky, W. E. Variables in experimental games: toward a field theory.

Wiley, M. G. M. Sex differences in cooperation and competition. Ann Arbor,

Wilson, K. V. & Bixenstine, V. E. Forms of social control in two-person,

Wrightsman, L. S. Personality and attitudinal correlates of trusting and
trustworthy behaviors in a two-person game. Journal of Personality